

My life and work

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MY LIFE AND WORK



Henry Ford

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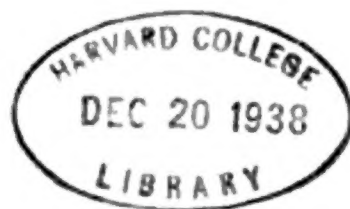
By HENRY FORD



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MY LIFE AND WORK

INTRODUCTION

WHAT IS THE IDEA?

WE HAVE only started on our development of our country—we have not as yet, with all our talk of wonderful progress, done more than scratch the surface. The progress has been wonderful enough—but when we compare what we have done with what there is to do, then our past accomplishments are as nothing. When we consider that more power is used merely in ploughing the soil than is used in all the industrial establishments of the country put together, an inkling comes of how much opportunity there is ahead. And now, with so many countries of the world in ferment and with so much unrest everywhere, is an excellent time to suggest something of the things that may be done—in the light of what has been done.

When one speaks of increasing power, machinery, and industry there comes up a picture of a cold, metallic sort of world in which great factories will drive away the trees, the flowers, the birds, and the green fields. And that then we shall have a world composed of metal machines and human machines. With all of that I do not agree. 'I think that unless we know more about machines and their use, unless we better understand the mechanical portion of life, we cannot have the time to enjoy the trees, and the birds, and the flowers, and the green fields.'

I think that we have already done too much toward

banishing the pleasant things from life by thinking that there is some opposition between living and providing the means of living. We waste so much time and energy that we have little left over in which to enjoy ourselves. Power and machinery, money and goods, are useful only as they set us free to live. They are but means to an end. For instance, I do not consider the machines which bear my name simply as machines. If that was all there was to it I would do something else. I take them as concrete evidence of the working out of a theory of business which I hope is something more than a theory of business—a theory that looks toward making this world a better place in which to live. The fact that the commercial success of the Ford Motor Company has been most unusual is important only because it serves to demonstrate, in a way which no one can fail to understand, that the theory to date is right. Considered solely in this light I can criticize the prevailing system of industry and the organization of money and society from the standpoint of one who has not been beaten by them.

As things are now organized, I could, were I thinking only selfishly, ask for no change. If I merely want money the present system is all right; it gives money in plenty to me. But I am thinking of service. The present system does not permit of the best service because it encourages every kind of waste—it keeps many men from getting the full return from service. And it is going nowhere. It is all a matter of better planning and adjustment.

I have no quarrel with the general attitude of scoffing at new ideas. It is better to be skeptical of all new ideas and to insist upon being shown rather than to rush around in a continuous brainstorm after every new idea. Skepticism, if by that we mean cautiousness, is the balance wheel of civilization. Most of the present acute troubles

of the world arise out of taking on new ideas without first carefully investigating to discover if they are good ideas. An idea is not necessarily good because it is old, or necessarily bad because it is new, but if an old idea works, then the weight of the evidence is all in its favour. Ideas are of themselves extraordinarily valuable, but an idea is just an idea. Almost any one can think up an idea. The thing that counts is developing it into a practical product.

I am now most interested in fully demonstrating that the ideas we have put into practice are capable of the largest application—that they have nothing peculiarly to do with motor cars or tractors but form something in the nature of a universal code. I am quite certain that it is the natural code and I want to demonstrate it so thoroughly that it will be accepted, not as a new idea, but as a natural code.

The natural thing to do is to work—to recognize that prosperity and happiness can be obtained only through honest effort. Human ills flow largely from attempting to escape from this natural course. I have no suggestion which goes beyond accepting in its fullest this principle of nature. I take it for granted that we must work. All that we have done comes as the result of a certain insistence that since we must work it is better to work intelligently and forehandedly; that the better we do our work the better off we shall be. All of which I conceive to be merely elemental common sense.

I am not a reformer. I think there is entirely too much attempt at reforming in the world and that we pay too much attention to reformers. We have two kinds of reformers. Both are nuisances. The man who calls himself a reformer wants to smash things. He is the sort of man who would tear up a whole shirt because the collar button did not fit the buttonhole. It would never occur to him to enlarge the buttonhole. This sort of re-

former never under any circumstances knows what he is doing. Experience and reform do not go together. A reformer cannot keep his zeal at white heat in the presence of a fact. He must discard all facts.

Since 1914 a great many persons have received brand-new intellectual outfits. Many are beginning to think for the first time. They opened their eyes and realized that they were in the world. Then, with a thrill of independence, they realized that they could look at the world critically. They did so and found it faulty. The intoxication of assuming the masterful position of a critic of the social system—which it is every man's right to assume—is unbalancing at first. The very young critic is very much unbalanced. He is strongly in favour of wiping out the old order and starting a new one. They actually managed to start a new world in Russia. It is there that the work of the world makers can best be studied. We learn from Russia that it is the minority and not the majority who determine destructive action. We learn also that while men may decree social laws in conflict with natural laws, Nature vetoes those laws more ruthlessly than did the Czars. Nature has vetoed the whole Soviet Republic. For it sought to deny Nature. It denied above all else the right to the fruits of labour. Some people say, "Russia will have to go to work," but that does not describe the case. The fact is that poor Russia is at work, but her work counts for nothing. It is not free work. In the United States a workman works eight hours a day; in Russia, he works twelve to fourteen. In the United States, if a workman wishes to lay off a day or a week, and is able to afford it, there is nothing to prevent him. In Russia, under Sovietism, the workman goes to work whether he wants to or not. The freedom of the citizen has disappeared in the discipline of a prison-like monotony in which all are treated alike. That is

slavery. Freedom is the right to work a decent length of time and to get a decent living for doing so; to be able to arrange the little personal details of one's own life. It is the aggregate of these and many other items of freedom which makes up the great idealistic Freedom. The minor forms of Freedom lubricate the everyday life of all of us.

Russia could not get along without intelligence and experience. As soon as she began to run her factories by committees, they went to rack and ruin; there was more debate than production. As soon as they threw out the skilled man, thousands of tons of precious materials were spoiled. The fanatics talked the people into starvation. The Soviets are now offering the engineers, the administrators, the foremen and superintendents, whom at first they drove out, large sums of money if only they will come back. Bolshevism is now crying for the brains and experience which it yesterday treated so ruthlessly. All that "reform" did to Russia was to block production.

There is in this country a sinister element that desires to creep in between the men who work with their hands and the men who think and plan for the men who work with their hands. The same influence that drove the brains, experience, and ability out of Russia is busily engaged in raising prejudice here. We must not suffer the stranger, the destroyer, the hater of happy humanity, to divide our people. In unity is American strength—and freedom.

On the other hand, we have a different kind of reformer who never calls himself one. He is singularly like the radical reformer. The radical has had no experience and does not want it. The other class of reformer has had plenty of experience but it does him no good. I refer to the reactionary—who will be surprised to find himself put in exactly the same class as the Bolshevik. He wants to go back to some previous condition, not because it was

the best condition, but because he thinks he knows about that condition.

The one crowd wants to smash up the whole world in order to make a better one. The other holds the world as so good that it might well be let stand as it is—and decay. The second notion arises as does the first—out of not using the eyes to see with. It is perfectly possible to smash this world, but it is not possible to build a new one. It is possible to prevent the world from going forward, but it is not possible then to prevent it from going back—from decaying. It is foolish to expect that, if everything be overturned, everyone will thereby get three meals a day. Or, should everything be petrified, that thereby six per cent. interest may be paid. The trouble is that reformers and reactionaries alike get away from the realities—from the primary functions.

One of the counsels of caution is to be very certain that we do not mistake a reactionary turn for a return of common sense. We have passed through a period of fireworks of every description, and the making of a great many idealistic maps of progress. We did not get anywhere. It was a convention, not a march. Lovely things were said, but when we got home we found the furnace out. Reactionaries have frequently taken advantage of the recoil from such a period, and they have promised “the good old times”—which usually means the bad old abuses—and because they are perfectly void of vision they are sometimes regarded as “practical men.” Their return to power is often hailed as the return of common sense.

The primary functions are agriculture, manufacture, and transportation. Community life is impossible without them. They hold the world together. Raising things, making things, and carrying things are as primitive as human need and yet as modern as anything

can be. They are of the essence of physical life. When they cease, community life ceases. Things do get out of shape in this present world under the present system, but we may hope for a betterment if the foundations stand sure. The great delusion is that one may change the foundation—usurp the part of destiny in the social process. The foundations of society are the men and means to *grow* things, to *make* things, and to *carry* things. As long as agriculture, manufacture, and transportation survive, the world can survive any economic or social change. As we serve our jobs we serve the world.

There is plenty of work to do. Business is merely work. Speculation in things already produced—that is not business. It is just more or less respectable graft. But it cannot be legislated out of existence. Laws can do very little. Law never does anything constructive. It can never be more than a policeman, and so it is a waste of time to look to our state capitals or to Washington to do that which law was not designed to do. As long as we look to legislation to cure poverty or to abolish special privilege we are going to see poverty spread and special privilege grow. We have had enough of looking to Washington and we have had enough of legislators—not so much, however, in this as in other countries—promising laws to do that which laws cannot do.

When you get a whole country—as did ours—thinking that Washington is a sort of heaven and behind its clouds dwell omniscience and omnipotence, you are educating that country into a dependent state of mind which augurs ill for the future. Our help does not come from Washington, but from ourselves; our help may, however, go to Washington as a sort of central distribution point where all our efforts are coördinated for the general good. We may help the Government; the Government cannot help us.

The slogan of "less government in business and more business in government" is a very good one, not mainly on account of business or government, but on account of the people. Business is not the reason why the United States was founded. The Declaration of Independence is not a business charter, nor is the Constitution of the United States a commercial schedule. The United States—its land, people, government, and business—are but methods by which the life of the people is made worth while. The Government is a servant and never should be anything but a servant. The moment the people become adjuncts to government, then the law of retribution begins to work, for such a relation is unnatural, immoral, and inhuman. We cannot live without business and we cannot live without government. Business and government are necessary as servants, like water and grain; as masters they overturn the natural order.

The welfare of the country is squarely up to us as individuals. That is where it should be and that is where it is safest. Governments can promise something for nothing but they cannot deliver. They can juggle the currencies as they did in Europe (and as bankers the world over do, as long as they can get the benefit of the juggling) with a patter of solemn nonsense. But it is work and work alone that can continue to deliver the goods—and that, down in his heart, is what every man knows.

There is little chance of an intelligent people, such as ours, ruining the fundamental processes of economic life. Most men know they cannot get something for nothing. Most men feel—even if they do not know—that money is not wealth. The ordinary theories which promise everything to everybody, and demand nothing from anybody, are promptly denied by the instincts of the ordinary man, even when he does not find reasons against them. He *knows* they are wrong. That is enough. The present

order, always clumsy, often stupid, and in many ways imperfect, has this advantage over any other—it works. Doubtless our order will merge by degrees into another, and the new one will also work—but not so much by reason of what it is as by reason of what men will bring into it. The reason why Bolshevism did not work, and cannot work, is not economic. It does not matter whether industry is privately managed or socially controlled; it does not matter whether you call the workers share “wages” or “dividends”; it does not matter whether you regimentalize the people as to food, clothing, and shelter, or whether you allow them to eat, dress, and live as they like. Those are mere matters of detail. The incapacity of the Bolshevist leaders is indicated by the fuss they made over such details. Bolshevism failed because it was both unnatural and immoral. Our system stands. Is it wrong? Of course it is wrong, at a thousand points! Is it clumsy?—of course it is clumsy. By all right and reason it ought to break down. But it does not—because it is instinct with certain economic and moral fundamentals.

The economic fundamental is labour. Labour is the human element which makes the fruitful seasons of the earth useful to men. It is men’s labour that makes the harvest what it is. That is the economic fundamental: every one of us is working with material which we did not and could not create, but which was presented to us by Nature.

The moral fundamental is man’s right in his labour. This is variously stated. It is sometimes called “the right of property.” It is sometimes masked in the command, “Thou shalt not steal.” It is the other man’s right in his property that makes stealing a crime. When a man has earned his bread, he has a right to that bread. If another steals it, he does more than steal bread; he invades a sacred human right.

If we cannot produce we cannot have—but some say if we produce it is only for the capitalists. Capitalists who become such because they provide better means of production are of the foundation of society. They have really nothing of their own. They merely manage property for the benefit of others. Capitalists who become such through trading in money are a temporarily necessary evil. They may not be evil at all if their money goes to production. If their money goes to complicating distribution—to raising barriers between the producer and the consumer—then they are evil capitalists and they will pass away when money is better adjusted to work; and money will become better adjusted to work when it is fully realized that through work and work alone may health, wealth, and happiness inevitably be secured.

There is no reason why a man who is willing to work should not be able to work and to receive the full value of his work. There is equally no reason why a man who can but will not work should not receive the full value of his services to the community. He should most certainly be permitted to take away from the community an equivalent of what he contributes to it. If he contributes nothing he should take away nothing. He should have the freedom of starvation. We are not getting anywhere when we insist that every man ought to have more than he deserves to have—just because some do get more than they deserve to have.

There can be no greater absurdity and no greater disservice to humanity in general than to insist that all men are equal. Most certainly all men are not equal, and any democratic conception which strives to make men equal is only an effort to block progress. Men cannot be of equal service. The men of larger ability are less numerous than the men of smaller ability; it is possible for a mass of the smaller men to pull the larger ones down—but in so

doing they pull themselves down. It is the larger men who give the leadership to the community and enable the smaller men to live with less effort.

The conception of democracy which names a levelling-down of ability makes for waste. No two things in nature are alike. We build our cars absolutely interchangeable. All parts are as nearly alike as chemical analysis, the finest machinery, and the finest workmanship can make them. No fitting of any kind is required, and it would certainly seem that two Fords standing side by side, looking exactly alike and made so exactly alike that any part could be taken out of one and put into the other, would be alike. But they are not. They will have different road habits. We have men who have driven hundreds, and in some cases thousands, of Fords and they say that no two ever act precisely the same—that, if they should drive a new car for an hour or even less and then the car were mixed with a bunch of other new ones, also each driven for a single hour and under the same conditions, that although they could not recognize the car they had been driving merely by looking at it, they could do so by driving it.

I have been speaking in general terms. Let us be more concrete. A man ought to be able to live on a scale commensurate with the service that he renders. This is rather a good time to talk about this point, for we have recently been through a period when the rendering of service was the last thing that most people thought of. We were getting to a place where no one cared about costs or service. Orders came without effort. Whereas once it was the customer who favoured the merchant by dealing with him, conditions changed until it was the merchant who favoured the customer by selling to him. That is bad for business. Monopoly is bad for business. Profiteering is bad for business. The lack of necessity to

hustle is bad for business. Business is never as healthy as when, like a chicken, it must do a certain amount of scratching for what it gets. Things were coming too easily. There was a let-down of the principle that an honest relation ought to obtain between values and prices. The public no longer had to be "catered to." There was even a "public be damned" attitude in many places. It was intensely bad for business. Some men called that abnormal condition "prosperity." It was not prosperity—it was just a needless money chase. Money chasing is not business.

It is very easy, unless one keeps a plan thoroughly in mind, to get burdened with money and then, in an effort to make more money, to forget all about selling to the people what they want. Business on a money-making basis is most insecure. It is a touch-and-go affair, moving irregularly, and rarely over a term of years amounting to much. It is the function of business to produce for consumption and not for money or speculation. Producing for consumption implies that the quality of the article produced will be high and that the price will be low—that the article be one which serves the people and not merely the producer. If the money feature is twisted out of its proper perspective, then the production will be twisted to serve the producer.

The producer depends for his prosperity upon serving the people. He may get by for a while serving himself, but if he does, it will be purely accidental, and when the people wake up to the fact that they are not being served, the end of that producer is in sight. During the boom period the larger effort of production was to serve itself and hence, the moment the people woke up, many producers went to smash. They said that they had entered into a "period of depression." Really they had not. They were simply trying to pit nonsense against sense—

which is something that cannot successfully be done. Being greedy for money is the surest way not to get it, but when one serves for the sake of service—for the satisfaction of doing that which one believes to be right—then money abundantly takes care of itself.

Money comes naturally as the result of service. And it is absolutely necessary to have money. But we do not want to forget that the end of money is not ease but the opportunity to perform more service. In my mind nothing is more abhorrent than a life of ease. None of us has any right to ease. There is no place in civilization for the idler. Any scheme looking to abolishing money is only making affairs more complex, for we must have a measure. That our present system of money is a satisfactory basis for exchange is a matter of grave doubt. That is a question which I shall talk of in a subsequent chapter. The gist of my objection to the present monetary system is that it tends to become a thing of itself and to block instead of facilitate production.

My effort is in the direction of simplicity. People in general have so little and it costs so much to buy even the barest necessities (let alone that share of the luxuries to which I think everyone is entitled) because nearly everything that we make is much more complex than it needs to be. Our clothing, our food, our household furnishings—all could be much simpler than they now are and at the same time be better looking. Things in past ages were made in certain ways and makers since then have just followed.

I do not mean that we should adopt freak styles. There is no necessity for that. Clothing need not be a bag with a hole cut in it. That might be easy to make but it would be inconvenient to wear. A blanket does not require much tailoring, but none of us could get much work done if we went around Indian-fashion in blankets. Real

simplicity means that which gives the very best service and is the most convenient in use. The trouble with drastic reforms is they always insist that a man be made over in order to use certain designed articles. I think that dress reform for women—which seems to mean ugly clothes—must always originate with plain women who want to make everyone else look plain. That is not the right process. Start with an article that suits and then study to find some way of eliminating the entirely useless parts. This applies to everything—a shoe, a dress, a house, a piece of machinery, a railroad, a steamship, an airplane. As we cut out useless parts and simplify necessary ones we also cut down the cost of making. This is simple logic, but oddly enough the ordinary process starts with a cheapening of the manufacturing instead of with a simplifying of the article. The start ought to be with the article. First we ought to find whether it is as well made as it should be—does it give the best possible service? Then—are the materials the best or merely the most expensive? Then—can its complexity and weight be cut down? And so on.

There is no more sense in having extra weight in an article than there is in the cockade on a coachman's hat. In fact, there is not as much. For the cockade may help the coachman to identify his hat while the extra weight means only a waste of strength. I cannot imagine where the delusion that weight means strength came from. It is all well enough in a pile-driver, but why move a heavy weight if we are not going to hit anything with it? In transportation why put extra weight in a machine? Why not add it to the load that the machine is designed to carry? Fat men cannot run as fast as thin men but we build most of our vehicles as though dead-weight fat increased speed! A deal of poverty grows out of the carriage of excess weight.

Some day we shall discover how further to eliminate weight. Take wood, for example. For certain purposes wood is now the best substance we know, but wood is extremely wasteful. The wood in a Ford car contains thirty pounds of water. There must be some way of doing better than that. There must be some method by which we can gain the same strength and elasticity without having to lug useless weight. And so through a thousand processes.

The farmer makes too complex an affair out of his daily work. I believe that the average farmer puts to a really useful purpose only about 5 per cent. of the energy that he spends. If any one ever equipped a factory in the style, say, the average farm is fitted out, the place would be cluttered with men. The worst factory in Europe is hardly as bad as the average farm barn. Power is utilized to the least possible degree. Not only is everything done by hand, but seldom is a thought given to logical arrangement. A farmer doing his chores will walk up and down a rickety ladder a dozen times. He will carry water for years instead of putting in a few lengths of pipe. His whole idea, when there is extra work to do, is to hire extra men. He thinks of putting money into improvements as an expense. Farm products at their lowest prices are dearer than they ought to be. Farm profits at their highest are lower than they ought to be. It is waste motion—waste effort—that makes farm prices high and profits low.

On my own farm at Dearborn we do everything by machinery. We have eliminated a great number of wastes, but we have not as yet touched on real economy. We have not yet been able to put in five or ten years of intense night-and-day study to discover what really ought to be done. We have left more undone than we have done. Yet at no time—no matter what the value of crops—have we failed to turn a first-class profit. We are not farmers—we are industrialists on the farm. The

moment the farmer considers himself as an industrialist, with a horror of waste either in material or in men, then we are going to have farm products so low-priced that all will have enough to eat, and the profits will be so satisfactory that farming will be considered as among the least hazardous and most profitable of occupations.

Lack of knowledge of what is going on and lack of knowledge of what the job really is and the best way of doing it are the reasons why farming is thought not to pay. Nothing could pay the way farming is conducted. The farmer follows luck and his forefathers. He does not know how economically to produce, and he does not know how to market. A manufacturer who knew how neither to produce nor to market would not long stay in business. That the farmer can stay on shows how wonderfully profitable farming can be.

The way to attain low-priced, high-volume production in the factory or on the farm—and low-priced, high-volume production means plenty for everyone—is quite simple. The trouble is that the general tendency is to complicate very simple affairs. Take, for an instance, an “improvement.”

When we talk about improvements usually we have in mind some change in a product. An “improved” product is one that has been changed. That is not my idea. I do not believe in starting to make until I have discovered the best possible thing. This, of course, does not mean that a product should never be changed, but I think that it will be found more economical in the end not even to try to produce an article until you have fully satisfied yourself that utility, design, and material are the best. If your researches do not give you that confidence, then keep right on searching until you find confidence. The place to start manufacturing is with the article. The factory, the organization, the selling, and the financial plans will

shape themselves to the article. You will have a cutting edge on your business chisel and in the end you will save time. Rushing into manufacturing without being certain of the product is the unrecognized cause of many business failures. People seem to think that the big thing is the factory or the store or the financial backing or the management. The big thing is the product, and any hurry in getting into fabrication before designs are completed is just so much waste time. I spent twelve years before I had a Model T—which is what is known to-day as the Ford car—that suited me. We did not attempt to go into real production until we had a real product. That product has not been essentially changed.

We are constantly experimenting with new ideas. If you travel the roads in the neighbourhood of Dearborn you can find all sorts of models of Ford cars. They are experimental cars—they are not new models. I do not believe in letting any good idea get by me, but I will not quickly decide whether an idea is good or bad. If an idea seems good or seems even to have possibilities, I believe in doing whatever is necessary to test out the idea from every angle. But testing out the idea is something very different from making a change in the car. Where most manufacturers find themselves quicker to make a change in the product than in the method of manufacturing—we follow exactly the opposite course.

Our big changes have been in methods of manufacturing. They never stand still. I believe that there is hardly a single operation in the making of our car that is the same as when we made our first car of the present model. That is why we make them so cheaply. The few changes that have been made in the car have been in the direction of convenience in use or where we found that a change in design might give added strength. The materials in the car change as we learn more and more about

materials. Also we do not want to be held up in production or have the expense of production increased by any possible shortage in a particular material, so we have for most parts worked out substitute materials. Vanadium steel, for instance, is our principal steel. With it we can get the greatest strength with the least weight, but it would not be good business to let our whole future depend upon being able to get vanadium steel. We have worked out a substitute. All our steels are special, but for every one of them we have at least one, and sometimes several, fully proved and tested substitutes. And so on through all of our materials and likewise with our parts. In the beginning we made very few of our parts and none of our motors. Now we make all our motors and most of our parts because we find it cheaper to do so. But also we aim to make some of every part so that we cannot be caught in any market emergency or be crippled by some outside manufacturer being unable to fill his orders. The prices on glass were run up outrageously high during the war; we are among the largest users of glass in the country. Now we are putting up our own glass factory. If we had devoted all of this energy to making changes in the product we should be nowhere; but by not changing the product we are able to give our energy to the improvement of the making.

The principal part of a chisel is the cutting edge. If there is a single principle on which our business rests it is that. It makes no difference how finely made a chisel is or what splendid steel it has in it or how well it is forged—if it has no cutting edge it is not a chisel. It is just a piece of metal. All of which being translated means that it is what a thing does—not what it is supposed to do—that matters. What is the use of putting a tremendous force behind a blunt chisel if a light blow on a sharp chisel will do the work? The chisel is there to cut, not to be ham-

mered. The hammering is only incidental to the job. So if we want to work why not concentrate on the work and do it in the quickest possible fashion? The cutting edge of merchandising is the point where the product touches the consumer. An unsatisfactory product is one that has a dull cutting edge. A lot of waste effort is needed to put it through. The cutting edge of a factory is the man and the machine on the job. If the man is not right the machine cannot be; if the machine is not right the man cannot be. For any one to be required to use more force than is absolutely necessary for the job in hand is waste.

The essence of my idea then is that waste and greed block the delivery of true service. Both waste and greed are unnecessary. Waste is due largely to not understanding what one does, or being careless in the doing of it. Greed is merely a species of nearsightedness. I have striven toward manufacturing with a minimum of waste, both of materials and of human effort, and then toward distribution at a minimum of profit, depending for the total profit upon the volume of distribution. In the process of manufacturing I want to distribute the maximum of wage—that is, the maximum of buying power. Since also this makes for a minimum cost and we sell at a minimum profit, we can distribute a product in consonance with buying power. Thus everyone who is connected with us—either as a manager, worker, or purchaser—is the better for our existence. The institution that we have erected is performing a service. That is the only reason I have for talking about it. The principles of that service are these:

1. An absence of fear of the future and of veneration for the past. One who fears the future, who fears failure, limits his activities. Failure is only the opportunity more intelligently to begin again. There is no disgrace in

honest failure; there is disgrace in fearing to fail. What is past is useful only as it suggests ways and means for progress.

2. A disregard of competition. • Whoever does a thing best ought to be the one to do it. • It is criminal to try to get business away from another man—criminal because one is then trying to lower for personal gain the condition of one's fellow man—to rule by force instead of by intelligence.

3. The putting of service before profit. Without a profit, business cannot extend. There is nothing inherently wrong about making a profit. Well-conducted business enterprise cannot fail to return a profit, but profit must and inevitably will come as a reward for good service. It cannot be the basis—it must be the result of service.

4. Manufacturing is not buying low and selling high. It is the process of buying materials fairly and, with the smallest possible addition of cost, transforming those materials into a consumable product and giving it to the consumer. Gambling, speculating, and sharp dealing, tend only to clog this progression.

How all of this arose, how it has worked out, and how it applies generally are the subjects of these chapters.

CHAPTER I

THE BEGINNING OF BUSINESS

ON MAY 31, 1921, the Ford Motor Company turned out Car No. 5,000,000. It is out in my museum along with the gasoline buggy that I began work on thirty years before and which first ran satisfactorily along in the spring of 1893. I was running it when the bobolinks came to Dearborn and they always come on April 2nd. There is all the difference in the world in the appearance of the two vehicles and almost as much difference in construction and materials, but in fundamentals the two are curiously alike—except that the old buggy has on it a few wrinkles that we have not yet quite adopted in our modern car. For that first car or buggy, even though it had but two cylinders, would make twenty miles an hour and run sixty miles on the three gallons of gas the little tank held and is as good to-day as the day it was built. The development in methods of manufacture and in materials has been greater than the development in basic design. The whole design has been refined; the present Ford car, which is the "Model T," has four cylinders and a self starter—it is in every way a more convenient and an easier riding car. It is simpler than the first car. But almost every point in it may be found also in the first car. The changes have been brought about through experience in the making and not through any change in the basic principle—which I take to be an important fact demonstrating that, given a good idea to start with, it is better to concentrate on perfecting it than to hunt

around for a new idea.* One idea at a time is about as much as any one can handle.

It was life on the farm that drove me into devising ways and means to better transportation. I was born on July 30, 1863, on a farm at Dearborn, Michigan, and my earliest recollection is that, considering the results, there was too much work on the place. That is the way I still feel about farming. There is a legend that my parents were very poor and that the early days were hard ones. Certainly they were not rich, but neither were they poor. As Michigan farmers went, we were prosperous. The house in which I was born is still standing, and it and the farm are part of my present holding.

There was too much hard hand labour on our own and all other farms of the time. Even when very young I suspected that much might somehow be done in a better way. That is what took me into mechanics—although my mother always said that I was born a mechanic. I had a kind of workshop with odds and ends of metal for tools before I had anything else. In those days we did not have the toys of to-day; what we had were home made. My toys were all tools—they still are! And every fragment of machinery was a treasure.

The biggest event of those early years was meeting with a road engine about eight miles out of Detroit one day when we were driving to town. I was then twelve years old. The second biggest event was getting a watch—which happened in the same year. I remember that engine as though I had seen it only yesterday, for it was the first vehicle other than horse-drawn that I had ever seen. It was intended primarily for driving threshing machines and sawmills and was simply a portable engine and boiler mounted on wheels with a water tank and coal cart trailing behind. I had seen plenty of these engines hauled around by horses, but this one had a chain that made a

connection between the engine and the rear wheels of the wagon-like frame on which the boiler was mounted. The engine was placed over the boiler and one man standing on the platform behind the boiler shovelled coal, managed the throttle, and did the steering. It had been made by Nichols, Shepard & Company of Battle Creek. I found that out at once. The engine had stopped to let us pass with our horses and I was off the wagon and talking to the engineer before my father, who was driving, knew what I was up to. The engineer was very glad to explain the whole affair. He was proud of it. He showed me how the chain was disconnected from the propelling wheel and a belt put on to drive other machinery. He told me that the engine made two hundred revolutions a minute and that the chain pinion could be shifted to let the wagon stop while the engine was still running. This last is a feature which, although in different fashion, is incorporated into modern automobiles. It was not important with steam engines, which are easily stopped and started, but it became very important with the gasoline engine. It was that engine which took me into automotive transportation. I tried to make models of it, and some years later I did make one that ran very well, but from the time I saw that road engine as a boy of twelve right forward to to-day, my great interest has been in making a machine that would travel the roads. Driving to town I always had a pocket full of trinkets—nuts, washers, and odds and ends of machinery. Often I took a broken watch and tried to put it together. When I was thirteen I managed for the first time to put a watch together so that it would keep time. By the time I was fifteen I could do almost anything in watch repairing—although my tools were of the crudest. There is an immense amount to be learned simply by tinkering with things. It is not possible to learn from books how everything is made—and a

real mechanic ought to know how nearly everything is made. Machines are to a mechanic what books are to a writer. He gets ideas from them, and if he has any brains he will apply those ideas.

From the beginning I never could work up much interest in the labour of farming. I wanted to have something to do with machinery. My father was not entirely in sympathy with my bent toward mechanics. He thought that I ought to be a farmer. When I left school at seventeen and became an apprentice in the machine shop of the Drydock Engine Works I was all but given up for lost. I passed my apprenticeship without trouble—that is, I was qualified to be a machinist long before my three-year term had expired—and having a liking for fine work and a leaning toward watches I worked nights at repairing in a jewellery shop. At one period of those early days I think that I must have had fully three hundred watches. I thought that I could build a serviceable watch for around thirty cents and nearly started in the business. But I did not because I figured out that watches were not universal necessities, and therefore people generally would not buy them. Just how I reached that surprising conclusion I am unable to state. I did not like the ordinary jewellery and watchmaking work excepting where the job was hard to do. Even then I wanted to make something in quantity. It was just about the time when the standard railroad time was being arranged. We had formerly been on sun time and for quite a while, just as in our present daylight-saving days, the railroad time differed from the local time. That bothered me a good deal and so I succeeded in making a watch that kept both times. It had two dials and it was quite a curiosity in the neighbourhood.

In 1879—that is, about four years after I first saw that Nichols-Shepard machine—I managed to get a chance to

run one and when my apprenticeship was over I worked with a local representative of the Westinghouse Company of Schenectady as an expert in the setting up and repair of their road engines. The engine they put out was much the same as the Nichols-Shepard engine excepting that the engine was up in front, the boiler in the rear, and the power was applied to the back wheels by a belt. They could make twelve miles an hour on the road even though the self-propelling feature was only an incident of the construction. They were sometimes used as tractors to pull heavy loads and, if the owner also happened to be in the threshing-machine business, he hitched his threshing machine and other paraphernalia to the engine in moving from farm to farm. What bothered me was the weight and the cost. They weighed a couple of tons and were far too expensive to be owned by other than a farmer with a great deal of land. They were mostly employed by people who went into threshing as a business or who had sawmills or some other line that required portable power.

Even before that time I had the idea of making some kind of a light steam car that would take the place of horses—more especially, however, as a tractor to attend to the excessively hard labour of ploughing. It occurred to me, as I remember somewhat vaguely, that precisely the same idea might be applied to a carriage or a wagon on the road. A horseless carriage was a common idea. People had been talking about carriages without horses for many years back—in fact, ever since the steam engine was invented—but the idea of the carriage at first did not seem so practical to me as the idea of an engine to do the harder farm work, and of all the work on the farm ploughing was the hardest. Our roads were poor and we had not the habit of getting around. One of the most remarkable features of the automobile on the farm is the way that it has broadened the farmer's life. We simply took for

granted that unless the errand were urgent we would not go to town, and I think we rarely made more than a trip a week. In bad weather we did not go even that often.

Being a full-fledged machinist and with a very fair workshop on the farm it was not difficult for me to build a steam wagon or tractor. In the building of it came the idea that perhaps it might be made for road use. I felt perfectly certain that horses, considering all the bother of attending them and the expense of feeding, did not earn their keep. The obvious thing to do was to design and build a steam engine that would be light enough to run an ordinary wagon or to pull a plough. I thought it more important first to develop the tractor. To lift farm drudgery off flesh and blood and lay it on steel and motors has been my most constant ambition. It was circumstances that took me first into the actual manufacture of road cars. I found eventually that people were more interested in something that would travel on the road than in something that would do the work on the farms. In fact, I doubt that the light farm tractor could have been introduced on the farm had not the farmer had his eyes opened slowly but surely by the automobile. But that is getting ahead of the story. I thought the farmer would be more interested in the tractor.

I built a steam car that ran. It had a kerosene-heated boiler and it developed plenty of power and a neat control—which is so easy with a steam throttle. But the boiler was dangerous. To get the requisite power without too big and heavy a power plant required that the engine work under high pressure; sitting on a high-pressure steam boiler is not altogether pleasant. To make it even reasonably safe required an excess of weight that nullified the economy of the high pressure. For two years I kept experimenting with various sorts of boilers—the engine and control problems were simple enough—

and then I definitely abandoned the whole idea of running a road vehicle by steam. I knew that in England they had what amounted to locomotives running on the roads hauling lines of trailers and also there was no difficulty in designing a big steam tractor for use on a large farm. But ours were not then English roads; they would have stalled or racked to pieces the strongest and heaviest road tractor. And anyway the manufacturing of a big tractor which only a few wealthy farmers could buy did not seem to me worth while.

But I did not give up the idea of a horseless carriage. The work with the Westinghouse representative only served to confirm the opinion I had formed that steam was not suitable for light vehicles. That is why I stayed only a year with that company. There was nothing more that the big steam tractors and engines could teach me and I did not want to waste time on something that would lead nowhere. A few years before—it was while I was an apprentice—I read in the *World of Science*, an English publication, of the “silent gas engine” which was then coming out in England. I think it was the Otto engine. It ran with illuminating gas, had a single large cylinder, and the power impulses being thus intermittent required an extremely heavy fly-wheel. As far as weight was concerned it gave nothing like the power per pound of metal that a steam engine gave, and the use of illuminating gas seemed to dismiss it as even a possibility for road use. It was interesting to me only as all machinery was interesting. I followed in the English and American magazines which we got in the shop the development of the engine and most particularly the hints of the possible replacement of the illuminating gas fuel by a gas formed by the vaporization of gasoline. The idea of gas engines was by no means new, but this was the first time that a really serious effort had been made to put them on the

market. They were received with interest rather than enthusiasm and I do not recall any one who thought that the internal combustion engine could ever have more than a limited use. All the wise people demonstrated conclusively that the engine could not compete with steam. They never thought that it might carve out a career for itself. That is the way with wise people—they are so wise and practical that they always know to a dot just why something cannot be done; they always know the limitations. That is why I never employ an expert in full bloom. If ever I wanted to kill opposition by unfair means I would endow the opposition with experts. They would have so much good advice that I could be sure they would do little work.

The gas engine interested me and I followed its progress, but only from curiosity, until about 1885 or 1886 when, the steam engine being discarded as the motive power for the carriage that I intended some day to build, I had to look around for another sort of motive power. In 1885 I repaired an Otto engine at the Eagle Iron Works in Detroit. No one in town knew anything about them. There was a rumour that I did and, although I had never before been in contact with one, I undertook and carried through the job. That gave me a chance to study the new engine at first hand and in 1887 I built one on the Otto four-cycle model just to see if I understood the principles. "Four cycle" means that the piston traverses the cylinder four times to get one power impulse. The first stroke draws in the gas, the second compresses it, the third is the explosion or power stroke, while the fourth stroke exhausts the waste gas. The little model worked well enough; it had a one-inch bore and a three-inch stroke, operated with gasoline, and while it did not develop much power, it was slightly lighter in proportion than the engines being offered commercially.

I gave it away later to a young man who wanted it for something or other and whose name I have forgotten; it was eventually destroyed. That was the beginning of the work with the internal combustion engine.

I was then on the farm to which I had returned, more because I wanted to experiment than because I wanted to farm, and, now being an all-around machinist, I had a first-class workshop to replace the toy shop of earlier days. My father offered me forty acres of timber land, provided I gave up being a machinist. I agreed in a provisional way, for cutting the timber gave me a chance to get married. I fitted out a sawmill and a portable engine and started to cut out and saw up the timber on the tract. Some of the first of that lumber went into a cottage on my new farm and in it we began our married life. It was not a big house—thirty-one feet square and only a story and a half high—but it was a comfortable place. I added to it my workshop, and when I was not cutting timber I was working on the gas engines—learning what they were and how they acted. I read everything I could find, but the greatest knowledge came from the work. A gas engine is a mysterious sort of thing—it will not always go the way it should. You can imagine how those first engines acted!

It was in 1890 that I began on a double-cylinder engine. It was quite impractical to consider the single cylinder for transportation purposes—the fly-wheel had to be entirely too heavy. Between making the first four-cycle engine of the Otto type and the start on a double cylinder I had made a great many experimental engines out of tubing. I fairly knew my way about. The double cylinder I thought could be applied to a road vehicle and my original idea was to put it on a bicycle with a direct connection to the crankshaft and allowing for the rear wheel of the bicycle to act as the balance wheel. The speed was going to be varied only by the throttle. I never carried out this plan

because it soon became apparent that the engine, gasoline tank, and the various necessary controls would be entirely too heavy for a bicycle. The plan of the two opposed cylinders was that, while one would be delivering power the other would be exhausting. This naturally would not require so heavy a fly-wheel to even the application of power. The work started in my shop on the farm. Then I was offered a job with the Detroit Electric Company as an engineer and machinist at forty-five dollars a month. I took it because that was more money than the farm was bringing me and I had decided to get away from farm life anyway. The timber had all been cut. We rented a house on Bagley Avenue, Detroit. The workshop came along and I set it up in a brick shed at the back of the house. During the first several months I was in the night shift at the electric-light plant—which gave me very little time for experimenting—but after that I was in the day shift and every night and all of every Saturday night I worked on the new motor. I cannot say that it was hard work. No work with interest is ever hard. I always am certain of results. They always come if you work hard enough. But it was a very great thing to have my wife even more confident than I was. She has always been that way.

I had to work from the ground up—that is, although I knew that a number of people were working on horseless carriages, I could not know what they were doing. The hardest problems to overcome were in the making and breaking of the spark and in the avoidance of excess weight. For the transmission, the steering gear, and the general construction, I could draw on my experience with the steam tractors. In 1892 I completed my first motor car, but it was not until the spring of the following year that it ran to my satisfaction. This first car had something of the appearance of a buggy. There were two

cylinders with a two-and-a-half-inch bore and a six-inch stroke set side by side and over the rear axle. I made them out of the exhaust pipe of a steam engine that I had bought. They developed about four horsepower. The power was transmitted from the motor to the countershaft by a belt and from the countershaft to the rear wheel by a chain. The car would hold two people, the seat being suspended on posts and the body on elliptical springs. There were two speeds—one of ten and the other of twenty miles per hour—obtained by shifting the belt, which was done by a clutch lever in front of the driving seat. Thrown forward, the lever put in the high speed; thrown back, the low speed; with the lever upright the engine could run free. To start the car it was necessary to turn the motor over by hand with the clutch free. To stop the car one simply released the clutch and applied the foot brake. There was no reverse, and speeds other than those of the belt were obtained by the throttle. I bought the iron work for the frame of the carriage and also the seat and the springs. The wheels were twenty-eight-inch wire bicycle wheels with rubber tires. The balance wheel I had cast from a pattern that I made and all of the more delicate mechanism I made myself. One of the features that I discovered necessary was a compensating gear that permitted the same power to be applied to each of the rear wheels when turning corners. The machine altogether weighed about five hundred pounds. A tank under the seat held three gallons of gasoline which was fed to the motor through a small pipe and a mixing valve. The ignition was by electric spark. The original machine was air-cooled—or to be more accurate, the motor simply was not cooled at all. I found that on a run of an hour or more the motor heated up, and so I very shortly put a water jacket around the cylinders and piped it to a tank in the rear of the car over the cylinders.

Nearly all of these various features had been planned in advance. That is the way I have always worked. I draw a plan and work out every detail on the plan before starting to build. For otherwise one will waste a great deal of time in makeshifts as the work goes on and the finished article will not have coherence. It will not be rightly proportioned. Many inventors fail because they do not distinguish between planning and experimenting. The largest building difficulties that I had were in obtaining the proper materials. The next were with tools. There had to be some adjustments and changes in details of the design, but what held me up most was that I had neither the time nor the money to search for the best material for each part. But in the spring of 1893 the machine was running to my partial satisfaction and giving an opportunity further to test out the design and material on the road.

CHAPTER II

WHAT I LEARNED ABOUT BUSINESS

MY "gasoline buggy" was the first and for a long time the only automobile in Detroit. It was considered to be something of a nuisance, for it made a racket and it scared horses. Also it blocked traffic. For if I stopped my machine anywhere in town a crowd was around it before I could start up again. If I left it alone even for a minute some inquisitive person always tried to run it. Finally, I had to carry a chain and chain it to a lamp post whenever I left it anywhere. And then there was trouble with the police. I do not know quite why, for my impression is that there were no speed-limit laws in those days. Anyway, I had to get a special permit from the mayor and thus for a time enjoyed the distinction of being the only licensed chauffeur in America. I ran that machine about one thousand miles through 1895 and 1896 and then sold it to Charles Ainsley of Detroit for two hundred dollars. That was my first sale. I had built the car not to sell but only to experiment with. I wanted to start another car. Ainsley wanted to buy. I could use the money and we had no trouble in agreeing upon a price.

It was not at all my idea to make cars in any such petty fashion. I was looking ahead to production, but before that could come I had to have something to produce. It does not pay to hurry. I started a second car in 1896; it was much like the first but a little lighter. It also had the belt drive which I did not give up until some time later; the belts were all right excepting in hot weather. That is why I later adopted gears. I learned a great deal

from that car. Others in this country and abroad were building cars by that time, and in 1895 I heard that a Benz car from Germany was on exhibition in Macy's store in New York. I travelled down to look at it but it had no features that seemed worth while. It also had the belt drive, but it was much heavier than my car. I was working for lightness; the foreign makers have never seemed to appreciate what light weight means. I built three cars in all in my home shop and all of them ran for years in Detroit. I still have the first car; I bought it back a few years later from a man to whom Mr. Ainsley had sold it. I paid one hundred dollars for it.

During all this time I kept my position with the electric company and gradually advanced to chief engineer at a salary of one hundred and twenty-five dollars a month. But my gas-engine experiments were no more popular with the president of the company than my first mechanical leanings were with my father. It was not that my employer objected to experiments—only to experiments with a gas engine. I can still hear him say:

“Electricity, yes, that's the coming thing. But gas—no.”

He had ample grounds for his skepticism—to use the mildest terms. Practically no one had the remotest notion of the future of the internal combustion engine, while we were just on the edge of the great electrical development. As with every comparatively new idea, electricity was expected to do much more than we even now have any indication that it can do. I did not see the use of experimenting with electricity for my purposes. A road car could not run on a trolley even if trolley wires had been less expensive; no storage battery was in sight of a weight that was practical. An electrical car had of necessity to be limited in radius and to contain a large amount of motive machinery in proportion to the power

exerted. That is not to say that I held or now hold electricity cheaply; we have not yet begun to use electricity. But it has its place, and the internal combustion engine has its place. Neither can substitute for the other—which is exceedingly fortunate.

I have the dynamo that I first had charge of at the Detroit Edison Company. When I started our Canadian plant I bought it from an office building to which it had been sold by the electric company, had it revamped a little, and for several years it gave excellent service in the Canadian plant. When we had to build a new power plant, owing to the increase in business, I had the old motor taken out to my museum—a room out at Dearborn that holds a great number of my mechanical treasures.

The Edison Company offered me the general superintendency of the company but only on condition that I would give up my gas engine and devote myself to something really useful. I had to choose between my job and my automobile. I chose the automobile, or rather I gave up the job—there was really nothing in the way of a choice. For already I knew that the car was bound to be a success. I quit my job on August 15, 1899, and went into the automobile business.

It might be thought something of a step, for I had no personal funds. What money was left over from living was all used in experimenting. But my wife agreed that the automobile could not be given up—that we had to make or break. There was no “demand” for automobiles—there never is for a new article. They were accepted in much the fashion as was more recently the airplane. At first the “horseless carriage” was considered merely a freak notion and many wise people explained with particularity why it could never be more than a toy. No man of money even thought of it as a commercial possibility. I cannot imagine why each new means of transportation

meets with such opposition. There are even those to-day who shake their heads and talk about the luxury of the automobile and only grudgingly admit that perhaps the motor truck is of some use. But in the beginning there was hardly any one who sensed that the automobile could be a large factor in industry. The most optimistic hoped only for a development akin to that of the bicycle. When it was found that an automobile really could go and several makers started to put out cars, the immediate query was as to which would go fastest. It was a curious but natural development—that racing idea. I never thought anything of racing, but the public refused to consider the automobile in any light other than as a fast toy. Therefore later we had to race. The industry was held back by this initial racing slant, for the attention of the makers was diverted to making fast rather than good cars. It was a business for speculators.

A group of men of speculative turn of mind organized, as soon as I left the electric company, the Detroit Automobile Company to exploit my car. I was the chief engineer and held a small amount of the stock. For three years we continued making cars more or less on the model of my first car. We sold very few of them; I could get no support at all toward making better cars to be sold to the public at large. The whole thought was to make to order and to get the largest price possible for each car. The main idea seemed to be to get the money. And being without authority other than my engineering position gave me, I found that the new company was not a vehicle for realizing my ideas but merely a money-making concern—that did not make much money. In March, 1902, I resigned, determined never again to put myself under orders. The Detroit Automobile Company later became the Cadillac Company under the ownership of the Ielands, who came in subsequently.

I rented a shop—a one-story brick shed—at 81 Park Place to continue my experiments and to find out what business really was. I thought that it must be something different from what it had proved to be in my first adventure.

The year from 1902 until the formation of the Ford Motor Company was practically one of investigation. In my little one-room brick shop I worked on the development of a four-cylinder motor and on the outside I tried to find out what business really was and whether it needed to be quite so selfish a scramble for money as it seemed to be from my first short experience. From the period of the first car, which I have described, until the formation of my present company I built in all about twenty-five cars, of which nineteen or twenty were built with the Detroit Automobile Company. The automobile had passed from the initial stage where the fact that it could run at all was enough, to the stage where it had to show speed. Alexander Winton of Cleveland, the founder of the Winton car, was then the track champion of the country and willing to meet all comers. I designed a two-cylinder enclosed engine of a more compact type than I had before used, fitted it into a skeleton chassis, found that I could make speed, and arranged a race with Winton. We met on the Grosse Point track at Detroit. I beat him. That was my first race, and it brought advertising of the only kind that people cared to read.

The public thought nothing of a car unless it made speed—unless it beat other racing cars. My ambition to build the fastest car in the world led me to plan a four-cylinder motor. But of that more later.

•The most surprising feature of business as it was conducted was the large attention given to finance and the small attention to service. That seemed to me to be reversing the natural process which is that the money

should come as the result of work and not before the work. The second feature was the general indifference to better methods of manufacture as long as whatever was done got by and took the money. In other words, an article apparently was not built with reference to how greatly it could serve the public but with reference solely to how much money could be had for it—and that without any particular care whether the customer was satisfied. To sell him was enough. A dissatisfied customer was regarded not as a man whose trust had been violated, but either as a nuisance or as a possible source of more money in fixing up the work which ought to have been done correctly in the first place. For instance, in automobiles there was not much concern as to what happened to the car once it had been sold. How much gasoline it used per mile was of no great moment; how much service it actually gave did not matter; and if it broke down and had to have parts replaced, then that was just hard luck for the owner. It was considered good business to sell parts at the highest possible price on the theory that, since the man had already bought the car, he simply had to have the part and would be willing to pay for it.

The automobile business was not on what I would call an honest basis, to say nothing of being, from a manufacturing standpoint, on a scientific basis, but it was no worse than business in general. That was the period, it may be remembered, in which many corporations were being floated and financed. The bankers, who before then had confined themselves to the railroads, got into industry. * My idea was then and still is that if a man did his work well, the price he would get for that work, the profits and all financial matters, would care for themselves and that a business ought to start small and build itself up and out of its earnings. † If there are no earnings then that is a signal to the owner that he is

wasting his time and does not belong in that business. I have never found it necessary to change those ideas, but I discovered that this simple formula of doing good work and getting paid for it was supposed to be slow for modern business. The plan at that time most in favour was to start off with the largest possible capitalization and then sell all the stock and all the bonds that could be sold. Whatever money happened to be left over after all the stock and bond-selling expenses and promoters, charges and all that, went grudgingly into the foundation of the business. A good business was not one that did good work and earned a fair profit. A good business was one that would give the opportunity for the floating of a large amount of stocks and bonds at high prices. It was the stocks and bonds, not the work, that mattered. I could not see how a new business or an old business could be expected to be able to charge into its product a great big bond interest and then sell the product at a fair price. I have never been able to see that.

I have never been able to understand on what theory the original investment of money can be charged against a business. Those men in business who call themselves financiers say that money is "worth" 6 per cent. or 5 per cent. or some other per cent., and that if a business has one hundred thousand dollars invested in it, the man who made the investment is entitled to charge an interest payment on the money, because, if instead of putting that money into the business he had put it into a savings bank or into certain securities, he could have a certain fixed return. Therefore they say that a proper charge against the operating expenses of a business is the interest on this money. This idea is at the root of many business failures and most service failures. Money is not worth a particular amount. As money it is not worth anything, for it will do nothing of itself. The only use of money is

to buy tools to work with or the product of tools. Therefore money is worth what it will help you to produce or buy and no more. If a man thinks that his money will earn 5 per cent. or 6 per cent. he ought to place it where he can get that return, but money placed in a business is not a charge on the business—or, rather, should not be. It ceases to be money and becomes, or should become, an engine of production, and it is therefore worth what it produces—and not a fixed sum according to some scale that has no bearing upon the particular business in which the money has been placed. Any return should come after it has produced, not before.

Business men believed that you could do anything by “financing” it. If it did not go through on the first financing then the idea was to “refinance.” The process of “refinancing” was simply the game of sending good money after bad. In the majority of cases the need of refinancing arises from bad management, and the effect of refinancing is simply to pay the poor managers to keep up their bad management a little longer. It is merely a postponement of the day of judgment. This makeshift of refinancing is a device of speculative financiers. Their money is no good to them unless they can connect it up with a place where real work is being done, and that they cannot do unless, somehow, that place is poorly managed. Thus, the speculative financiers delude themselves that they are putting their money out to use. They are not; they are putting it out to waste.

I determined absolutely that never would I join a company in which finance came before the work or in which bankers or financiers had a part. And further that, if there were no way to get started in the kind of business that I thought could be managed in the interest of the public, then I simply would not get started at all. For my own short experience, together with what I saw going

on around me, was quite enough proof that business as a mere money-making game was not worth giving much thought to and was distinctly no place for a man who wanted to accomplish anything. Also it did not seem to me to be the way to make money. I have yet to have it demonstrated that it is the way. For the only foundation of real business is service.

A manufacturer is not through with his customer when a sale is completed. He has then only started with his customer. In the case of an automobile the sale of the machine is only something in the nature of an introduction. If the machine does not give service, then it is better for the manufacturer if he never had the introduction, for he will have the worst of all advertisements—a dissatisfied customer. There was something more than a tendency in the early days of the automobile to regard the selling of a machine as the real accomplishment and that thereafter it did not matter what happened to the buyer. That is the shortsighted salesman-on-commission attitude. If a salesman is paid only for what he sells, it is not to be expected that he is going to exert any great effort on a customer out of whom no more commission is to be made. And it is right on this point that we later made the largest selling argument for the Ford. The price and the quality of the car would undoubtedly have made a market, and a large market. We went beyond that. A man who bought one of our cars was in my opinion entitled to continuous use of that car, and therefore if he had a breakdown of any kind it was our duty to see that his machine was put into shape again at the earliest possible moment. In the success of the Ford car the early provision of service was an outstanding element. Most of the expensive cars of that period were ill provided with service stations. If your car broke down you had to depend on the local repair man—when you were entitled

to depend upon the manufacturer. If the local repair man were a forehanded sort of a person, keeping on hand a good stock of parts (although on many of the cars the parts were not interchangeable), the owner was lucky. But if the repair man were a shiftless person, with an inadequate knowledge of automobiles and an inordinate desire to make a good thing out of every car that came into his place for repairs, then even a slight breakdown meant weeks of laying up and a whopping big repair bill that had to be paid before the car could be taken away. The repair men were for a time the largest menace to the automobile industry. Even as late as 1910 and 1911 the owner of an automobile was regarded as essentially a rich man whose money ought to be taken away from him. We met that situation squarely and at the very beginning. We would not have our distribution blocked by stupid, greedy men.

That is getting some years ahead of the story, but it is control by finance that breaks up service because it looks to the immediate dollar. If the first consideration is to earn a certain amount of money, then, unless by some stroke of luck matters are going especially well and there is a surplus over for service so that the operating men may have a chance, future business has to be sacrificed for the dollar of to-day.

And also I noticed a tendency among many men in business to feel that their lot was hard—they worked against a day when they might retire and live on an income—get out of the strife. Life to them was a battle to be ended as soon as possible. That was another point I could not understand, for as I reasoned, life is not a battle except with our own tendency to sag with the downpull of “getting settled.” If to petrify is success, all one has to do is to humour the lazy side of the mind; but if to grow is success, then one must wake up anew every morning and keep awake all day. I saw great

businesses become but the ghost of a name because someone thought they could be managed just as they were always managed, and though the management may have been most excellent in its day, its excellence consisted in its alertness to its day, and not in slavish following of its yesterdays. Life, as I see it, is not a location, but a journey. Even the man who most feels himself "settled" is not settled—he is probably sagging back. Everything is in flux, and was meant to be. Life flows. We may live at the same number of the street, but it is never the same man who lives there.

And out of the delusion that life is a battle that may be lost by a false move grows, I have noticed, a great love for regularity. Men fall into the half-alive habit. Seldom does the cobbler take up with the new-fangled way of soling shoes, and seldom does the artisan willingly take up with new methods in his trade. Habit conduces to a certain inertia, and any disturbance of it affects the mind like trouble. It will be recalled that when a study was made of shop methods, so that the workmen might be taught to produce with less useless motion and fatigue, it was most opposed by the workmen themselves. Though they suspected that it was simply a game to get more out of them, what most irked them was that it interfered with the well-worn grooves in which they had become accustomed to move. Business men go down with their businesses because they like the old way so well they cannot bring themselves to change. One sees them all about—men who do not know that yesterday is past, and who woke up this morning with their last year's ideas. It could almost be written down as a formula that when a man begins to think that he has at last found his method he had better begin a most searching examination of himself to see whether some part of his brain has not gone to sleep. There is a subtle danger in a man thinking

that he is "fixed" for life. It indicates that the next jolt of the wheel of progress is going to fling him off.

There is also the great fear of being thought a fool. So many men are afraid of being considered fools. I grant that public opinion is a powerful police influence for those who need it. Perhaps it is true that the majority of men need the restraint of public opinion. Public opinion may keep a man better than he would otherwise be—if not better morally, at least better as far as his social desirability is concerned. But it is not a bad thing to be a fool for righteousness' sake. The best of it is that such fools usually live long enough to prove that they were not fools—or the work they have begun lives long enough to prove they were not foolish.

The money influence—the pressing to make a profit on an "investment"—and its consequent neglect of or skimping of work and hence of service showed itself to me in many ways. It seemed to be at the bottom of most troubles. It was the cause of low wages—for without well-directed work high wages cannot be paid. And if the whole attention is not given to the work it cannot be well directed. Most men want to be free to work; under the system in use they could not be free to work. During my first experience I was not free—I could not give full play to my ideas. Everything had to be planned to make money; the last consideration was the work. And the most curious part of it all was the insistence that it was the money and not the work that counted. It did not seem to strike any one as illogical that money should be put ahead of work—even though everyone had to admit that the profit had to come from the work. The desire seemed to be to find a short cut to money and to pass over the obvious short cut—which is through the work.

Take competition; I found that competition was supposed to be a menace and that a good manager circum-

vented his competitors by getting a monopoly through artificial means. The idea was that there were only a certain number of people who could buy and that it was necessary to get their trade ahead of someone else. Some will remember that later many of the automobile manufacturers entered into an association under the Selden Patent just so that it might be legally possible to control the price and the output of automobiles. They had the same idea that so many trades unions have—the ridiculous notion that more profit can be had doing less work than more. The plan, I believe, is a very antiquated one. I could not see then and am still unable to see that there is not always enough for the man who does his work; time spent in fighting competition is wasted; it had better be spent in doing the work. There are always enough people ready and anxious to buy, provided you supply what they want and at the proper price—and this applies to personal services as well as to goods. ~

During this time of reflection I was far from idle. We were going ahead with a four-cylinder motor and the building of a pair of big racing cars. I had plenty of time, for I never left my business. I do not believe a man can ever leave his business. He ought to think of it by day and dream of it by night. It is nice to plan to do one's work in office hours, to take up the work in the morning, to drop it in the evening—and not have a care until the next morning. It is perfectly possible to do that if one is so constituted as to be willing through all of his life to accept direction, to be an employee, possibly a responsible employee, but not a director or manager of anything. A manual labourer must have a limit on his hours, otherwise he will wear himself out. ~ If he intends to remain always a manual labourer, then he should forget about his work when the whistle blows, but if he intends to go forward and do anything, the whistle is only a signal to start think-

ing over the day's work in order to discover how it might be done better. /

The man who has the largest capacity for work and thought is the man who is bound to succeed. I cannot pretend to say, because I do not know, whether the man who works always, who never leaves his business, who is absolutely intent upon getting ahead, and who therefore does get ahead—is happier than the man who keeps office hours, both for his brain and his hands. It is not necessary for any one to decide the question. A ten-horsepower engine will not pull as much as a twenty. The man who keeps brain office hours limits his horsepower. If he is satisfied to pull only the load that he has, well and good, that is his affair—but he must not complain if another who has increased his horsepower pulls more than he does. Leisure and work bring different results. If a man wants leisure and gets it—then he has no cause to complain. But he cannot have both leisure and the results of work.

Concretely, what I most realized about business in that year—and I have been learning more each year without finding it necessary to change my first conclusions—is this:

(1) That finance is given a place ahead of work and therefore tends to kill the work and destroy the fundamental of service.

(2) That thinking first of money instead of work brings on fear of failure and this fear blocks every avenue of business—it makes a man afraid of competition, of changing his methods, or of doing anything which might change his condition.

(3) That the way is clear for any one who thinks **first** of service—of doing the work in the best possible way.

CHAPTER III

STARTING THE REAL BUSINESS

IN THE little brick shop at 81 Park Place I had ample opportunity to work out the design and some of the methods of manufacture of a new car. Even if it were possible to organize the exact kind of corporation that I wanted—one in which doing the work well and suiting the public would be controlling factors—it became apparent that I never could produce a thoroughly good motor car that might be sold at a low price under the existing cut-and-try manufacturing methods.

Everybody knows that it is always possible to do a thing better the second time. I do not know why manufacturing should not at that time have generally recognized this as a basic fact—unless it might be that the manufacturers were in such a hurry to obtain something to sell that they did not take time for adequate preparation. Making “to order” instead of making in volume is, I suppose, a habit, a tradition, that has descended from the old handicraft days. Ask a hundred people how they want a particular article made. About eighty will not know; they will leave it to you. Fifteen will think that they must say something, while five will really have preferences and reasons. The ninety-five, made up of those who do not know and admit it and the fifteen who do not know but do not admit it, constitute the real market for any product. The five who want something special may or may not be able to pay the price for special work. If they have the price, they can get the work, but they constitute a special and limited market. Of the

ninety-five perhaps ten or fifteen will pay a price for quality. Of those remaining, a number will buy solely on price and without regard to quality. Their numbers are thinning with each day. Buyers are learning how to buy. The majority will consider quality and buy the biggest dollar's worth of quality. If, therefore, you discover what will give this 95 per cent. of people the best all-round service and then arrange to manufacture at the very highest quality and sell at the very lowest price, you will be meeting a demand which is so large that it may be called universal.

This is not standardizing. The use of the word "standardizing" is very apt to lead one into trouble, for it implies a certain freezing of design and method and usually works out so that the manufacturer selects whatever article he can the most easily make and sell at the highest profit. The public is not considered either in the design or in the price. The thought behind most standardization is to be able to make a larger profit. The result is that with the economies which are inevitable if you make only one thing, a larger and larger profit is continually being had by the manufacturer. His output also becomes larger—his facilities produce more—and before he knows it his markets are overflowing with goods which will not sell. These goods would sell if the manufacturer would take a lower price for them. There is always buying power present—but that buying power will not always respond to reductions in price. If an article has been sold at too high a price and then, because of stagnant business, the price is suddenly cut, the response is sometimes most disappointing. And for a very good reason. The public is wary. It thinks that the price-cut is a fake and it sits around waiting for a real cut. We saw much of that last year. If, on the contrary, the economies of making are transferred at once to the price and if it is well known that

such is the policy of the manufacturer, the public will have confidence in him and will respond. They will trust him to give honest value. So standardization may seem bad business unless it carries with it the plan of constantly reducing the price at which the article is sold. And the price has to be reduced (this is very important) because of the manufacturing economies that have come about and not because the falling demand by the public indicates that it is not satisfied with the price. The public should always be wondering how it is possible to give so much for the money.

Standardization (to use the word as I understand it) is not just taking one's best selling article and concentrating on it. It is planning day and night and probably for years, first on something which will best suit the public and then on how it should be made. The exact processes of manufacturing will develop of themselves. Then, if we shift the manufacturing from the profit to the service basis, we shall have a real business in which the profits will be all that any one could desire.

All of this seems self-evident to me. It is the logical basis of any business that wants to serve 95 per cent. of the community. It is the logical way in which the community can serve itself. I cannot comprehend why all business does not go on this basis. All that has to be done in order to adopt it is to overcome the habit of grabbing at the nearest dollar as though it were the only dollar in the world. The habit has already to an extent been overcome. All the large and successful retail stores in this country are on the one-price basis. The only further step required is to throw overboard the idea of pricing on what the traffic will bear and instead go to the common-sense basis of pricing on what it costs to manufacture and then reducing the cost of manufacture. If the design of the product has been sufficiently studied, then

changes in it will come very slowly. But changes in manufacturing processes will come very rapidly and wholly naturally. That has been our experience in everything we have undertaken. How naturally it has all come about, I shall later outline. The point that I wish to impress here is that it is impossible to get a product on which one may concentrate unless an unlimited amount of study is given beforehand. It is not just an afternoon's work.

These ideas were forming with me during this year of experimenting. Most of the experimenting went into the building of racing cars. The idea in those days was that a first-class car ought to be a racer. I never really thought much of racing, but following the bicycle idea, the manufacturers had the notion that winning a race on a track told the public something about the merits of an automobile—although I can hardly imagine any test that would tell less.

But, as the others were doing it, I, too, had to do it. In 1903, with Tom Cooper, I built two cars solely for speed. They were quite alike. One we named the "999" and the other the "Arrow." If an automobile were going to be known for speed, then I was going to make an automobile that would be known wherever speed was known. These were. I put in four great big cylinders giving 80 H.P.—which up to that time had been unheard of. The roar of those cylinders alone was enough to half kill a man. There was only one seat. One life to a car was enough. I tried out the cars. Cooper tried out the cars. We let them out at full speed. I cannot quite describe the sensation. Going over Niagara Falls would have been but a pastime after a ride in one of them. I did not want to take the responsibility of racing the "999" which we put up first, neither did Cooper. Cooper said he knew a man who lived on speed, that nothing could go too fast for him. He wired to Salt Lake City and on came a professional

bicycle rider named Barney Oldfield. He had never driven a motor car, but he liked the idea of trying it. He said he would try anything once.

It took us only a week to teach him how to drive. The man did not know what fear was. All that he had to learn was how to control the monster. Controlling the fastest car of to-day was nothing as compared to controlling that car. The steering wheel had not yet been thought of. All the previous cars that I had built simply had tillers. On this one I put a two-handed tiller, for holding the car in line required all the strength of a strong man. The race for which we were working was at three miles on the Grosse Point track. We kept our cars as a dark horse. We left the predictions to the others. The tracks then were not scientifically banked. It was not known how much speed a motor car could develop. No one knew better than Oldfield what the turns meant and as he took his seat, while I was cranking the car for the start, he remarked cheerily: "Well, this chariot may kill me, but they will say afterward that I was going like hell when she took me over the bank."

And he did go He never dared to look around. He did not shut off on the curves. He simply let that car go—and go it did. He was about half a mile ahead of the next man at the end of the race!

The "999" did what it was intended to do: It advertised the fact that I could build a fast motor car. A week after the race I formed the Ford Motor Company. I was vice-president, designer, master mechanic, superintendent, and general manager. The capitalization of the company was one hundred thousand dollars, and of this I owned $25\frac{1}{2}$ per cent. The total amount subscribed in cash was about twenty-eight thousand dollars—which is the only money that the company has ever received for the capital fund from other than operations. In the begin-

ing I thought that it was possible, notwithstanding my former experience, to go forward with a company in which I owned less than the controlling share. I very shortly found I had to have control and therefore in 1906, with funds that I had earned in the company, I bought enough stock to bring my holdings up to 51 per cent. and a little later bought enough more to give me $58\frac{1}{2}$ per cent. The new equipment and the whole progress of the company have always been financed out of earnings. In 1919 my son Edsel purchased the remaining $41\frac{1}{2}$ per cent of the stock because certain of the minority stockholders disagreed with my policies. For these shares he paid at the rate of \$12,500 for each \$100 par and in all paid about seventy-five millions.

The original company and its equipment, as may be gathered, were not elaborate. We rented Strelow's carpenter shop on Mack Avenue. In making my designs I had also worked out the methods of making, but, since at that time we could not afford to buy machinery, the entire car was made according to my designs, but by various manufacturers, and about all we did, even in the way of assembling, was to put on the wheels, the tires, and the body. That would really be the most economical method of manufacturing if only one could be certain that all of the various parts would be made on the manufacturing plan that I have above outlined. The most economical manufacturing of the future will be that in which the whole of an article is not made under one roof—unless, of course, it be a very simple article. The modern—or better, the future—method is to have each part made where it may best be made and then assemble the parts into a complete unit at the points of consumption. That is the method we are now following and expect to extend. It would make no difference whether one company or one individual owned all the factories fabricating the com-

ponent parts of a single product, or whether such part were made in our independently owned factory, *if only all adopted the same service methods*. If we can buy as good a part as we can make ourselves and the supply is ample and the price right, we do not attempt to make it ourselves—or, at any rate, to make more than an emergency supply. In fact, it might be better to have the ownership widely scattered.

I had been experimenting principally upon the cutting down of weight. Excess weight kills any self-propelled vehicle. There are a lot of fool ideas about weight. It is queer, when you come to think of it, how some fool terms get into current use. There is the phrase “heavy-weight” as applied to a man’s mental apparatus! What does it mean? No one wants to be fat and heavy of body—then why of head? For some clumsy reason we have come to confuse strength with weight. The crude methods of early building undoubtedly had much to do with this. The old ox-cart weighed a ton—and it had so much weight that it was weak! To carry a few tons of humanity from New York to Chicago, the railroad builds a train that weighs many hundred tons, and the result is an absolute loss of real strength and the extravagant waste of untold millions in the form of power. The law of diminishing returns begins to operate at the point where strength becomes weight. Weight may be desirable in a steam roller but nowhere else. Strength has nothing to do with weight. The mentality of the man who does things in the world is agile, light, and strong. The most beautiful things in the world are those from which all excess weight has been eliminated. Strength is never just weight—either in men or things. Whenever any one suggests to me that I might increase weight or add a part, I look into decreasing weight and eliminating a part! The car that I designed was lighter

than any car that had yet been made. It would have been lighter if I had known how to make it so—later I got the materials to make the lighter car.

In our first year we built "Model A," selling the runabout for eight hundred and fifty dollars and the tonneau for one hundred dollars more. This model had a two-cylinder opposed motor developing eight horsepower. It had a chain drive, a seventy-two inch wheel base—which was supposed to be long—and a fuel capacity of five gallons. We made and sold 1,708 cars in the first year. That is how well the public responded.

Every one of these "Model A's" has a history. Take No. 420. Colonel D. C. Collier of California bought it in 1904. He used it for a couple of years, sold it, and bought a new Ford. No. 420 changed hands frequently until 1907 when it was bought by one Edmund Jacobs living near Ramona in the heart of the mountains. He drove it for several years in the roughest kind of work. Then he bought a new Ford and sold his old one. By 1915 No. 420 had passed into the hands of a man named Cantello who took out the motor, hitched it to a water pump, rigged up shafts on the chassis and now, while the motor chugs away at the pumping of water, the chassis drawn by a burro acts as a buggy. The moral, of course, is that you can dissect a Ford but you cannot kill it.

In our first advertisement we said:

Our purpose is to construct and market an automobile specially designed for everyday wear and tear—business, professional, and family use; an automobile which will attain to a sufficient speed to satisfy the average person without acquiring any of those breakneck velocities which are so universally condemned; a machine which will be admired by man, woman, and child alike for its compactness, its simplicity, its safety, its all-around convenience, and—last but not least—its exceedingly reasonable price, which places it within the reach of many thousands who could not think of paying the comparatively fabulous prices asked for most machines.

And these are the points we emphasized:

Good material.

Simplicity—most of the cars at that time required considerable skill in their management.

The engine.

The ignition—which was furnished by two sets of six dry cell batteries.

The automatic oiling.

The simplicity and the ease of control of the transmission, which was of the planetary type.

The workmanship.

We did not make the pleasure appeal. We never have. In its first advertising we showed that a motor car was a utility. We said:

We often hear quoted the old proverb, "Time is money"—and yet how few business and professional men act as if they really believed its truth.

Men who are constantly complaining of shortage of time and lamenting the fewness of days in the week—men to whom every five minutes wasted means a dollar thrown away—men to whom five minutes' delay sometimes means the loss of many dollars—will yet depend on the haphazard, uncomfortable, and limited means of transportation afforded by street cars, etc., when the investment of an exceedingly moderate sum in the purchase of a perfected, efficient, high-grade automobile would cut out anxiety and unpunctuality and provide a luxurious means of travel ever at your beck and call.

Always ready, always sure.

Built to save you time and consequent money.

Built to take you anywhere you want to go and bring you back again on time.

Built to add to your reputation for punctuality; to keep your customers good-humoured and in a buying mood.

Built for business or pleasure—just as you say.

Built also for the good of your health—to carry you "jarlessly" over any kind of half decent roads, to refresh your brain with the luxury of much "out-dooriness" and your lungs with the "tonic of tonics"—the right kind of atmosphere.

It is your say, too, when it comes to speed. You can—if you choose—loiter lingeringly through shady avenues or you can press

down on the foot-lever until all the scenery looks alike to you and you have to keep your eyes skinned to count the milestones as they pass.

I am giving the gist of this advertisement to show that, from the beginning, we were looking to providing service—we never bothered with a “sporting car.”

The business went along almost as by magic. The cars gained a reputation for standing up. They were tough, they were simple, and they were well made. I was working on my design for a universal single model but I had not settled the designs nor had we the money to build and equip the proper kind of plant for manufacturing. I had not the money to discover the very best and lightest materials. We still had to accept the materials that the market offered—we got the best to be had but we had no facilities for the scientific investigation of materials or for original research.

My associates were not convinced that it was possible to restrict our cars to a single model. The automobile trade was following the old bicycle trade, in which every manufacturer thought it necessary to bring out a new model each year and to make it so unlike all previous models that those who had bought the former models would want to get rid of the old and buy the new. That was supposed to be good business. It is the same idea that women submit to in their clothing and hats. That is not service—it seeks only to provide something new, not something better. It is extraordinary how firmly rooted is the notion that business—continuous selling—depends not on satisfying the customer once and for all, but on first getting his money for one article and then persuading him he ought to buy a new and different one. The plan which I then had in the back of my head but to which we were not then sufficiently advanced to give expression, was that, when a model was settled upon

then every improvement on that model should be interchangeable with the old model, so that a car should never get out of date. It is my ambition to have every piece of machinery, or other non-consumable product that I turn out, so strong and so well made that no one ought ever to have to buy a second one. A good machine of any kind ought to last as long as a good watch.

In the second year we scattered our energies among three models. We made a four-cylinder touring car, "Model B," which sold for two thousand dollars; "Model C," which was a slightly improved "Model A" and sold at fifty dollars more than the former price; and "Model F," a touring car which sold for a thousand dollars. That is, we scattered our energy and increased prices—and therefore we sold fewer cars than in the first year. The sales were 1,695 cars.

That "Model B"—the first four-cylinder car for general road use—had to be advertised. Winning a race or making a record was then the best kind of advertising. So I fixed up the "Arrow," the twin of the old "999"—in fact practically remade it—and a week before the New York Automobile show I drove it myself over a surveyed mile straightaway on the ice. I shall never forget that race. The ice seemed smooth enough, so smooth that if I had called off the trial we should have secured an immense amount of the wrong kind of advertising, but instead of being smooth, that ice was seamed with fissures which I knew were going to mean trouble the moment I got up speed. But there was nothing to do but go through with the trial, and I let the old "Arrow" out. At every fissure the car leaped into the air. I never knew how it was coming down. When I wasn't in the air, I was skidding, but somehow I stayed top side up and on the course, making a record that went all over the world! That put "Model B" on the map—but not enough on

to overcome the price advances. No stunt and no advertising will sell an article for any length of time. 'Business is not a game.' The moral is coming.

Our little wooden shop had, with the business we were doing, become totally inadequate, and in 1906 we took out of our working capital sufficient funds to build a three-story plant at the corner of Piquette and Beaubien streets—which for the first time gave us real manufacturing facilities. We began to make and to assemble quite a number of the parts, although still we were principally an assembling shop. In 1905-1906 we made only two models—one the four-cylinder car at \$2,000 and another touring car at \$1,000, both being the models of the previous year—and our sales dropped to 1,599 cars.

Some said it was because we had not brought out new models. I thought it was because our cars were too expensive—they did not appeal to the 95 per cent. I changed the policy in the next year—having first acquired stock control. For 1906-1907 we entirely left off making touring cars and made three models of runabouts and roadsters, none of which differed materially from the other in manufacturing process or in component parts, but were somewhat different in appearance. The big thing was that the cheapest car sold for \$600 and the most expensive for only \$750, and right there came the complete demonstration of what price meant. We sold 8,423 cars—nearly five times as many as in our biggest previous year. Our banner week was that of May 15, 1908, when we assembled 311 cars in six working days. It almost swamped our facilities. The foreman had a tallyboard on which he chalked up each car as it was finished and turned over to the testers. The tallyboard was hardly equal to the task. On one day in the following June we assembled an even one hundred cars.

In the next year we departed from the programme

that had been so successful and I designed a big car—fifty horsepower, six cylinder—that would burn up the roads. We continued making our small cars, but the 1907 panic and the diversion to the more expensive model cut down the sales to 6,398 cars.

We had been through an experimenting period of five years. The cars were beginning to be sold in Europe. The business, as an automobile business then went, was considered extraordinarily prosperous. We had plenty of money. Since the first year we have practically always had plenty of money. We sold for cash, we did not borrow money, and we sold directly to the purchaser. We had no bad debts and we kept within ourselves on every move. I have always kept well within my resources. I have never found it necessary to strain them, because, inevitably, if you give attention to work and service, the resources will increase more rapidly than you can devise ways and means of disposing of them.

We were careful in the selection of our salesmen. At first there was great difficulty in getting good salesmen because the automobile trade was not supposed to be stable. It was supposed to be dealing in a luxury—in pleasure vehicles. We eventually appointed agents, selecting the very best men we could find, and then paying to them a salary larger than they could possibly earn in business for themselves. In the beginning we had not paid much in the way of salaries. We were feeling our way, but when we knew what our way was, we adopted the policy of paying the very highest reward for service and then insisting upon getting the highest service. Among the requirements for an agent we laid down the following:

- (1) A progressive, up-to-date man keenly alive to the possibilities of business.
- (2) A suitable place of business clean and dignified in appearance.

(3) A stock of parts sufficient to make prompt replacements and keep in active service every Ford car in his territory.

(4) An adequately equipped repair shop which has in it the right machinery for every necessary repair and adjustment.

(5) Mechanics who are thoroughly familiar with the construction and operation of Ford cars.

(6) A comprehensive bookkeeping system and a follow-up sales system, so that it may be instantly apparent what is the financial status of the various departments of his business, the condition and size of his stock, the present owners of cars, and the future prospects.

(7) Absolute cleanliness throughout every department. There must be no unwashed windows, dusty furniture, dirty floors.

(8) A suitable display sign.

(9) The adoption of policies which will ensure absolutely square dealing and the highest character of business ethics.

And this is the general instruction that was issued:

A dealer or a salesman ought to have the name of every possible automobile buyer in his territory, including all those who have never given the matter a thought. He should then personally solicit by visitation if possible—by correspondence at the least—every man on that list and then making necessary memoranda, know the automobile situation as related to every resident so solicited. If your territory is too large to permit this, you have too much territory.

The way was not easy. We were harried by a big suit brought against the company to try to force us into line with an association of automobile manufacturers, who were operating under the false principle that there was only a limited market for automobiles and that a monopoly of that market was essential. This was the famous Selden Patent suit. At times the support of our defense severely

strained our resources. Mr. Selden, who has but recently died, had little to do with the suit. It was the association which sought a monopoly under the patent. The situation was this:

George B. Selden, a patent attorney, filed an application as far back as 1879 for a patent the object of which was stated to be "The production of a safe, simple, and cheap road locomotive, light in weight, easy to control, possessed of sufficient power to overcome an ordinary inclination." This application was kept alive in the Patent Office, by methods which are perfectly legal, until 1895, when the patent was granted. In 1879, when the application was filed, the automobile was practically unknown to the general public, but by the time the patent was issued everybody was familiar with self-propelled vehicles, and most of the men, including myself, who had been for years working on motor propulsion, were surprised to learn that what we had made practicable was covered by an application of years before, although the applicant had kept his idea merely as an idea. He had done nothing to put it into practice.

The specific claims under the patent were divided into six groups and I think that not a single one of them was a really new idea even in 1879 when the application was filed. The Patent Office allowed a combination and issued a so-called "combination patent" deciding that the combination (a) of a carriage with its body machinery and steering wheel, with the (b) propelling mechanism clutch and gear, and finally (c) the engine, made a valid patent.

With all of that we were not concerned. I believed that my engine had nothing whatsoever in common with what Selden had in mind. The powerful combination of manufacturers who called themselves the "licensed manufacturers" because they operated under licenses from the patentee, brought suit against us as soon as we began to

be a factor in motor production. The suit dragged on. It was intended to scare us out of business. We took volumes of testimony, and the blow came on September 15, 1909, when Judge Hough rendered an opinion in the United States District Court finding against us. Immediately that Licensed Association began to advertise, warning prospective purchasers against our cars. They had done the same thing in 1903 at the start of the suit, when it was thought that we could be put out of business. I had implicit confidence that eventually we should win our suit. I simply knew that we were right, but it was a considerable blow to get the first decision against us, for we believed that many buyers—even though no injunction was issued against us—would be frightened away from buying because of the threats of court action against individual owners. The idea was spread that if the suit finally went against me, every man who owned a Ford car would be prosecuted. Some of my more enthusiastic opponents, I understand, gave it out privately that there would be criminal as well as civil suits and that a man buying a Ford car might as well be buying a ticket to jail. We answered with an advertisement for which we took four pages in the principal newspapers all over the country. We set out our case—we set out our confidence in victory—and in conclusion said:

In conclusion we beg to state if there are any prospective automobile buyers who are at all intimidated by the claims made by our adversaries that we will give them, in addition to the protection of the Ford Motor Company with its some \$6,000,000.00 of assets, an individual bond backed by a Company of more than \$6,000,000.00 more of assets, so that each and every individual owner of a Ford car will be protected until at least \$12,000,000.00 of assets have been wiped out by those who desire to control and monopolize this wonderful industry.

The bond is yours for the asking, so do not allow yourself to be sold inferior cars at extravagant prices because of any statement made by this "Divine" body.

N. B.—This fight is not being waged by the Ford Motor Company without the advice and counsel of the ablest patent attorneys of the East and West.

We thought that the bond would give assurance to the buyers—that they needed confidence. They did not. We sold more than eighteen thousand cars—nearly double the output of the previous year—and I think about fifty buyers asked for bonds—perhaps it was less than that.

As a matter of fact, probably nothing so well advertised the Ford car and the Ford Motor Company as did this suit. It appeared that we were the under dog and we had the public's sympathy. The association had seventy million dollars—we at the beginning had not half that number of thousands. I never had a doubt as to the outcome, but nevertheless it was a sword hanging over our heads that we could as well do without. Prosecuting that suit was probably one of the most shortsighted acts that any group of American business men has ever combined to commit. Taken in all its sidelights, it forms the best possible example of joining unwittingly to kill a trade. I regard it as most fortunate for the automobile makers of the country that we eventually won, and the association ceased to be a serious factor in the business. By 1908, however, in spite of this suit, we had come to a point where it was possible to announce and put into fabrication the kind of car that I wanted to build.

CHAPTER IV

THE SECRET OF MANUFACTURING AND SERVING

NOW I am not outlining the career of the Ford Motor Company for any personal reason. I am not saying: "Go thou and do likewise." What I am trying to emphasize is that the ordinary way of doing business is not the best way. I am coming to the point of my entire departure from the ordinary methods. From this point dates the extraordinary success of the company.

We had been fairly following the custom of the trade. Our automobile was less complex than any other. We had no outside money in the concern. But aside from these two points we did not differ materially from the other automobile companies, excepting that we had been somewhat more successful and had rigidly pursued the policy of taking all cash discounts, putting our profits back into the business, and maintaining a large cash balance. We entered cars in all of the races. We advertised and we pushed our sales. Outside of the simplicity of the construction of the car, our main difference in design was that we made no provision for the purely "pleasure car." We were just as much a pleasure car as any other car on the market, but we gave no attention to purely luxury features. We would do special work for a buyer, and I suppose that we would have made a special car at a price. We were a prosperous company. We might easily have sat down and said: "Now we have arrived. Let us hold what we have got."

Indeed, there was some disposition to take this stand.

Some of the stockholders were seriously alarmed when our production reached one hundred cars a day. They wanted to do something to stop me from ruining the company, and when I replied to the effect that one hundred cars a day was only a trifle and that I hoped before long to make a thousand a day, they were inexpressibly shocked and I understand seriously contemplated court action. If I had followed the general opinion of my associates I should have kept the business about as it was, put our funds into a fine administration building, tried to make bargains with such competitors as seemed too active, made new designs from time to time to catch the fancy of the public, and generally have passed on into the position of a quiet, respectable citizen with a quiet, respectable business.

The temptation to stop and hang on to what one has is quite natural. I can entirely sympathize with the desire to quit a life of activity and retire to a life of ease. I have never felt the urge myself but I can comprehend what it is—although I think that a man who retires ought entirely to get out of a business. There is a disposition to retire and retain control. It was, however, no part of my plan to do anything of that sort. I regarded our progress merely as an invitation to do more—as an indication that we had reached a place where we might begin to perform a real service. I had been planning every day through these years toward a universal car. The public had given its reactions to the various models. The cars in service, the racing, and the road tests gave excellent guides as to the changes that ought to be made, and even by 1905 I had fairly in mind the specifications of the kind of car I wanted to build. But I lacked the material to give strength without weight. I came across that material almost by accident.

In 1905 I was at a motor race at Palm Beach. There was a big smash-up and a French car was wrecked. We

had entered our "Model K"—the high-powered six. I thought the foreign cars had smaller and better parts than we knew anything about. After the wreck I picked up a little valve strip stem. It was very light and very strong. I asked what it was made of. Nobody knew. I gave the stem to my assistant.

"Find out all about this," I told him. "That is the kind of material we ought to have in our cars."

He found eventually that it was a French steel and that there was vanadium in it. We tried every steel maker in America—not one could make vanadium steel. I sent to England for a man who understood how to make the steel commercially. The next thing was to get a plant to turn it out. That was another problem. Vanadium requires 3,000 degrees Fahrenheit. The ordinary furnace could not go beyond 2,700 degrees. I found a small steel company in Canton, Ohio. I offered to guarantee them against loss if they would run a heat for us. They agreed. The first heat was a failure. Very little vanadium remained in the steel. I had them try again, and the second time the steel came through. Until then we had been forced to be satisfied with steel running between 60,000 and 70,000 pounds tensile strength. With vanadium, the strength went up to 170,000 pounds.

Having vanadium in hand I pulled apart our models and tested in detail to determine what kind of steel was best for every part—whether we wanted a hard steel, a tough steel, or an elastic steel. We, for the first time I think, in the history of any large construction, determined scientifically the exact quality of the steel. As a result we then selected twenty different types of steel for the various steel parts. About ten of these were vanadium. Vanadium was used wherever strength and lightness were required. Of course they are not all the same kind of vanadium steel. The other elements vary according to

whether the part is to stand hard wear or whether it needs spring—in short, according to what it needs. Before these experiments I believe that not more than four different grades of steel had ever been used in automobile construction. By further experimenting, especially in the direction of heat treating, we have been able still further to increase the strength of the steel and therefore to reduce the weight of the car. In 1910 the French Department of Commerce and Industry took one of our steering spindle connecting rod yokes—selecting it as a vital unit—and tried it against a similar part from what they considered the best French car, and in every test our steel proved the stronger.

The vanadium steel disposed of much of the weight. The other requisites of a universal car I had already worked out and many of them were in practice. The design had to balance. Men die because a part gives out. Machines wreck themselves because some parts are weaker than others. Therefore, a part of the problem in designing a universal car was to have as nearly as possible all parts of equal strength considering their purpose—to put a motor in a one-horse shay. Also it had to be fool proof. This was difficult because a gasoline motor is essentially a delicate instrument and there is a wonderful opportunity for any one who has a mind that way to mess it up. I adopted this slogan:

“When one of my cars breaks down I know I am to blame.”

From the day the first motor car appeared on the streets it had to me appeared to be a necessity. It was this knowledge and assurance that led me to build to the one end—a car that would meet the wants of the multitudes. All my efforts were then and still are turned to the production of one car—one model. And, year following year, the pressure was, and still is, to improve and

refine and make better, with an increasing reduction in price. The universal car had to have these attributes:

(1) Quality in material to give service in use. Vanadium steel is the strongest, toughest, and most lasting of steels. It forms the foundation and super-structure of the cars. It is the highest quality steel in this respect in the world, regardless of price.

(2) Simplicity in operation—because the masses are not mechanics.

(3) Power in sufficient quantity.

(4) Absolute reliability—because of the varied uses to which the cars would be put and the variety of roads over which they would travel.

(5) Lightness. With the Ford there are only 7.95 pounds to be carried by each cubic inch of piston displacement. This is one of the reasons why Ford cars are “always going,” wherever and whenever you see them—through sand and mud, through slush, snow, and water, up hills, across fields and roadless plains.

(6) Control—to hold its speed always in hand, calmly and safely meeting every emergency and contingency either in the crowded streets of the city or on dangerous roads. The planetary transmission of the Ford gave this control and anybody could work it. That is the “why” of the saying: “Anybody can drive a Ford.” It can turn around almost anywhere.

(7) The more a motor car weighs, naturally the more fuel and lubricants are used in the driving; the lighter the weight, the lighter the expense of operation. The light weight of the Ford car in its early years was used as an argument against it. Now that is all changed.

The design which I settled upon was called “Model T.” The important feature of the new model—which, if it were accepted, as I thought it would be, I intended to make the

only model and then start into real production—was its simplicity. There were but four constructional units in the car—the power plant, the frame, the front axle, and the rear axle. All of these were easily accessible and they were designed so that no special skill would be required for their repair or replacement. I believed then, although I said very little about it because of the novelty of the idea, that it ought to be possible to have parts so simple and so inexpensive that the menace of expensive hand repair work would be entirely eliminated. The parts could be made so cheaply that it would be less expensive to buy new ones than to have old ones repaired. They could be carried in hardware shops just as nails or bolts are carried. I thought that it was up to me as the designer to make the car so completely simple that no one could fail to understand it.

That works both ways and applies to everything. The less complex an article, the easier it is to make, the cheaper it may be sold, and therefore the greater number may be sold.

It is not necessary to go into the technical details of the construction but perhaps this is as good a place as any to review the various models, because "Model T" was the last of the models and the policy which it brought about took this business out of the ordinary line of business. Application of the same idea would take any business out of the ordinary run.

I designed eight models in all before "Model T." They were: "Model A," "Model B," "Model C," "Model F," "Model N," "Model R," "Model S," and "Model K." Of these, Models "A," "C," and "F" had two-cylinder opposed horizontal motors. In "Model A" the motor was at the rear of the driver's seat. In all of the other models it was in a hood in front. Models "B," "N," "R," and "S" had motors of the four-

cylinder vertical type. "Model K" had six cylinders. "Model A" developed eight horsepower. "Model B" developed twenty-four horsepower with a $4\frac{1}{2}$ -inch cylinder and a 5-inch stroke. The highest horsepower was in "Model K," the six-cylinder car, which developed forty horsepower. The largest cylinders were those of "Model B." The smallest were in Models "N," "R," and "S" which were $3\frac{3}{4}$ inches in diameter with a $3\frac{3}{8}$ -inch stroke. "Model T" has a $3\frac{3}{4}$ -inch cylinder with a 4-inch stroke. The ignition was by dry batteries in all excepting "Model B," which had storage batteries, and in "Model K" which had both battery and magneto. In the present model, the magneto is a part of the power plant and is built in. The clutch in the first four models was of the cone type; in the last four and in the present model, of the multiple disc type. The transmission in all of the cars has been planetary. "Model A" had a chain drive. "Model B" had a shaft drive. The next two models had chain drives. Since then all of the cars have had shaft drives. "Model A" had a 72-inch wheel base. Model "B," which was an extremely good car, had 92 inches. "Model K" had 120 inches. "Model C" had 78 inches. The others had 84 inches, and the present car has 100 inches. In the first five models all of the equipment was extra. The next three were sold with a partial equipment. The present car is sold with full equipment. Model "A" weighed 1,250 pounds. The lightest cars were Models "N" and "R." They weighed 1,050 pounds, but they were both runabouts. The heaviest car was the six-cylinder, which weighed 2,000 pounds. The present car weighs 1,200 lbs.

The "Model T" had practically no features which were not contained in some one or other of the previous models. Every detail had been fully tested in practice. There was no guessing as to whether or not it would be a successful

model. It had to be. There was no way it could escape being so, for it had not been made in a day. It contained all that I was then able to put into a motor car plus the material, which for the first time I was able to obtain. We put out "Model T" for the season 1908-1909.

The company was then five years old. The original factory space had been .28 acre. We had employed an average of 311 people in the first year, built 1,708 cars, and had one branch house. In 1908, the factory space had increased to 2.65 acres and we owned the building. The average number of employees had increased to 1,908. We built 6,181 cars and had fourteen branch houses. It was a prosperous business.

During the season 1908-1909 we continued to make Models "R" and "S," four-cylinder runabouts and roadsters, the models that had previously been so successful, and which sold at \$700 and \$750. But "Model T" swept them right out. We sold 10,607 cars—a larger number than any manufacturer had ever sold. The price for the touring car was \$850. On the same chassis we mounted a town car at \$1,000, a roadster at \$825, a coupé at \$950, and a landaulet at \$950.

This season demonstrated conclusively to me that it was time to put the new policy in force. The salesmen, before I had announced the policy, were spurred by the great sales to think that even greater sales might be had if only we had more models. It is strange how, just as soon as an article becomes successful, somebody starts to think that it would be more successful if only it were different. There is a tendency to keep monkeying with styles and to spoil a good thing by changing it. The salesmen were insistent on increasing the line. They listened to the 5 per cent., the special customers who could say what they wanted, and forgot all about the

95 per cent. who just bought without making any fuss. No business can improve unless it pays the closest possible attention to complaints and suggestions. If there is any defect in service then that must be instantly and rigorously investigated, but when the suggestion is only as to style, one has to make sure whether it is not merely a personal whim that is being voiced. Salesmen always want to cater to whims instead of acquiring sufficient knowledge of their product to be able to explain to the customer with the whim that what they have will satisfy his every requirement—that is, of course, provided what they have does satisfy these requirements.

Therefore in 1909 I announced one morning, without any previous warning, that in the future we were going to build only one model, that the model was going to be “Model T,” and that the chassis would be exactly the same for all cars, and I remarked:

“Any customer can have a car painted any colour that he wants so long as it is black.”

I cannot say that any one agreed with me. The selling people could not of course see the advantages that a single model would bring about in production. More than that, they did not particularly care. They thought that our production was good enough as it was and there was a very decided opinion that lowering the sales price would hurt sales, that the people who wanted quality would be driven away and that there would be none to replace them. There was very little conception of the motor industry. A motor car was still regarded as something in the way of a luxury. The manufacturers did a good deal to spread this idea. Some clever persons invented the name “pleasure car” and the advertising emphasized the pleasure features. The sales people had ground for their objections and particularly when I made the following announcement:

I will build a motor car for the great multitude. It will be large enough for the family but small enough for the individual to run and care for. It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no man making a good salary will be unable to own one—and enjoy with his family the blessing of hours of pleasure in God's great open spaces.

This announcement was received not without pleasure. The general comment was:

"If Ford does that he will be out of business in six months."

The impression was that a good car could not be built at a low price, and that, anyhow, there was no use in building a low-priced car because only wealthy people were in the market for cars. The 1908-1909 sales of more than ten thousand cars had convinced me that we needed a new factory. We already had a big modern factory—the Piquette Street plant. It was as good as, perhaps a little better than, any automobile factory in the country. But I did not see how it was going to care for the sales and production that were inevitable. So I bought sixty acres at Highland Park, which was then considered away out in the country from Detroit. The amount of ground bought and the plans for a bigger factory than the world has ever seen were opposed. The question was already being asked:

"How soon will Ford blow up?"

Nobody knows how many thousand times it has been asked since. It is asked only because of the failure to grasp that a principle rather than an individual is at work, and the principle is so simple that it seems mysterious. *

For 1909-1910, in order to pay for the new land and buildings, I slightly raised the prices. This is perfectly justifiable and results in a benefit, not an injury, to the purchaser. I did exactly the same thing a few years ago—or rather, in that case I did not lower the price as is my

annual custom, in order to build the River Rouge plant. The extra money might in each case have been had by borrowing, but then we should have had a continuing charge upon the business and all subsequent cars would have had to bear this charge. The price of all the models was increased \$100, with the exception of the roadster, which was increased only \$75 and of the landaulet and town car, which were increased \$150 and \$200 respectively. We sold 18,664 cars, and then for 1910-1911, with the new facilities, I cut the touring car from \$950 to \$780 and we sold 34,528 cars. That is the beginning of the steady reduction in the price of the cars in the face of ever-increasing cost of materials and ever-higher wages.

Contrast the year 1908 with the year 1911. The factory space increased from 2.65 to 32 acres. The average number of employees from 1,908 to 4,110, and the cars built from a little over six thousand to nearly thirty-five thousand. You will note that men were not employed in proportion to the output.

We were, almost overnight it seems, in great production. How did all this come about?

Simply through the application of an inevitable principle. By the application of intelligently directed power and machinery. In a little dark shop on a side street an old man had laboured for years making axe handles. Out of seasoned hickory he fashioned them, with the help of a draw shave, a chisel, and a supply of sandpaper. Carefully was each handle weighed and balanced. No two of them were alike. The curve must exactly fit the hand and must conform to the grain of the wood. From dawn until dark the old man laboured. His average product was eight handles a week, for which he received a dollar and a half each. And often some of these were unsaleable—because the balance was not true.

To-day you can buy a better axe handle, made by

machinery, for a few cents. And you need not worry about the balance. They are all alike—and every one is perfect. Modern methods applied in a big way have not only brought the cost of axe handles down to a fraction of their former cost—but they have immensely improved the product.

It was the application of these same methods to the making of the Ford car that at the very start lowered the price and heightened the quality. We just developed an idea. The nucleus of a business may be an idea. That is, an inventor or a thoughtful workman works out a new and better way to serve some established human need; the idea commends itself, and people want to avail themselves of it. In this way a single individual may prove, through his idea or discovery, the nucleus of a business. But the creation of the body and bulk of that business is shared by everyone who has anything to do with it. No manufacturer can say: "I built this business"—if he has required the help of thousands of men in building it. It is a joint production. Everyone employed in it has contributed something to it. By working and producing they make it possible for the purchasing world to keep coming to that business for the type of service it provides, and thus they help establish a custom, a trade, a habit which supplies them with a livelihood. That is the way our company grew and just how I shall start explaining in the next chapter.

In the meantime, the company had become world-wide. We had branches in London and in Australia. We were shipping to every part of the world, and in England particularly we were beginning to be as well known as in America. The introduction of the car in England was somewhat difficult on account of the failure of the American bicycle. Because the American bicycle had not been suited to English uses it was taken for granted and made a point of by the distributors that no American vehicle

could appeal to the British market. Two "Model A's" found their way to England in 1903. The newspapers refused to notice them. The automobile agents refused to take the slightest interest. It was rumoured that the principal components of its manufacture were string and hoop wire and that a buyer would be lucky if it held together for a fortnight! In the first year about a dozen cars in all were used; the second was only a little better. And I may say as to the reliability of that "Model A" that most of them after nearly twenty years are still in some kind of service in England.

In 1905 our agent entered a "Model C" in the Scottish Reliability Trials. In those days reliability runs were more popular in England than motor races. Perhaps there was an inkling that after all an automobile was not merely a toy. The Scottish Trials was over eight hundred miles of hilly, heavy roads. The Ford came through with only one involuntary stop against it. That started the Ford sales in England. In that same year Ford taxicabs were placed in London for the first time. In the next several years the sales began to pick up. The cars went into every endurance and reliability test and won every one of them. The Brighton dealer had ten Fords driven over the South Downs for two days in a kind of steeplechase and every one of them came through. As a result six hundred cars were sold that year. In 1911 Henry Alexander drove a "Model T" to the top of Ben Nevis, 4,600 feet. That year 14,060 cars were sold in England, and it has never since been necessary to stage any kind of a stunt. We eventually opened our own factory at Manchester; at first it was purely an assembling plant. But as the years have gone by we have progressively made more and more of the car.

CHAPTER V

GETTING INTO PRODUCTION

IF a device would save in time just 10 per cent. or increase results 10 per cent., then its absence is always a 10 per cent. tax. If the time of a person is worth fifty cents an hour, a 10 per cent. saving is worth five cents an hour. If the owner of a skyscraper could increase his income 10 per cent, he would willingly pay half the increase just to know how. The reason why he owns a skyscraper is that science has proved that certain materials, used in a given way, can save space and increase rental incomes. A building thirty stories high needs no more ground space than one five stories high. Getting along with the old-style architecture costs the five-story man the income of twenty-five floors. Save ten steps a day for each of twelve thousand employees and you will have saved fifty miles of wasted motion and misspent energy.

Those are the principles on which the production of my plant was built up. They all come practically as of course. In the beginning we tried to get machinists. As the necessity for production increased it became apparent not only that enough machinists were not to be had, but also that skilled men were not necessary in production, and out of this grew a principle that I later want to present in full.

It is self-evident that a majority of the people in the world are not mentally—even if they are physically—capable of making a good living. That is, they are not capable of furnishing with their own hands a sufficient

quantity of the goods which this world needs to be able to exchange their unaided product for the goods which they need. I have heard it said, in fact I believe it is quite a current thought, that we have taken skill out of work. We have not. We have put in skill. We have put a higher skill into planning, management, and tool building, and the results of that skill are enjoyed by the man who is not skilled. This I shall later enlarge on.

We have to recognize the unevenness in human mental equipments. If every job in our place required skill the place would never have existed. Sufficiently skilled men to the number needed could not have been trained in a hundred years. A million men working by hand could not even approximate our present daily output. No one could manage a million men. But more important than that, the product of the unaided hands of those million men could not be sold at a price in consonance with buying power. And even if it were possible to imagine such an aggregation and imagine its management and correlation, just think of the area that it would have to occupy! How many of the men would be engaged, not in producing, but in merely carrying from place to place what the other men had produced? I cannot see how under such conditions the men could possibly be paid more than ten or twenty cents a day—for of course it is not the employer who pays wages. He only handles the money. It is the product that pays the wages and it is the management that arranges the production so that the product may pay the wages.

The more economical methods of production did not begin all at once. They began gradually—just as we began gradually to make our own parts. “Model T” was the first motor that we made ourselves. The great economies began in assembling and then extended to other sections so that, while to-day we have skilled mechanics

in plenty, they do not produce automobiles—they make it easy for others to produce them. Our skilled men are the tool makers, the experimental workmen, the machinists, and the pattern makers. They are as good as any men in the world—so good, indeed, that they should not be wasted in doing that which the machines they contrive can do better. The rank and file of men come to us unskilled; they learn their jobs within a few hours or a few days. If they do not learn within that time they will never be of any use to us. These men are, many of them, foreigners, and all that is required before they are taken on is that they should be potentially able to do enough work to pay the overhead charges on the floor space they occupy. They do not have to be able-bodied men. We have jobs that require great physical strength—although they are rapidly lessening; we have other jobs that require no strength whatsoever—jobs which, as far as strength is concerned, might be attended to by a child of three.

It is not possible, without going deeply into technical processes, to present the whole development of manufacturing, step by step, in the order in which each thing came about. I do not know that this could be done, because something has been happening nearly every day and nobody can keep track. Take at random a number of the changes. From them it is possible not only to gain some idea of what will happen when this world is put on a production basis, but also to see how much more we pay for things than we ought to, and how much lower wages are than they ought to be, and what a vast field remains to be explored. The Ford Company is only a little way along on the journey.

A Ford car contains about five thousand parts—that is counting screws, nuts, and all. Some of the parts are fairly bulky and others are almost the size of watch parts. In our first assembling we simply started to put a car

together at a spot on the floor and workmen brought to it the parts as they were needed in exactly the same way that one builds a house. When we started to make parts it was natural to create a single department of the factory to make that part, but usually one workman performed all of the operations necessary on a small part. The rapid press of production made it necessary to devise plans of production that would avoid having the workers falling over one another. The undirected worker spends more of his time walking about for materials and tools than he does in working; he gets small pay because pedestrianism is not a highly paid line.

The first step forward in assembly came when we began taking the work to the men instead of the men to the work. We now have two general principles in all operations—that a man shall never have to take more than one step, if possibly it can be avoided, and that no man need ever stoop over.

The principles of assembly are these:

(1) Place the tools and the men in the sequence of the operation so that each component part shall travel the least possible distance while in the process of finishing.

(2) Use work slides or some other form of carrier so that when a workman completes his operation, he drops the part always in the same place—which place must always be the most convenient place to his hand—and if possible have gravity carry the part to the next workman for his operation.

(3) Use sliding assembling lines by which the parts to be assembled are delivered at convenient distances.

The net result of the application of these principles is the reduction of the necessity for thought on the part of the worker and the reduction of his movements to a minimum. He does as nearly as possible only one thing with only one movement.

The assembling of the chassis is, from the point of view of the non-mechanical mind, our most interesting and perhaps best known operation, and at one time it was an exceedingly important operation. We now ship out the parts for assembly at the point of distribution.

Along about April 1, 1913, we first tried the experiment of an assembly line. We tried it on assembling the fly-wheel magneto. We try everything in a little way first—we will rip out anything once we discover a better way, but we have to know absolutely that the new way is going to be better than the old before we do anything drastic.

I believe that this was the first moving line ever installed. The idea came in a general way from the overhead trolley that the Chicago packers use in dressing beef. We had previously assembled the fly-wheel magneto in the usual method. With one workman doing a complete job he could turn out from thirty-five to forty pieces in a nine-hour day, or about twenty minutes to an assembly. What he did alone was then spread into twenty-nine operations; that cut down the assembly time to thirteen minutes, ten seconds. Then we raised the height of the line eight inches—this was in 1914—and cut the time to seven minutes. Further experimenting with the speed that the work should move at cut the time down to five minutes. In short, the result is this: by the aid of scientific study one man is now able to do somewhat more than four did only a comparatively few years ago. That line established the efficiency of the method and we now use it everywhere. The assembling of the motor, formerly done by one man, is now divided into eighty-four operations—those men do the work that three times their number formerly did. In a short time we tried out the plan on the chassis.

About the best we had done in stationary chassis assembling was an average of twelve hours and twenty-

eight minutes per chassis. We tried the experiment of drawing the chassis with a rope and windlass down a line two hundred fifty feet long. Six assemblers travelled with the chassis and picked up the parts from piles placed along the line. This rough experiment reduced the time to five hours fifty minutes per chassis. In the early part of 1914 we elevated the assembly line. We had adopted the policy of "man-high" work; we had one line twenty-six and three quarter inches and another twenty-four and one half inches from the floor—to suit squads of different heights. The waist-high arrangement and a further subdivision of work so that each man had fewer movements cut down the labour time per chassis to one hour thirty-three minutes. Only the chassis was then assembled in the line. The body was placed on in "John R. Street"—the famous street that runs through our Highland Park factories. Now the line assembles the whole car.

It must not be imagined, however, that all this worked out as quickly as it sounds. The speed of the moving work had to be carefully tried out; in the fly-wheel magneto we first had a speed of sixty inches per minute. That was too fast. Then we tried eighteen inches per minute. That was too slow. Finally we settled on forty-four inches per minute. The idea is that a man must not be hurried in his work—he must have every second necessary but not a single unnecessary second. We have worked out speeds for each assembly, for the success of the chassis assembly caused us gradually to overhaul our entire method of manufacturing and to put all assembling in mechanically driven lines. The chassis assembling line, for instance, goes at a pace of six feet per minute; the front axle assembly line goes at one hundred eighty-nine inches per minute. In the chassis assembling are forty-five separate operations or stations. The first

men fasten four mud-guard brackets to the chassis frame; the motor arrives on the tenth operation and so on in detail. Some men do only one or two small operations, others do more. The man who places a part does not fasten it—the part may not be fully in place until after several operations later. The man who puts in a bolt does not put on the nut; the man who puts on the nut does not tighten it. On operation number thirty-four the budding motor gets its gasoline; it has previously received lubrication; on operation number forty-four the radiator is filled with water, and on operation number forty-five the car drives out onto John R. Street.

Essentially the same ideas have been applied to the assembling of the motor. In October, 1913, it required nine hours and fifty-four minutes of labour time to assemble one motor; six months later, by the moving assembly method, this time had been reduced to five hours and fifty-six minutes. Every piece of work in the shops moves; it may move on hooks on overhead chains going to assembly in the exact order in which the parts are required; it may travel on a moving platform, or it may go by gravity, but the point is that there is no lifting or trucking of anything other than materials. Materials are brought in on small trucks or trailers operated by cut-down Ford chassis, which are sufficiently mobile and quick to get in and out of any aisle where they may be required to go. No workman has anything to do with moving or lifting anything. That is all in a separate department—the department of transportation.

We started assembling a motor car in a single factory. Then as we began to make parts, we began to departmentalize so that each department would do only one thing. As the factory is now organized each department makes only a single part or assembles a part. A department is a little factory in itself. The part comes into it as raw

material or as a casting, goes through the sequence of machines and heat treatments, or whatever may be required, and leaves that department finished. It was only because of transport ease that the departments were grouped together when we started to manufacture. I did not know that such minute divisions would be possible; but as our production grew and departments multiplied, we actually changed from making automobiles to making parts. Then we found that we had made another new discovery, which was that by no means all of the parts had to be made in one factory. It was not really a discovery—it was something in the nature of going around in a circle to my first manufacturing when I bought the motors and probably ninety per cent. of the parts. When we began to make our own parts we practically took for granted that they all had to be made in the one factory—that there was some special virtue in having a single roof over the manufacture of the entire car. We have now developed away from this. If we build any more large factories, it will be only because the making of a single part must be in such tremendous volume as to require a large unit. I hope that in the course of time the big Highland Park plant will be doing only one or two things. The casting has already been taken away from it and has gone to the River Rouge plant. So now we are on our way back to where we started from—excepting that, instead of buying our parts on the outside, we are beginning to make them in our own factories on the outside.

This is a development which holds exceptional consequences, for it means, as I shall enlarge in a later chapter, that highly standardized, highly subdivided industry need no longer become concentrated in large plants with all the inconveniences of transportation and housing that hamper large plants. A thousand or five hundred men ought to be enough in a single factory; then there would be no problem

of transporting them to work or away from work and there would be no slums or any of the other unnatural ways of living incident to the overcrowding that must take place if the workmen are to live within reasonable distances of a very large plant.

Highland Park now has five hundred departments. Down at our Piquette plant we had only eighteen departments, and formerly at Highland Park we had only one hundred and fifty departments. This illustrates how far we are going in the manufacture of parts.

Hardly a week passes without some improvement being made somewhere in machine or process, and sometimes this is made in defiance of what is called "the best shop practice." I recall that a machine manufacturer was once called into conference on the building of a special machine. The specifications called for an output of two hundred per hour.

"This is a mistake," said the manufacturer, "you mean two hundred a day—no machine can be forced to two hundred an hour."

The company officer sent for the man who had designed the machine and they called his attention to the specification. He said:

"Yes, what about it?"

"It can't be done," said the manufacturer positively, "no machine built will do that—it is out of the question."

"Out of the question!" exclaimed the engineer, "if you will come down to the main floor you will see one doing it; we built one to see if it could be done and now we want more like it."

The factory keeps no record of experiments. The foremen and superintendents remember what has been done. If a certain method has formerly been tried and failed, somebody will remember it—but I am not particularly anxious for the men to remember what someone else has

tried to do in the past, for then we might quickly accumulate far too many things that could not be done. That is one of the troubles with extensive records. If you keep on recording all of your failures you will shortly have a list showing that there is nothing left for you to try—whereas it by no means follows because one man has failed in a certain method that another man will not succeed.

They told us we could not cast gray iron by our endless chain method and I believe there is a record of failures. But we are doing it. The man who carried through our work either did not know or paid no attention to the previous figures. Likewise we were told that it was out of the question to pour the hot iron directly from the blast furnace into mould. The usual method is to run the iron into pigs, let them season for a time, and then remelt them for casting. But at the River Rouge plant we are casting directly from cupolas that are filled from the blast furnaces. Then, too, a record of failures—particularly if it is a dignified and well-authenticated record—deters a young man from trying. We get some of our best results from letting fools rush in where angels fear to tread.

None of our men are “experts.” We have most unfortunately found it necessary to get rid of a man as soon as he thinks himself an expert—because no one ever considers himself expert if he really knows his job. A man who knows a job sees so much more to be done than he has done, that he is always pressing forward and never gives up an instant of thought to how good and how efficient he is. Thinking always ahead, thinking always of trying to do more, brings a state of mind in which nothing is impossible. The moment one gets into the “expert” state of mind a great number of things become impossible.

I refuse to recognize that there are impossibilities. I cannot discover that any one knows enough about anything on this earth definitely to say what is and what is not

possible. The right kind of experience, the right kind of technical training, ought to enlarge the mind and reduce the number of impossibilities. It unfortunately does nothing of the kind. Most technical training and the average of that which we call experience, provide a record of previous failures and, instead of these failures being taken for what they are worth, they are taken as absolute bars to progress. If some man, calling himself an authority, says that this or that cannot be done, then a horde of unthinking followers start the chorus: "It can't be done."

Take castings. - Casting has always been a wasteful process and is so old that it has accumulated many traditions which make improvements extraordinarily difficult to bring about. I believe one authority on moulding declared—before we started our experiments—that any man who said he could reduce costs within half a year wrote himself down as a fraud.

Our foundry used to be much like other foundries. When we cast the first "Model T" cylinders in 1910, everything in the place was done by hand; shovels and wheelbarrows abounded. The work was then either skilled or unskilled; we had moulders and we had labourers. Now we have about five per cent. of thoroughly skilled moulders and core setters, but the remaining 95 per cent. are unskilled, or to put it more accurately, must be skilled in exactly one operation which the most stupid man can learn within two days. The moulding is all done by machinery. Each part which we have to cast has a unit or units of its own—according to the number required in the plan of production. The machinery of the unit is adapted to the single casting; thus the men in the unit each perform a single operation that is always the same. A unit consists of an overhead railway to which at intervals are hung little platforms for the moulds. Without going

into technical details, let me say the making of the moulds and the cores, and the packing of the cores, are done with the work in motion on the platforms. The metal is poured at another point as the work moves, and by the time the mould in which the metal has been poured reaches the terminal, it is cool enough to start on its automatic way to cleaning, machining, and assembling. And the platform is moving around for a new load.

Take the development of the piston-rod assembly. Even under the old plan, this operation took only three minutes and did not seem to be one to bother about. There were two benches and twenty-eight men in all; they assembled one hundred seventy-five pistons and rods in a nine-hour day—which means just five seconds over three minutes each. There was no inspection, and many of the piston and rod assemblies came back from the motor assembling line as defective. It is a very simple operation. The workman pushed the pin out of the piston, oiled the pin, slipped the rod in place, put the pin through the rod and piston, tightened one screw, and opened another screw. That was the whole operation. The foreman, examining the operation, could not discover why it should take as much as three minutes. He analyzed the motions with a stop-watch. He found that four hours out of a nine-hour day were spent in walking. The assembler did not go off anywhere, but he had to shift his feet to gather in his materials and to push away his finished piece. In the whole task, each man performed six operations. The foreman devised a new plan; he split the operation into three divisions, put a slide on the bench and three men on each side of it, and an inspector at the end. Instead of one man performing the whole operation, one man then performed only one third of the operation—he performed only as much as he could do without shifting his feet. They cut down the squad from twenty-eight to fourteen men.

The former record for twenty-eight men was one hundred seventy-five assemblies a day. Now seven men turn out twenty-six hundred assemblies in eight hours. It is not necessary to calculate the savings there!

Painting the rear axle assembly once gave some trouble. It used to be dipped by hand into a tank of enamel. This required several handlings and the services of two men. Now one man takes care of it all on a special machine, designed and built in the factory. The man now merely hangs the assembly on a moving chain which carries it up over the enamel tank, two levers then thrust thimbles over the ends of the ladle shaft, the paint tank rises six feet, immerses the axle, returns to position, and the axle goes on to the drying oven. The whole cycle of operations now takes just thirteen seconds.

The radiator is a complex affair and soldering it used to be a matter of skill. There are ninety-five tubes in a radiator. Fitting and soldering these tubes in place is by hand a long operation, requiring both skill and patience. Now it is all done by a machine which will make twelve hundred radiator cores in eight hours; then they are soldered in place by being carried through a furnace by a conveyor. No tinsmith work and so no skill are required.

We used to rivet the crank-case arms to the crank-case, using pneumatic hammers which were supposed to be the latest development. It took six men to hold the hammers and six men to hold the casings, and the din was terrific. Now an automatic press operated by one man, who does nothing else, gets through five times as much work in a day as those twelve men did.

In the Piquette plant the cylinder casting travelled four thousand feet in the course of finishing; now it travels only slightly over three hundred feet.

There is no manual handling of material. There is not a

single hand operation. If a machine can be made automatic, it is made automatic. Not a single operation is ever considered as being done in the best or cheapest way. At that, only about ten per cent. of our tools are special; the others are regular machines adjusted to the particular job. And they are placed almost side by side. We put more machinery per square foot of floor space than any other factory in the world—every foot of space not used carries an overhead expense. We want none of that waste. Yet there is all the room needed—no man has too much room and no man has too little room. Dividing and subdividing operations, keeping the work in motion—those are the keynotes of production. But also it is to be remembered that all the parts are designed so that they can be most easily made. And the saving? Although the comparison is not quite fair, it is startling. If at our present rate of production we employed the same number of men per car that we did when we began in 1903—and those men were only for assembly—we should to-day require a force of more than two hundred thousand. We have less than fifty thousand men on automobile production at our highest point of around four thousand cars a day!

CHAPTER VI

MACHINES AND MEN

THAT which one has to fight hardest against in bringing together a large number of people to do work is excess organization and consequent red tape. To my mind there is no bent of mind more dangerous than that which is sometimes described as the "genius for organization." This usually results in the birth of a great big chart showing, after the fashion of a family tree, how authority ramifies. The tree is heavy with nice round berries, each of which bears the name of a man or of an office. Every man has a title and certain duties which are strictly limited by the circumference of his berry.

If a straw boss wants to say something to the general superintendent, his message has to go through the subforeman, the foreman, the department head, and all the assistant superintendents, before, in the course of time, it reaches the general superintendent. Probably by that time what he wanted to talk about is already history. It takes about six weeks for the message of a man living in a berry on the lower left-hand corner of the chart to reach the president or chairman of the board, and if it ever does reach one of these august officials, it has by that time gathered to itself about a pound of criticisms, suggestions, and comments. Very few things are ever taken under "official consideration" until long after the time when they actually ought to have been done. The buck is passed to and fro and all responsibility is dodged by individuals—following the lazy notion that two heads are better than one.

Now a business, in my way of thinking, is not a machine. It is a collection of people who are brought together to do work and not to write letters to one another. It is not necessary for any one department to know what any other department is doing. If a man is doing his work he will not have time to take up any other work. It is the business of those who plan the entire work to see that all of the departments are working properly toward the same end. It is not necessary to have meetings to establish good feeling between individuals or departments. It is not necessary for people to love each other in order to work together. Too much good fellowship may indeed be a very bad thing, for it may lead to one man trying to cover up the faults of another. That is bad for both men.

When we are at work we ought to be at work. When we are at play we ought to be at play. There is no use trying to mix the two. The sole object ought to be to get the work done and to get paid for it. When the work is done, then the play can come, but not before. And so the Ford factories and enterprises have no organization, no specific duties attaching to any position, no line of succession or of authority, very few titles, and no conferences. We have only the clerical help that is absolutely required; we have no elaborate records of any kind, and consequently no red tape.

We make the individual responsibility complete. The workman is absolutely responsible for his work. The straw boss is responsible for the workmen under him. The foreman is responsible for his group. The department head is responsible for the department. The general superintendent is responsible for the whole factory. Every man has to know what is going on in his sphere. I say "general superintendent." There is no such formal title. One man is in charge of the factory and has been for years. He has two men with him, who, without in any way

having their duties defined, have taken particular sections of the work to themselves. With them are about half a dozen other men in the nature of assistants, but without specific duties. They have all made jobs for themselves—but there are no limits to their jobs. They just work in where they best fit. One man chases stock and shortages. Another has grabbed inspection, and so on.

This may seem haphazard, but it is not. A group of men, wholly intent upon getting work done, have no difficulty in seeing that the work is done. They do not get into trouble about the limits of authority, because they are not thinking of titles. If they had offices and all that, they would shortly be giving up their time to office work and to wondering why did they not have a better office than some other fellow.

Because there are no titles and no limits of authority, there is no question of red tape or going over a man's head. Any workman can go to anybody, and so established has become this custom, that a foreman does not get sore if a workman goes over him and directly to the head of the factory. The workman rarely ever does so, because a foreman knows as well as he knows his own name that if he has been unjust it will be very quickly found out, and he shall no longer be a foreman. One of the things that we will not tolerate is injustice of any kind. The moment a man starts to swell with authority he is discovered, and he goes out, or goes back to a machine. A large amount of labour unrest comes from the unjust exercise of authority by those in subordinate positions, and I am afraid that in far too many manufacturing institutions it is really not possible for a workman to get a square deal.

The work and the work alone controls us. That is one of the reasons why we have no titles. Most men can swing a job, but they are floored by a title. The effect of a

title is very peculiar. It has been used too much as a sign of emancipation from work. It is almost equivalent to a badge bearing the legend:

“This man has nothing to do but regard himself as important and all others as inferior.”

Not only is a title often injurious to the wearer, but it has its effect on others as well. There is perhaps no greater single source of personal dissatisfaction among men than the fact that the title-bearers are not always the real leaders. Everybody acknowledges a real leader—a man who is fit to plan and command. And when you find a real leader who bears a title, you will have to inquire of someone else what his title is. He doesn't boast about it.

Titles in business have been greatly overdone and business has suffered. One of the bad features is the division of responsibility according to titles, which goes so far as to amount to a removal altogether of responsibility. Where responsibility is broken up into many small bits and divided among many departments, each department under its own titular head, who in turn is surrounded by a group bearing their nice sub-titles, it is difficult to find any one who really feels responsible. Everyone knows what “passing the buck” means. The game must have originated in industrial organizations where the departments simply shove responsibility along. The health of every organization depends on every member—whatever his place—feeling that everything that happens to come to his notice relating to the welfare of the business is his own job. Railroads have gone to the devil under the eyes of departments that say:

“Oh, that doesn't come under our department. Department X, 100 miles away, has that in charge.”

There used to be a lot of advice given to officials not to hide behind their titles. The very necessity for the advice showed a condition that needed more than advice

to correct it. And the correction is just this—abolish the titles. A few may be legally necessary; a few may be useful in directing the public how to do business with the concern, but for the rest the best rule is simple: “Get rid of them.”

As a matter of fact, the record of business in general just now is such as to detract very much from the value of titles. No one would boast of being president of a bankrupt bank. Business on the whole has not been so skillfully steered as to leave much margin for pride in the steersmen. The men who bear titles now and are worth anything are forgetting their titles and are down in the foundation of business looking for the weak spots. They are back again in the places from which they rose—trying to reconstruct from the bottom up. And when a man is really at work, he needs no title. His work honours him.

All of our people come into the factory or the offices through the employment departments. As I have said, we do not hire experts—neither do we hire men on past experiences or for any position other than the lowest. Since we do not take a man on his past history, we do not refuse him because of his past history. I never met a man who was thoroughly bad. There is always some good in him—if he gets a chance. That is the reason we do not care in the least about a man's antecedents—we do not hire a man's history, we hire the man. If he has been in jail, that is no reason to say that he will be in jail again. I think, on the contrary, he is, if given a chance, very likely to make a special effort to keep out of jail. Our employment office does not bar a man for anything he has previously done—he is equally acceptable whether he has been in Sing Sing or at Harvard and we do not even inquire from which place he has graduated. All that he needs is the desire to work. If he does not desire to work, it is very unlikely that he will apply for a position, for it is

pretty well understood that a man in the Ford plant works.

We do not, to repeat, care what a man has been. If he has gone to college he ought to be able to go ahead faster, but he has to start at the bottom and prove his ability. Every man's future rests solely with himself. There is far too much loose talk about men being unable to obtain recognition. With us every man is fairly certain to get the exact recognition he deserves.

Of course, there are certain factors in the desire for recognition which must be reckoned with. The whole modern industrial system has warped the desire so out of shape that it is now almost an obsession. There was a time when a man's personal advancement depended entirely and immediately upon his work, and not upon any one's favour; but nowadays it often depends far too much upon the individual's good fortune in catching some influential eye. That is what we have successfully fought against. Men will work with the idea of catching somebody's eye; they will work with the idea that if they fail to get credit for what they have done, they might as well have done it badly or not have done it at all. Thus the work sometimes becomes a secondary consideration. The job in hand—the article in hand, the special kind of service in hand—turns out to be not the principal job. The main work becomes personal advancement—a platform from which to catch somebody's eye. This habit of making the work secondary and the recognition primary is unfair to the work. It makes recognition and credit the real job. And this also has an unfortunate effect on the worker. It encourages a peculiar kind of ambition which is neither lovely nor productive. It produces the kind of man who imagines that by “standing in with the boss” he will get ahead. Every shop knows this kind of man. And the worst of it is there are some things in the present industrial system which make it appear that the game really pays.

Foremen are only human. It is natural that they should be flattered by being made to believe that they hold the weal or woe of workmen in their hands. It is natural, also, that being open to flattery, their self-seeking subordinates should flatter them still more to obtain and profit by their favour. That is why I want as little as possible of the personal element.

It is particularly easy for any man who never knows it all to go forward to a higher position with us. Some men will work hard but they do not possess the capacity to think and especially to think quickly. Such men get as far as their ability deserves. A man may, by his industry, deserve advancement, but it cannot be possibly given him unless he also has a certain element of leadership. This is not a dream world we are living in. I think that every man in the shaking-down process of our factory eventually lands about where he belongs.

We are never satisfied with the way that everything is done in any part of the organization; we always think it ought to be done better and that eventually it will be done better. The spirit of crowding forces the man who has the qualities for a higher place eventually to get it. He perhaps would not get the place if at any time the organization—which is a word I do not like to use—became fixed, so that there would be routine steps and dead men's shoes. But we have so few titles that a man who ought to be doing something better than he is doing, very soon gets to doing it—he is not restrained by the fact that there is no position ahead of him “open”—for there are no “positions.” We have no cut-and-dried places—our best men make their places. This is easy enough to do, for there is always work, and when you think of getting the work done instead of finding a title to fit a man who wants to be promoted, then there is no difficulty about promotion. The promotion itself is not formal; the man simply finds himself

doing something other than what he was doing and getting more money.

All of our people have thus come up from the bottom. The head of the factory started as a machinist. The man in charge of the big River Rouge plant began as a pattern-maker. Another man overseeing one of the principal departments started as a sweeper. There is not a single man anywhere in the factory who did not simply come in off the street. Everything that we have developed has been done by men who have qualified themselves with us. We fortunately did not inherit any traditions and we are not founding any. If we have a tradition it is this:

Everything can always be done better than it is being done.

That pressing always to do work better and faster solves nearly every factory problem. A department gets its standing on its rate of production. The rate of production and the cost of production are distinct elements. The foremen and superintendents would only be wasting time were they to keep a check on the costs in their departments. There are certain costs—such as the rate of wages, the overhead, the price of materials, and the like, which they could not in any way control, so they do not bother about them. What they can control is the rate of production in their own departments. The rating of a department is gained by dividing the number of parts produced by the number of hands working. Every foreman checks his own department daily—he carries the figures always with him. The superintendent has a tabulation of all the scores; if there is something wrong in a department the output score shows it at once, the superintendent makes inquiries and the foreman looks alive. A considerable part of the incentive to better methods is directly traceable to this simple rule-of-thumb method of rating production. The foreman need not be

a cost accountant—he is no better a foreman for being one. His charges are the machines and the human beings in his department. When they are working at their best he has performed his service. The rate of his production is his guide. There is no reason for him to scatter his energies over collateral subjects.

This rating system simply forces a foreman to forget personalities—to forget everything other than the work in hand. If he should select the people he likes instead of the people who can best do the work, his department record will quickly show up that fact.

There is no difficulty in picking out men. They pick themselves out because—although one hears a great deal about the lack of opportunity for advancement—the average workman is more interested in a steady job than he is in advancement. Scarcely more than five per cent. of those who work for wages, while they have the desire to receive more money, have also the willingness to accept the additional responsibility and the additional work which goes with the higher places. Only about twenty-five per cent. are even willing to be straw bosses, and most of them take that position because it carries with it more pay than working on a machine. Men of a more mechanical turn of mind, but with no desire for responsibility, go into the tool-making departments where they receive considerably more pay than in production proper. But the vast majority of men want to stay put. They want to be led. They want to have everything done for them and to have no responsibility. Therefore, in spite of the great mass of men, the difficulty is not to discover men to advance, but men who are willing to be advanced.

The accepted theory is that all people are anxious for advancement, and a great many pretty plans have been built up from that. I can only say that we do not find that

to be the case. The Americans in our employ do want to go ahead, but they by no means do always want to go clear through to the top. The foreigners, generally speaking, are content to stay as straw bosses. Why all of this is, I do not know. I am giving the facts.

As I have said, everyone in the place reserves an open mind as to the way in which every job is being done. If there is any fixed theory—any fixed rule—it is that no job is being done well enough. The whole factory management is always open to suggestion, and we have an informal suggestion system by which any workman can communicate any idea that comes to him and get action on it.

The saving of a cent per piece may be distinctly worth while. A saving of one cent on a part at our present rate of production represents twelve thousand dollars a year. One cent saved on each part would amount to millions a year. Therefore, in comparing savings, the calculations are carried out to the thousandth part of a cent. If the new way suggested shows a saving and the cost of making the change will pay for itself within a reasonable time—say within three months—the change is made practically as of course. These changes are by no means limited to improvements which will increase production or decrease cost. A great many—perhaps most of them—are in the line of making the work easier. We do not want any hard, man-killing work about the place, and there is now very little of it. And usually it so works out that adopting the way which is easier on the men also decreases the cost. There is most intimate connection between decency and good business. We also investigate down to the last decimal whether it is cheaper to make or to buy a part.

The suggestions come from everywhere. The Polish workmen seem to be the cleverest of all of the foreigners

in making them. One, who could not speak English, indicated that if the tool in his machine were set at a different angle it might wear longer. As it was it lasted only four or five cuts. He was right, and a lot of money was saved in grinding. Another Pole, running a drill press, rigged up a little fixture to save handling the part after drilling. That was adopted generally and a considerable saving resulted. The men often try out little attachments of their own because, concentrating on one thing, they can, if they have a mind that way, usually devise some improvement. The cleanliness of a man's machine also—although cleaning a machine is no part of his duty—is usually an indication of his intelligence.

Here are some of the suggestions: A proposal that castings be taken from the foundry to the machine shop on an overhead conveyor saved seventy men in the transport division. There used to be seventeen men—and this was when production was smaller—taking the burrs off gears, and it was a hard, nasty job. A man roughly sketched a special machine. His idea was worked out and the machine built. Now four men have several times the output of the seventeen men—and have no hard work at all to do. Changing from a solid to a welded rod in one part of the chassis effected an immediate saving of about one half million a year on a smaller than the present-day production. Making certain tubes out of flat sheets instead of drawing them in the usual way effected another enormous saving.

The old method of making a certain gear comprised four operations and 12 per cent. of the steel went into scrap. We use most of our scrap and eventually we will use it all, but that is no reason for not cutting down on scrap—the mere fact that all waste is not a dead loss is no excuse for permitting waste. One of the workmen devised a very simple new method for making this gear in which the scrap was

only one per cent. Again, the cam shaft has to have heat treatment in order to make the surface hard; the cam shafts always came out of the heat-treat oven somewhat warped, and even back in 1918, we employed 37 men just to straighten the shafts. Several of our men experimented for about a year and finally worked out a new form of oven in which the shafts could not warp. In 1921, with the production much larger than in 1918, we employed only eight men in the whole operation.

And then there is the pressing to take away the necessity for skill in any job done by any one. The old-time tool hardener was an expert. He had to judge the heating temperatures. It was a hit-or-miss operation. The wonder is that he hit so often. The heat treatment in the hardening of steel is highly important—providing one knows exactly the right heat to apply. That cannot be known by rule-of-thumb. It has to be measured. We introduced a system by which the man at the furnace has nothing at all to do with the heat. He does not see the pyrometer—the instrument which registers the temperature. Coloured electric lights give him his signals.

None of our machines is ever built haphazardly. The idea is investigated in detail before a move is made. Sometimes wooden models are constructed or again the parts are drawn to full size on a blackboard. We are not bound by precedent but we leave nothing to luck, and we have yet to build a machine that will not do the work for which it was designed. About ninety per cent. of all experiments have been successful.

Whatever expertness in fabrication that has developed has been due to men. I think that if men are unhampered and they know that they are serving, they will always put all of mind and will into even the most trivial of tasks.

CHAPTER VII

THE TERROR OF THE MACHINE

REPETITIVE labour—the doing of one thing over and over again and always in the same way—is a terrifying prospect to a certain kind of mind. It is terrifying to me. I could not possibly do the same thing day in and day out, but to other minds, perhaps I might say to the majority of minds, repetitive operations hold no terrors. In fact, to some types of mind thought is absolutely appalling. To them the ideal job is one where the creative instinct need not be expressed. The jobs where it is necessary to put in mind as well as muscle have very few takers—we always need men who like a job because it is difficult. The average worker, I am sorry to say, wants a job in which he does not have to put forth much physical exertion—above all, he wants a job in which he does not have to think. Those who have what might be called the creative type of mind and who thoroughly abhor monotony are apt to imagine that all other minds are similarly restless and therefore to extend quite unwanted sympathy to the labouring man who day in and day out performs almost exactly the same operation.

When you come right down to it, most jobs are repetitive. A business man has a routine that he follows with great exactness; the work of a bank president is nearly all routine; the work of under officers and clerks in a bank is purely routine. Indeed, for most purposes and most people, it is necessary to establish something in the way of a routine and to make most motions purely repetitive—otherwise the individual will not get enough

done to be able to live off his own exertions. There is no reason why any one with a creative mind should be at a monotonous job, for everywhere the need for creative men is pressing. There will never be a dearth of places for skilled people, but we have to recognize that the will to be skilled is not general. And even if the will be present, then the courage to go through with the training is absent. One cannot become skilled by mere wishing.

There are far too many assumptions about what human nature ought to be and not enough research into what it is. Take the assumption that creative work can be undertaken only in the realm of vision. We speak of creative "artists" in music, painting, and the other arts. We seemingly limit the creative functions to productions that may be hung on gallery walls, or played in concert halls, or otherwise displayed where idle and fastidious people gather to admire each other's culture. But if a man wants a field for vital creative work, let him come where he is dealing with higher laws than those of sound, or line, or colour; let him come where he may deal with the laws of personality. We want artists in industrial relationship. We want masters in industrial method—both from the standpoint of the producer and the product. We want those who can mould the political, social, industrial, and moral mass into a sound and shapely whole. We have limited the creative faculty too much and have used it for too trivial ends. We want men who can create the working design for all that is right and good and desirable in our life. Good intentions plus well-thought-out working designs can be put into practice and can be made to succeed. It is possible to increase the well-being of the workingman—not by having him do less work, but by aiding him to do more. If the world will give its attention and interest and energy to the making of plans that will profit the other fellow as he is, then such plans can be

established on a practical working basis. Such plans will endure—and they will be far the most profitable both in human and financial values. What this generation needs is a deep faith, a profound conviction in the practicability of righteousness, justice, and humanity in industry. If we cannot have these qualities, then we were better off without industry. Indeed, if we cannot get those qualities, the days of industry are numbered. But we can get them. We are getting them.

If a man cannot earn his keep without the aid of machinery, is it benefitting him to withhold that machinery because attendance upon it may be monotonous? And let him starve? Or is it better to put him in the way of a good living? Is a man the happier for starving? If he is the happier for using a machine to less than its capacity, is he happier for producing less than he might and consequently getting less than his share of the world's goods in exchange?

I have not been able to discover that repetitive labour injures a man in any way. I have been told by parlour experts that repetitive labour is soul- as well as body-destroying, but that has not been the result of our investigations. There was one case of a man who all day long did little but step on a treadle release. He thought that the motion was making him one-sided; the medical examination did not show that he had been affected but, of course, he was changed to another job that used a different set of muscles. In a few weeks he asked for his old job again. It would seem reasonable to imagine that going through the same set of motions daily for eight hours would produce an abnormal body, but we have never had a case of it. We shift men whenever they ask to be shifted and we should like regularly to change them—that would be entirely feasible if only the men would have it that way. They do not like changes which they do not

themselves suggest. Some of the operations are undoubtedly monotonous—so monotonous that it seems scarcely possible that any man would care to continue long at the same job. Probably the most monotonous task in the whole factory is one in which a man picks up a gear with a steel hook, shakes it in a vat of oil, then turns it into a basket. The motion never varies. The gears come to him always in exactly the same place, he gives each one the same number of shakes, and he drops it into a basket which is always in the same place. No muscular energy is required, no intelligence is required. He does little more than wave his hands gently to and fro—the steel rod is so light. Yet the man on that job has been doing it for eight solid years. He has saved and invested his money until now he has about forty thousand dollars—and he stubbornly resists every attempt to force him into a better job!

The most thorough research has not brought out a single case of a man's mind being twisted or deadened by the work. The kind of mind that does not like repetitive work does not have to stay in it. The work in each department is classified according to its desirability and skill into Classes "A," "B," and "C," each class having anywhere from ten to thirty different operations. A man comes directly from the employment office to "Class C." As he gets better he goes into "Class B," and so on into "Class A," and out of "Class A" into tool making or some supervisory capacity. It is up to him to place himself. If he stays in production it is because he likes it.

In a previous chapter I noted that no one applying for work is refused on account of physical condition. This policy went into effect on January 12, 1914, at the time of setting the minimum wage at five dollars a day and the working day at eight hours. It carried with it the further condition that no one should be discharged on account of physical condition, except, of course, in the case of con-

tagious disease. I think that if an industrial institution is to fill its whole rôle, it ought to be possible for a cross-section of its employees to show about the same proportions as a cross-section of a society in general. We have always with us the maimed and the halt. There is a most generous disposition to regard all of these people who are physically incapacitated for labour as a charge on society and to support them by charity. There are cases where I imagine that the support must be by charity—as, for instance, an idiot. But those cases are extraordinarily rare, and we have found it possible, among the great number of different tasks that must be performed somewhere in the company, to find an opening for almost any one and on the basis of production. The blind man or cripple can, in the particular place to which he is assigned, perform just as much work and receive exactly the same pay as a wholly able-bodied man would. We do not prefer cripples—but we have demonstrated that they can earn full wages.

It would be quite outside the spirit of what we are trying to do, to take on men because they were crippled, pay them a lower wage, and be content with a lower output. That might be directly helping the men but it would not be helping them in the best way. The best way is always the way by which they can be put on a productive par with able-bodied men. I believe that there is very little occasion for charity in this world—that is, charity in the sense of making gifts. Most certainly business and charity cannot be combined; the purpose of a factory is to produce, and it ill serves the community in general unless it does produce to the utmost of its capacity. We are too ready to assume without investigation that the full possession of faculties is a condition requisite to the best performance of all jobs. To discover just what was the real situation, I had all of the different jobs in the factory classified to the kind of

machine and work—whether the physical labour involved was light, medium, or heavy; whether it were a wet or a dry job, and if wet, with what kind of fluid; whether it were clean or dirty; near an oven or a furnace; the condition of the air; whether one or both hands had to be used; whether the employee stood or sat down at his work; whether it was noisy or quiet; whether it required accuracy; whether the light was natural or artificial; the number of pieces that had to be handled per hour; the weight of the material handled; and the description of the strain upon the worker. It turned out at the time of the inquiry that there were then 7,882 different jobs in the factory. Of these, 949 were classified as heavy work requiring strong, able-bodied, and practically physically perfect men; 3,338 required men of ordinary physical development and strength. The remaining 3,595 jobs were disclosed as requiring no physical exertion and could be performed by the slightest, weakest sort of men. In fact, most of them could be satisfactorily filled by women or older children. The lightest jobs were again classified to discover how many of them required the use of full faculties, and we found that 670 could be filled by legless men, 2,637 by one-legged men, 2 by armless men, 715 by one-armed men, and 10 by blind men. Therefore, out of 7,882 kinds of jobs, 4,034—although some of them required strength—did not require full physical capacity. That is, developed industry can provide wage work for a higher average of standard men than are ordinarily included in any normal community. If the jobs in any one industry or, say, any one factory, were analyzed as ours have been analyzed, the proportion might be very different, yet I am quite sure that if work is sufficiently subdivided—subdivided to the point of highest economy—there will be no dearth of places in which the physically incapacitated can do a man's job and get a man's wage. It is economically most wasteful to accept

crippled men as charges and then to teach them trivial tasks like the weaving of baskets or some other form of unremunerative hand labour, in the hope, not of aiding them to make a living, but of preventing despondency.

When a man is taken on by the Employment Department, the theory is to put him into a job suited to his condition. If he is already at work and he does not seem able to perform the work, or if he does not like his work, he is given a transfer card, which he takes up to the transfer department, and after an examination he is tried out in some other work more suited to his condition or disposition. Those who are below the ordinary physical standards are just as good workers, rightly placed, as those who are above. For instance, a blind man was assigned to the stock department to count bolts and nuts for shipment to branch establishments. Two other able-bodied men were already employed on this work. In two days the foreman sent a note to the transfer department releasing the able-bodied men because the blind man was able to do not only his own work but also the work that had formerly been done by the sound men.

This salvage can be carried further. It is usually taken for granted that when a man is injured he is simply out of the running and should be paid an allowance. But there is always a period of convalescence, especially in fracture cases, where the man is strong enough to work, and, indeed, by that time usually anxious to work, for the largest possible accident allowance can never be as great as a man's wage. If it were, then a business would simply have an additional tax put upon it, and that tax would show up in the cost of the product. There would be less buying of the product and therefore less work for somebody. That is an inevitable sequence that must always be borne in mind.

We have experimented with bedridden men—men who

were able to sit up. We put black oilcloth covers or aprons over the beds and set the men to work screwing nuts on small bolts. This is a job that has to be done by hand and on which fifteen or twenty men are kept busy in the Magneto Department. The men in the hospital could do it just as well as the men in the shop and they were able to receive their regular wages. In fact, their production was about 20 per cent., I believe, above the usual shop production. No man had to do the work unless he wanted to. But they all wanted to. It kept time from hanging on their hands. They slept and ate better and recovered more rapidly.

No particular consideration has to be given to deaf-and-dumb employees. They do their work one hundred per cent. The tubercular employees—and there are usually about a thousand of them—mostly work in the material salvage department. Those cases which are considered contagious work together in an especially constructed shed. The work of all of them is largely out of doors.

At the time of the last analysis of employed, there were 9,563 sub-standard men. Of these, 123 had crippled or amputated arms, forearms, or hands. One had both hands off. There were 4 totally blind men, 207 blind in one eye, 253 with one eye nearly blind, 37 deaf and dumb, 60 epileptics, 4 with both legs or feet missing, 234 with one foot or leg missing. The others had minor impediments.

The length of time required to become proficient in the various occupations is about as follows: 43 per cent. of all the jobs require not over one day of training; 36 per cent. require from one day to one week; 6 per cent. require from one to two weeks; 14 per cent. require from one month to one year; one per cent. require from one to six years. The last jobs require great skill—as in tool making and die sinking.

The discipline throughout the plant is rigid. There are

no petty rules, and no rules the justice of which can reasonably be disputed. The injustice of arbitrary discharge is avoided by confining the right of discharge to the employment manager, and he rarely exercises it. The year 1919 is the last on which statistics were kept. In that year 30,155 changes occurred. Of those 10,334 were absent more than ten days without notice and therefore dropped. Because they refused the job assigned or, without giving cause, demanded a transfer, 3,702 were let go. A refusal to learn English in the school provided accounted for 38 more; 108 enlisted; about 3,000 were transferred to other plants. Going home, going into farming or business accounted for about the same number. Eighty-two women were discharged because their husbands were working—we do not employ married women whose husbands have jobs. Out of the whole lot only 80 were flatly discharged and the causes were: Misrepresentation, 56; by order of Educational Department, 20; and undesirable, 4.

We expect the men to do what they are told. The organization is so highly specialized and one part is so dependent upon another that we could not for a moment consider allowing men to have their own way. Without the most rigid discipline we would have the utmost confusion. I think it should not be otherwise in industry. The men are there to get the greatest possible amount of work done and to receive the highest possible pay. If each man were permitted to act in his own way, production would suffer and therefore pay would suffer. Any one who does not like to work in our way may always leave. The company's conduct toward the men is meant to be exact and impartial. It is naturally to the interest both of the foremen and of the department heads that the releases from their departments should be few. The workman has a full chance to tell his story if he has been unjustly treated—

he has full recourse. Of course, it is inevitable that injustices occur. Men are not always fair with their fellow workmen. Defective human nature obstructs our good intentions now and then. The foreman does not always get the idea, or misapplies it—but the company's intentions are as I have stated, and we use every means to have them understood.

It is necessary to be most insistent in the matter of absences. A man may not come or go as he pleases; he may always apply for leave to the foreman, but if he leaves without notice, then, on his return, the reasons for his absence are carefully investigated and are sometimes referred to the Medical Department. If his reasons are good, he is permitted to resume work. If they are not good he may be discharged. In hiring a man the only data taken concerns his name, his address, his age, whether he is married or single, the number of his dependents, whether he has ever worked for the Ford Motor Company, and the condition of his sight and his hearing. No questions are asked concerning what the man has previously done, but we have what we call the "Better Advantage Notice," by which a man who has had a trade before he came to us files a notice with the employment department stating what the trade was. In this way, when we need specialists of any kind, we can get them right out of production. This is also one of the avenues by which tool makers and moulders quickly reach the higher positions. I once wanted a Swiss watch maker. The cards turned one up—he was running a drill press. The Heat Treat department wanted a skilled firebrick layer. He also was found on a drill press—he is now a general inspector.

There is not much personal contact—the men do their work and go home—a factory is not a drawing room. But we try to have justice and, while there may be little

in the way of hand shaking—we have no professional hand shakers—also we try to prevent opportunity for petty personalities. We have so many departments that the place is almost a world in itself—every kind of man can find a place somewhere in it. Take fighting between men. Men will fight, and usually fighting is a cause for discharge on the spot. We find that does not help the fighters—it merely gets them out of our sight. So the foremen have become rather ingenious in devising punishments that will not take anything away from the man's family and which require no time at all to administer.

One point that is absolutely essential to high capacity, as well as to humane production, is a clean, well-lighted and well-ventilated factory. Our machines are placed very close together—every foot of floor space in the factory carries, of course, the same overhead charge. The consumer must pay the extra overhead and the extra transportation involved in having machines even six inches farther apart than they have to be. We measure on each job the exact amount of room that a man needs; he must not be cramped—that would be waste. But if he and his machine occupy more space than is required, that also is waste. This brings our machines closer together than in probably any other factory in the world. To a stranger they may seem piled right on top of one another, but they are scientifically arranged, not only in the sequence of operations, but to give every man and every machine every square inch that he requires and, if possible, not a square inch, and certainly not a square foot, more than he requires. Our factory buildings are not intended to be used as parks. The close placing requires a maximum of safeguards and ventilation.

Machine safeguarding is a subject all of itself. We do not consider any machine—no matter how efficiently it may turn out its work—as a proper machine unless it is

absolutely safe. We have no machines that we consider unsafe, but even at that a few accidents will happen. Every accident, no matter how trivial, is traced back by a skilled man employed solely for that purpose, and a study is made of the machine to make that same accident in the future impossible.

When we put up the older buildings, we did not understand so much about ventilation as we do to-day. In all the later buildings, the supporting columns are made hollow and through them the bad air is pumped out and the good air introduced. A nearly even temperature is kept everywhere the year round and, during daylight, there is nowhere the necessity for artificial light. Something like seven hundred men are detailed exclusively to keeping the shops clean, the windows washed, and all of the paint fresh. The dark corners which invite expectoration are painted white. One cannot have morale without cleanliness. We tolerate makeshift cleanliness no more than makeshift methods.

No reason exists why factory work should be dangerous. If a man has worked too hard or through too long hours he gets into a mental state that invites accidents. Part of the work of preventing accidents is to avoid this mental state; part is to prevent carelessness, and part is to make machinery absolutely fool-proof. The principal causes of accidents as they are grouped by the experts are:

(1) Defective structures; (2) defective machines; (3) insufficient room; (4) absence of safeguards; (5) unclean conditions; (6) bad lights; (7) bad air; (8) unsuitable clothing; (9) carelessness; (10) ignorance; (11) mental condition; (12) lack of coöperation.

The questions of defective structures, defective machinery, insufficient room, unclean conditions, bad light, bad air, the wrong mental condition, and the lack of coöperation are easily disposed of. None of the men work

too hard. The wages settle nine tenths of the mental problems and construction gets rid of the others. We have then to guard against unsuitable clothing, carelessness, and ignorance, and to make everything we have fool-proof. This is more difficult where we have belts. In all of our new construction, each machine has its individual electric motor, but in the older construction we had to use belts. Every belt is guarded. Over the automatic conveyors are placed bridges so that no man has to cross at a dangerous point. Wherever there is a possibility of flying metal, the workman is required to wear goggles and the chances are further reduced by surrounding the machine with netting. Around hot furnaces we have railings. There is nowhere an open part of a machine in which clothing can be caught. All the aisles are kept clear. The starting switches of draw presses are protected by big red tags which have to be removed before the switch can be turned—this prevents the machine being started thoughtlessly. Workmen will wear unsuitable clothing—ties that may be caught in a pulley, flowing sleeves, and all manner of unsuitable articles. The bosses have to watch for that, and they catch most of the offenders. New machines are tested in every way before they are permitted to be installed. As a result we have practically no serious accidents.

Industry needs not exact a human toll.

CHAPTER VIII

WAGES

THERE is nothing to running a business by custom—to saying: “I pay the going rate of wages.” The same man would not so easily say: “I have nothing better or cheaper to sell than any one has.” No manufacturer in his right mind would contend that buying only the cheapest materials is the way to make certain of manufacturing the best article. Then why do we hear so much talk about the “liquidation of labour” and the benefits that will flow to the country from cutting wages—which means only the cutting of buying power and the curtailing of the home market? What good is industry if it be so unskillfully managed as not to return a living to everyone concerned? No question is more important than that of wages—most of the people of the country live on wages. The scale of their living—the rate of their wages—determines the prosperity of the country.

Throughout all the Ford industries we now have a minimum wage of six dollars a day; we used to have a minimum of five dollars; before that we paid whatever it was necessary to pay. It would be bad morals to go back to the old market rate of paying—but also it would be the worst sort of bad business.

First get at the relationships. It is not usual to speak of an employee as a partner, and yet what else is he? Whenever a man finds the management of a business too much for his own time or strength, he calls in assistants to share the management with him. Why, then, if a man finds the production part of a business too much for his

own two hands should he deny the title of "partner" to those who come in and help him produce? Every business that employs more than one man is a kind of partnership. The moment a man calls for assistance in his business—even though the assistant be but a boy—that moment he has taken a partner. He may himself be sole owner of the resources of the business and sole director of its operations, but only while he remains sole manager and sole producer can he claim complete independence. No man is independent as long as he has to depend on another man to help him. It is a reciprocal relation—the boss is the partner of his worker, the worker is partner of his boss. And such being the case, it is useless for one group or the other to assume that it is the one indispensable unit. Both are indispensable. The one can become unduly assertive only at the expense of the other—and eventually at its own expense as well. It is utterly foolish for Capital or for Labour to think of themselves as groups. They are partners. When they pull and haul against each other—they simply injure the organization in which they are partners and from which both draw support.

It ought to be the employer's ambition, as leader, to pay better wages than any similar line of business, and it ought to be the workman's ambition to make this possible. Of course there are men in all shops who seem to believe that if they do their best, it will be only for the employer's benefit—and not at all for their own. It is a pity that such a feeling should exist. But it does exist and perhaps it has some justification. If an employer urges men to do their best, and the men learn after a while that their best does not bring any reward, then they naturally drop back into "getting by." But if they see the fruits of hard work in their pay envelope—proof that harder work means higher pay—then also they begin to learn that they are a

part of the business, and that its success depends on them and their success depends on it.

“What ought the employer to pay?”—“What ought the employee to receive?” These are but minor questions. The basic question is “What can the business stand?” Certainly no business can stand outgo that exceeds its income. When you pump water out of a well at a faster rate than the water flows in, the well goes dry. And when the well runs dry, those who depend on it go thirsty. And if, perchance, they imagine they can pump one well dry and then jump to some other well, it is only a matter of time when all the wells will be dry. There is now a widespread demand for more justly divided rewards, but it must be recognized that there are limits to rewards. The business itself sets the limits. You cannot distribute \$150,000 out of a business that brings in only \$100,000. The business limits the wages, but does anything limit the business? The business limits itself by following bad precedents.

If men, instead of saying “the employer ought to do thus-and-so,” would say, “the business ought to be so stimulated and managed that it can do thus-and-so,” they would get somewhere. Because only the business can pay wages. Certainly the employer cannot, unless the business warrants. But if that business does warrant higher wages and the employer refuses, what is to be done? As a rule a business means the livelihood of too many men, to be tampered with. It is criminal to assassinate a business to which large numbers of men have given their labours and to which they have learned to look as their field of usefulness and their source of livelihood. Killing the business by a strike or a lockout does not help. The employer can gain nothing by looking over the employees and asking himself, “How little can I get them to take?” Nor the employee by glaring back and asking, “How

much can I force him to give?" Eventually both will have to turn to the business and ask, "How can this industry be made safe and profitable, so that it will be able to provide a sure and comfortable living for all of us?"

But by no means all employers or all employees will think straight. The habit of acting shortsightedly is a hard one to break. What can be done? Nothing. No rules or laws will effect the changes. But enlightened self-interest will. It takes a little while for enlightenment to spread. But spread it must, for the concern in which both employer and employees work to the same end of service is bound to forge ahead in business.

What do we mean by high wages, anyway?

We mean a higher wage than was paid ten months or ten years ago. We do not mean a higher wage than ought to be paid. Our high wages of to-day may be low wages ten years from now.

If it is right for the manager of a business to try to make it pay larger dividends, it is quite as right that he should try to make it pay higher wages. But it is not the manager of the business who pays the high wages. Of course, if he can and will not, then the blame is on him. But he alone can never make high wages possible. High wages cannot be paid unless the workmen earn them. Their labour is the productive factor. It is not the only productive factor—poor management can waste labour and material and nullify the efforts of labour. Labour can nullify the results of good management. But in a partnership of skilled management and honest labour, it is the workman who makes high wages possible. He invests his energy and skill, and if he makes an honest, whole-hearted investment, high wages ought to be his reward. Not only has he earned them, but he has had a big part in creating them.

It ought to be clear, however, that the high wage begins

down in the shop. If it is not created there it cannot get into pay envelopes. There will never be a system invented which will do away with the necessity of work. Nature has seen to that. Idle hands and minds were never intended for any one of us. Work is our sanity, our self-respect, our salvation. So far from being a curse, work is the greatest blessing. Exact social justice flows only out of honest work. The man who contributes much should take away much. Therefore no element of charity is present in the paying of wages. The kind of workman who gives the business the best that is in him is the best kind of workman a business can have. And he cannot be expected to do this indefinitely without proper recognition of his contribution. The man who comes to the day's job feeling that no matter how much he may give, it will not yield him enough of a return to keep him beyond want, is not in shape to do his day's work. He is anxious and worried, and it all reacts to the detriment of his work.

But if a man feels that his day's work is not only supplying his basic need, but is also giving him a margin of comfort and enabling him to give his boys and girls their opportunity and his wife some pleasure in life, then his job looks good to him and he is free to give it of his best. This is a good thing for him and a good thing for the business. The man who does not get a certain satisfaction out of his day's work is losing the best part of his pay.

For the day's work is a great thing—a very great thing! It is at the very foundation of the world; it is the basis of our self-respect. And the employer ought constantly to put in a harder day's work than any of his men. The employer who is seriously trying to do his duty in the world must be a hard worker. He cannot say, "I have so many thousand men working for me." The fact of the matter is that so many thousand men have him

working for them—and the better they work the busier they keep him disposing of their products. Wages and salaries are in fixed amounts, and this must be so, in order to have a basis to figure on. Wages and salaries are a sort of profit-sharing fixed in advance, but it often happens that when the business of the year is closed, it is discovered that more can be paid. And then more ought to be paid. When we are all in the business working together, we all ought to have some share in the profits—by way of a good wage, or salary, or added compensation. And that is beginning now quite generally to be recognized.

There is now a definite demand that the human side of business be elevated to a position of equal importance with the material side. And that is going to come about. It is just a question whether it is going to be brought about wisely—in a way that will conserve the material side which now sustains us, or unwisely and in such a way as shall take from us all the benefit of the work of the past years. Business represents our national livelihood, it reflects our economic progress, and gives us our place among other nations. We do not want to jeopardize that. What we want is a better recognition of the human element in business. And surely it can be achieved without dislocation, without loss to any one, indeed with an increase of benefit to every human being. And the secret of it all is in a recognition of human partnership. Until each man is absolutely sufficient unto himself, needing the services of no other human being in any capacity whatever, we shall never get beyond the need of partnership.

Such are the fundamental truths of wages. They are partnership distributions.

When can a wage be considered adequate? How much of a living is reasonably to be expected from work? Have you ever considered what a wage does or ought to do? To say that it should pay the cost of living is to say almost

nothing. The cost of living depends largely upon the efficiency of production and transportation; and the efficiency of these is the sum of the efficiencies of the management and the workers. Good work, well managed, ought to result in high wages and low living costs. If we attempt to regulate wages on living costs, we get nowhere. The cost of living is a result and we cannot expect to keep a result constant if we keep altering the factors which produce the result. When we try to regulate wages according to the cost of living, we are imitating a dog chasing his tail. And, anyhow, who is competent to say just what kind of living we shall base the costs on? Let us broaden our view and see what a wage is to the workmen—and what it ought to be.

The wage carries all the worker's obligations outside the shop; it carries all that is necessary in the way of service and management inside the shop. The day's productive work is the most valuable mine of wealth that has ever been opened. Certainly it ought to bear not less than all the worker's outside obligations. And certainly it ought to be made to take care of the worker's sunset days when labour is no longer possible to him—and should be no longer necessary. And if it is made to do even these, industry will have to be adjusted to a schedule of production, distribution, and reward, which will stop the leaks into the pockets of men who do not assist in production. In order to create a system which shall be as independent of the good-will of benevolent employers as of the ill-will of selfish ones, we shall have to find a basis in the actual facts of life itself.

It costs just as much physical strength to turn out a day's work when wheat is \$1 a bushel, as when wheat is \$2.50 a bushel. Eggs may be 12 cents a dozen or 90 cents a dozen. What difference does it make in the units of energy a man uses in a productive day's work?

If only the man himself were concerned, the cost of his maintenance and the profit he ought to have would be a simple matter. But he is not just an individual. He is a citizen, contributing to the welfare of the nation. He is a householder. He is perhaps a father with children who must be reared to usefulness on what he is able to earn. We must reckon with all these facts. How are you going to figure the contribution of the home to the day's work? You pay the man for his work, but how much does that work owe to his home? How much to his position as a citizen? How much to his position as a father? The man does the work in the shop, but his wife does the work in the home. The shop must pay them both. On what system of figuring is the home going to find its place on the cost sheets of the day's work? Is the man's own livelihood to be regarded as the "cost"? And is his ability to have a home and family the "profit"? Is the profit on a day's work to be computed on a cash basis only, measured by the amount a man has left over after his own and his family's wants are all supplied? Or are all these relationships to be considered strictly under head of cost, and the profit to be computed entirely outside of them? That is, after having supported himself and family, clothed them, housed them, educated them, given them the privileges incident to their standard of living, ought there to be provision made for still something more in the way of savings profit? And are all properly chargeable to the day's work? I think they are. Otherwise, we have the hideous prospect of little children and their mothers being forced out to work.

These are questions which call for accurate observation and computation. Perhaps there is no one item connected with our economic life that would surprise us more than a knowledge of just what burdens the day's work carries.

It is perhaps possible accurately to determine—albeit with considerable interference with the day's work itself—how much energy the day's work takes out of a man. But it is not at all possible accurately to determine how much it will require to put back that energy into him against the next day's demands. Nor is it possible to determine how much of that expended energy he will never be able to get back at all. Economics has never yet devised a sinking fund for the replacement of the strength of a worker. It is possible to set up a kind of sinking fund in the form of old-age pensions. But pensions do not attend to the profit which each day's labour ought to yield in order to take care of all of life's overhead, of all physical losses, and of the inevitable deterioration of the manual worker.

The best wages that have up to date ever been paid are not nearly as high as they ought to be. Business is not yet sufficiently well organized and its objectives are not yet sufficiently clear to make it possible to pay more than a fraction of the wages that ought to be paid. That is part of the work we have before us. It does not help toward a solution to talk about abolishing the wage system and substituting communal ownership. The wage system is the only one that we have, under which contributions to production can be rewarded according to their worth. Take away the wage measure and we shall have universal injustice. Perfect the system and we may have universal justice.

I have learned through the years a good deal about wages. I believe in the first place that, all other considerations aside, our own sales depend in a measure upon the wages we pay. If we can distribute high wages, then that money is going to be spent and it will serve to make storekeepers and distributors and manufacturers and workers in other lines more prosperous and their prosperity will be reflected in our sales. Country-wide high

wages spell country-wide prosperity, provided, however, the higher wages are paid for higher production. Paying high wages and lowering production is starting down the incline toward dull business.

It took us some time to get our bearings on wages, and it was not until we had gone thoroughly into production on "Model T," that it was possible to figure out what wages ought to be. Before then we had had some profit sharing. We had at the end of each year, for some years past, divided a percentage of our earnings with the employees. For instance, as long ago as 1909 we distributed eighty thousand dollars on the basis of years of service. A one-year man received 5 per cent. of his year's wages; a two-year man, $7\frac{1}{2}$ per cent., and a three-year man, 10 per cent. The objection to that plan was that it had no direct connection with the day's work. A man did not get his share until long after his work was done and then it came to him almost in the way of a present. It is always unfortunate to have wages tinged with charity.

And then, too, the wages were not scientifically adjusted to the jobs. The man in job "A" might get one rate and the man in job "B" a higher rate, while as a matter of fact job "A" might require more skill or exertion than job "B." A great deal of inequity creeps into wage rates unless both the employer and the employee know that the rate paid has been arrived at by something better than a guess. Therefore, starting about 1913 we had time studies made of all the thousands of operations in the shops. By a time study it is possible theoretically to determine what a man's output should be. Then, making large allowances, it is further possible to get at a satisfactory standard output for a day, and, taking into consideration the skill, to arrive at a rate which will express with fair accuracy the amount of skill and exertion that goes into

a job—and how much is to be expected from the man in the job in return for the wage. Without scientific study the employer does not know why he is paying a wage and the worker does not know why he is getting it. On the time figures all of the jobs in our factory were standardized and rates set.

We do not have piece work. Some of the men are paid by the day and some are paid by the hour, but in practically every case there is a required standard output below which a man is not expected to fall. Were it otherwise, neither the workman nor ourselves would know whether or not wages were being earned. There must be a fixed day's work before a real wage can be paid. Watchmen are paid for presence. Workmen are paid for work.

Having these facts in hand we announced and put into operation in January, 1914, a kind of profit-sharing plan in which the minimum wage for any class of work and under certain conditions was five dollars a day. At the same time we reduced the working day to eight hours—it had been nine—and the week to forty-eight hours. This was entirely a voluntary act. All of our wage rates have been voluntary. It was to our way of thinking an act of social justice, and in the last analysis we did it for our own satisfaction of mind. There is a pleasure in feeling that you have made others happy—that you have lessened in some degree the burdens of your fellow-men—that you have provided a margin out of which may be had pleasure and saving. Good-will is one of the few really important assets of life. A determined man can win almost anything that he goes after, but unless, in his getting, he gains good will he has not profited much.

There was, however, no charity in any way involved. That was not generally understood. Many employers thought we were just making the announcement because we were prosperous and wanted advertising and they

condemned us because we were upsetting standards—violating the custom of paying a man the smallest amount he would take. There is nothing to such standards and customs. They have to be wiped out. Some day they will be. Otherwise, we cannot abolish poverty. We made the change not merely because we wanted to pay higher wages and thought we could pay them. We wanted to pay these wages so that the business would be on a lasting foundation. We were not distributing anything—we were building for the future. A low wage business is always insecure.

Probably few industrial announcements have created a more world-wide comment than did this one, and hardly any one got the facts quite right. Workmen quite generally believed that they were going to get five dollars a day, regardless of what work they did.

The facts were somewhat different from the general impression. The plan was to distribute profits, but instead of waiting until the profits had been earned—to approximate them in advance and to add them, under certain conditions, to the wages of those persons who had been in the employ of the company for six months or more. It was classified participation among three classes of employees:

(1) Married men living with and taking good care of their families.

(2) Single men over twenty-two years of age who are of proved thrifty habits.

(3) Young men under twenty-two years of age, and women who are the sole support of some next of kin.

A man was first to be paid his just wages—which were then on an average of about fifteen per cent. above the usual market wage. He was then eligible to a certain profit. His wages plus his profit were calculated to give a minimum daily income of five dollars. The profit-

sharing rate was divided on an hour basis and was credited to the hourly wage rate, so as to give those receiving the lowest hourly rate the largest proportion of profits. It was paid every two weeks with the wages. For example, a man who received thirty-four cents an hour had a profit rate of twenty-eight and one half cents an hour—which would give him a daily income of five dollars. A man receiving fifty-four cents an hour would have a profit rate of twenty-one cents an hour—which would give him a daily income of six dollars.

It was a sort of prosperity-sharing plan. But on conditions. The man and his home had to come up to certain standards of cleanliness and citizenship. Nothing paternal was intended!—a certain amount of paternalism did develop, and that is one reason why the whole plan and the social welfare department were readjusted. But in the beginning the idea was that there should be a very definite incentive to better living and that the very best incentive was a money premium on proper living. A man who is living aright will do his work aright. And then, too, we wanted to avoid the possibility of lowering the standard of work through an increased wage. It was demonstrated in war time that too quickly increasing a man's pay sometimes increases only his cupidity and therefore decreases his earning power. If, in the beginning, we had simply put the increase in the pay envelopes, then very likely the work standards would have broken down. The pay of about half the men was doubled in the new plan; it might have been taken as "easy money." The thought of easy money breaks down work. There is a danger in too rapidly raising the pay of any man—whether he previously received one dollar or one hundred dollars a day. In fact, if the salary of a hundred-dollar-a-day man were increased overnight to three hundred dollars a day he would probably make a bigger fool of himself

than the working man whose pay is increased from one dollar to three dollars an hour. The man with the larger amount of money has larger opportunity to make a fool of himself.

In this first plan the standards insisted upon were not petty—although sometimes they may have been administered in a petty fashion. We had about fifty investigators in the Social Department; the standard of common sense among them was very high indeed, but it is impossible to assemble fifty men equally endowed with common sense. They erred at times—one always hears about the errors. It was expected that in order to receive the bonus married men should live with and take proper care of their families. We had to break up the evil custom among many of the foreign workers of taking in boarders—of regarding their homes as something to make money out of rather than as a place to live in. Boys under eighteen received a bonus if they supported the next of kin. Single men who lived wholesomely shared. The best evidence that the plan was essentially beneficial is the record. When the plan went into effect, 60 per cent. of the workers immediately qualified to share; at the end of six months 78 per cent. were sharing, and at the end of one year 87 per cent. Within a year and one half only a fraction of one per cent. failed to share.

The large wage had other results. In 1914, when the first plan went into effect, we had 14,000 employees and it had been necessary to hire at the rate of about 53,000 a year in order to keep a constant force of 14,000. In 1915 we had to hire only 6,508 men and the majority of these new men were taken on because of the growth of the business. With the old turnover of labour and our present force we should have to hire at the rate of nearly 200,000 men a year—which would be pretty nearly an impossible proposition. Even with the minimum of instruction that

is required to master almost any job in our place, we cannot take on a new staff each morning, or each week, or each month; for, although a man may qualify for acceptable work at an acceptable rate of speed within two or three days, he will be able to do more after a year's experience than he did at the beginning. The matter of labour turnover has not since bothered us; it is rather hard to give exact figures because when we are not running to capacity, we rotate some of the men in order to distribute the work among greatest number. This makes it hard to distinguish between the voluntary and involuntary exits. To-day we keep no figures; we now think so little of our turnover that we do not bother to keep records. As far as we know the turnover is somewhere between 8 per cent. and 6 per cent. a month.

We have made changes in the system, but we have not deviated from this principle:

If you expect a man to give his time and energy, fix his wages so that he will have no financial worries. It pays. Our profits, after paying good wages and a bonus—which bonus used to run around ten millions a year before we changed the system—show that paying good wages is the most profitable way of doing business.

There were objections to the bonus-on-conduct method of paying wages. It tended toward paternalism. Paternalism has no place in industry. Welfare work that consists in prying into employees' private concerns is out of date. Men need counsel and men need help, oftentimes special help; and all this ought to be rendered for decency's sake. But the broad workable plan of investment and participation will do more to solidify industry and strengthen organization than will any social work on the outside.

Without changing the principle we have changed the method of payment.



FORD ENGINES IN THE MAKING

Reduction of the general level of wages is not a cure for hard times but, on the contrary, does most to prolong them. The Ford prosperity recipe is high wages, low prices, and mass production.



Photograph from Living Galloway

FORDS ON THE FINAL ASSEMBLY LINE

Henry Ford turned the thinking of employers to reduction of unit costs—not wages—and helped them to see that it is bad business to destroy customers by reducing their purchasing power.

CHAPTER IX

WHY NOT ALWAYS HAVE GOOD BUSINESS?

THE employer has to live by the year. The workman has to live by the year. But both of them, as a rule, work by the week. They get an order or a job when they can and at the price they can. During what is called a prosperous time, orders and jobs are plentiful. During a "dull" season they are scarce. Business is always either feasting or fasting and is always either "good" or "bad." Although there is never a time when everyone has too much of this world's goods—when everyone is too comfortable or too happy—there come periods when we have the astounding spectacle of a world hungry for goods and an industrial machine hungry for work and the two—the demand and the means of satisfying it—held apart by a money barrier. Both manufacturing and employment are in-and-out affairs. Instead of a steady progression we go ahead by fits and starts—now going too fast, now stopping altogether. When a great many people want to buy, there is said to be a shortage of goods. When nobody wants to buy, there is said to be an overproduction of goods. I know that we have always had a shortage of goods, but I do not believe we have ever had an overproduction. We may have, at a particular time, too much of the wrong kind of goods. That is not overproduction—that is merely headless production. We may also have great stocks of goods at too high prices. That is not overproduction—it is either bad manufacturing or bad financing. Is business good or bad according

to the dictates of fate? Must we accept the conditions as inevitable? Business is good or bad as we make it so. The only reason for growing crops, for mining, or for manufacturing, is that people may eat, keep warm, have clothing to wear, and articles to use. There is no other possible reason, yet that reason is forced into the background and instead we have operations carried on, not to the end of service, but to the end of making money—and this because we have evolved a system of money that instead of being a convenient medium of exchange, is at times a barrier to exchange. Of this more later.

We suffer frequent periods of so-called bad luck only because we manage so badly. If we had a vast crop failure, I can imagine the country going hungry, but I cannot conceive how it is that we tolerate hunger and poverty, when they grow solely out of bad management, and especially out of the bad management that is implicit in an unreasoned financial structure. Of course the war upset affairs in this country. It upset the whole world. There would have been no war had management been better. But the war alone is not to blame. The war showed up a great number of the defects of the financial system, but more than anything else it showed how insecure is business supported only by a money foundation. I do not know whether bad business is the result of bad financial methods or whether the wrong motive in business created bad financial methods, but I do know that, while it would be wholly undesirable to try to overturn the present financial system, it is wholly desirable to reshape business on the basis of service. Then a better financial system will have to come. The present system will drop out because it will have no reason for being. The process will have to be a gradual one.

The start toward the stabilization of his own affairs may be made by any one. One cannot achieve perfect results

acting alone, but as the example begins to sink in there will be followers, and thus in the course of time we can hope to put inflated business and its fellow, depressed business, into a class with small-pox—that is, into the class of preventable diseases. It is perfectly possible, with the reorganization of business and finance that is bound to come about, to take the ill effect of seasons, if not the seasons, out of industry, and also the periodic depressions. Farming is already in process of reorganization. When industry and farming are fully reorganized they will be complementary; they belong together, not apart. As an indication, take our valve plant. We established it eighteen miles out in the country so that the workers could also be farmers. By the use of machinery farming need not consume more than a fraction of the time it now consumes; the time nature requires to produce is much larger than that required for the human contribution of seeding, cultivating, and harvesting; in many industries where the parts are not bulky it does not make much difference where they are made. By the aid of water power they can well be made out in farming country. Thus we can, to a much larger degree than is commonly known, have farmer-industrialists who both farm and work under the most scientific and healthful conditions. That arrangement will care for some seasonal industries; others can arrange a succession of products according to the seasons and the equipment, and still others can, with more careful management, iron out their seasons. A complete study of any specific problem will show the way.

The periodic depressions are more serious because they seem so vast as to be uncontrollable. Until the whole reorganization is brought about, they cannot be wholly controlled, but each man in business can easily do something for himself and while benefiting his own organization in a very material way, also help others. The Ford

production has not reflected good times or bad times; it has kept right on regardless of conditions excepting from 1917 to 1919, when the factory was turned over to war work. The year 1912-1913 was supposed to be a dull one; although now some call it "normal"; we all but doubled our sales; 1913-1914 was dull; we increased our sales by more than a third. The year 1920-1921 is supposed to have been one of the most depressed in history; we sold a million and a quarter cars, or about five times as many as in 1913-1914—the "normal year." There is no particular secret in it. It is, as is everything else in our business, the inevitable result of the application of a principle which can be applied to any business.

We now have a minimum wage of six dollars a day paid without reservation. The people are sufficiently used to high wages to make supervision unnecessary. The minimum wage is paid just as soon as a worker has qualified in his production—which is a matter that depends upon his own desire to work. We have put our estimate of profits into the wage and are now paying higher wages than during the boom times after the war. But we are, as always, paying them on the basis of work. And that the men do work is evidenced by the fact that although six dollars a day is the minimum wage, about 60 per cent. of the workers receive above the minimum. The six dollars is not a flat but a minimum wage.

Consider first the fundamentals of prosperity. Progress is not made by pulling off a series of stunts. Each step has to be regulated. A man cannot expect to progress without thinking. Take prosperity. A truly prosperous time is when the largest number of people are getting all they can legitimately eat and wear, and are in every sense of the word comfortable. It is the degree of the comfort of the people at large—not the size of the manufacturer's bank balance—that evidences prosperity. The function

of the manufacturer is to contribute to this comfort. He is an instrument of society and he can serve society only as he manages his enterprises so as to turn over to the public an increasingly better product at an ever-decreasing price, and at the same time to pay to all those who have a hand in his business an ever-increasing wage, based upon the work they do. In this way and in this way alone can a manufacturer or any one in business justify his existence.

We are not much concerned with the statistics and the theories of the economists on the recurring cycles of prosperity and depression. They call the periods when prices are high "prosperous." A really prosperous period is not to be judged on the prices that manufacturers are quoting for articles.

We are not concerned with combinations of words. If the prices of goods are above the incomes of the people, then get the prices down to the incomes. Ordinarily, business is conceived as starting with a manufacturing process and ending with a consumer. If that consumer does not want to buy what the manufacturer has to sell him and has not the money to buy it, then the manufacturer blames the consumer and says that business is bad, and thus, hitching the cart before the horse, he goes on his way lamenting. Isn't that nonsense?

Does the manufacturer exist for the consumer or does the consumer exist for the manufacturer? If the consumer will not—says he cannot—buy what the manufacturer has to offer, is that the fault of the manufacturer or the consumer? Or is nobody at fault? If nobody is at fault then the manufacturer must go out of business.

But what business ever started with the manufacturer and ended with the consumer? Where does the money to make the wheels go round come from? From the consumer, of course. And success in manufacture is based

solely upon an ability to serve that consumer to his liking. He may be served by quality or he may be served by price. He is best served by the highest quality at the lowest price, and any man who can give to the consumer the highest quality at the lowest price is bound to be a leader in business, whatever the kind of an article he makes. There is no getting away from this.

Then why flounder around waiting for good business? Get the costs down by better management. Get the prices down to the buying power.

Cutting wages is the easiest and most slovenly way to handle the situation, not to speak of its being an inhuman way. It is, in effect, throwing upon labour the incompetency of the managers of the business. If we only knew it, every depression is a challenge to every manufacturer to put more brains into his business—to overcome by management what other people try to overcome by wage reduction. To tamper with wages before all else is changed, is to evade the real issue. And if the real issue is tackled first, no reduction of wages may be necessary. That has been my experience. The immediate practical point is that, in the process of adjustment, someone will have to take a loss. And who can take a loss except those who have something which they can afford to lose? But the expression, “take a loss,” is rather misleading. Really no loss is taken at all. It is only a giving up of a certain part of the past profits in order to gain more in the future. I was talking not long since with a hardware merchant in a small town. He said:

“I expect to take a loss of \$10,000 on my stock. But of course, you know, it isn't really like losing that much. We hardware men have had pretty good times. Most of my stock was bought at high prices, but I have already sold several stocks and had the benefit of them. Besides, the ten thousand dollars which I say I will lose are not the

same kind of dollars that I used to have. They are, in a way, speculative dollars. They are not the good dollars that bought 100 cents' worth. So, though my loss may sound big, it is not big. And at the same time I am making it possible for the people in my town to go on building their houses without being discouraged by the size of the hardware item."

He is a wise merchant. He would rather take less profit and keep business moving than keep his stock at high prices and bar the progress of his community. A man like that is an asset to a town. He has a clear head. He is better able to swing the adjustment through his inventory than through cutting down the wages of his delivery men—through cutting down their ability to buy.

He did not sit around holding on to his prices and waiting for something to turn up. He realized what seems to have been quite generally forgotten—that it is part of proprietorship every now and again to lose money. We had to take our loss.

Our sales eventually fell off as all other sales fell off. We had a large inventory and, taking the materials and parts in that inventory at their cost price, we could not turn out a car at a price lower than we were asking, but that was a price which on the turn of business was higher than people could or wanted to pay. We closed down to get our bearings. We were faced with making a cut of \$17,000,000 in the inventory or taking a much larger loss than that by not doing business. So there was no choice at all.

That is always the choice that a man in business has. He can take the direct loss on his books and go ahead and do business or he can stop doing business and take the loss of idleness. The loss of not doing business is commonly a loss greater than the actual money involved, for during the period of idleness fear will consume initiative and, if

the shutdown is long enough, there will be no energy left over to start up with again.

There is no use waiting around for business to improve. If a manufacturer wants to perform his function, he must get his price down to what people will pay. There is always, no matter what the condition, a price that people can and will pay for a necessity, and always, if the will is there, that price can be met.

It cannot be met by lowering quality or by short-sighted economy, which results only in a dissatisfied working force. It cannot be met by fussing or buzzing around. It can be met only by increasing the efficiency of production and, viewed in this fashion, each business depression, so-called, ought to be regarded as a challenge to the brains of the business community. Concentrating on prices instead of on service is a sure indication of the kind of business man who can give no justification for his existence as a proprietor.

This is only another way of saying that sales should be made on the natural basis of real value, which is the cost of transmuting human energy into articles of trade and commerce. But that simple formula is not considered business-like. It is not complex enough. We have "business" which takes the most honest of all human activities and makes them subject to the speculative shrewdness of men who can produce false shortages of food and other commodities, and thus excite in society anxiety of demand. We have false stimulation and then false numbness.

Economic justice is being constantly and quite often innocently violated. You may say that it is the economic condition which makes mankind what it is; or you may say that it is mankind that makes the economic condition what it is. You will find many claiming that it is the economic system which makes men what they are. They blame

our industrial system for all the faults which we behold in mankind generally. And you will find other men who say that man creates his own conditions; that if the economic, industrial, or social system is bad, it is but a reflection of what man himself is. What is wrong in our industrial system is a reflection of what is wrong in man himself. Manufacturers hesitate to admit that the mistakes of the present industrial methods are, in part at least, their own mistakes, systematized and extended. But take the question outside of a man's immediate concerns, and he sees the point readily enough.

No doubt, with a less faulty human nature a less faulty social system would have grown up. Or, if human nature were worse than it is, a worse system would have grown up—though probably a worse system would not have lasted as long as the present one has. But few will claim that mankind deliberately set out to create a faulty social system. Granting without reserve that all faults of the social system are in man himself, it does not follow that he deliberately organized his imperfections and established them. We shall have to charge a great deal up to ignorance. We shall have to charge a great deal up to innocence.

Take the beginnings of our present industrial system. There was no indication of how it would grow. Every new advance was hailed with joy. No one ever thought of "capital" and "labour" as hostile interests. No one ever dreamed that the very fact of success would bring insidious dangers with it. And yet with growth every imperfection latent in the system came out. A man's business grew to such proportions that he had to have more helpers than he knew by their first names; but that fact was not regretted; it was rather hailed with joy. And yet it has since led to an impersonal system wherein the workman has become something less than a person

—a mere part of the system. No one believes, of course, that this dehumanizing process was deliberately invented. It just grew. It was latent in the whole early system, but no one saw it and no one could foresee it. Only prodigious and unheard-of development could bring it to light.

Take the industrial idea; what is it? The true industrial idea is not to make money. The industrial idea is to express a serviceable idea, to duplicate a useful idea, by as many thousands as there are people who need it.

To produce, produce; to get a system that will reduce production to a fine art; to put production on such a basis as will provide means for expansion and the building of still more shops, the production of still more thousands of useful things—that is the real industrial idea. The negation of the industrial idea is the effort to make a profit out of speculation instead of out of work. There are short-sighted men who cannot see that business is bigger than any one man's interests. Business is a process of give and take, live and let live. It is coöperation among many forces and interests. Whenever you find a man who believes that business is a river whose beneficial flow ought to stop as soon as it reaches him you find a man who thinks he can keep business alive by stopping its circulation. He would produce wealth by this stopping of the production of wealth.

The principles of service cannot fail to cure bad business. Which leads us into the practical application of the principles of service and finance.

CHAPTER X

HOW CHEAPLY CAN THINGS BE MADE?

NO ONE will deny that if prices are sufficiently low, buyers will always be found, no matter what are supposed to be the business conditions. That is one of the elemental facts of business. Sometimes raw materials will not move, no matter how low the price. We have seen something of that during the last year, but that is because the manufacturers and the distributors were trying to dispose of high-cost stocks before making new engagements. The markets were stagnant, but not "saturated" with goods. What is called a "saturated" market is only one in which the prices are above the purchasing power.

Unduly high prices are always a sign of unsound business, because they are always due to some abnormal condition. A healthy patient has a normal temperature; a healthy market has normal prices. High prices come about commonly by reason of speculation following the report of a shortage. Although there is never a shortage in everything, a shortage in just a few important commodities, or even in one, serves to start speculation. Or again, goods may not be short at all. An inflation of currency or credit will cause a quick bulge in apparent buying power and the consequent opportunity to speculate. There may be a combination of actual shortages and a currency inflation—as frequently happens during war. But in any condition of unduly high prices, no matter what the real cause, the people pay the high prices because they think there is going to be a shortage. They may buy bread ahead of their own needs,