

to be specialists, but a newspaper man ought to be a generalist. He must know a little something about everything and not too much about anything.

The raw material of the newspaper is Life, and life is something which insists upon unity. While you can take it apart in theses and books, you cannot do so in actuality without very serious and oft-times ludicrous results. There is a sad, sad story of old Judd Hawkins and his boy. The father took the boy at an early age—when he was a mere infant—up into the woods of Minnesota to raise horses. The lad grew up there in the wilderness completely surrounded by horses. His mother was dead. He arrived, in fact, at the age of twenty-one without having seen a railroad train, a school or a woman, and at that time his father thought perhaps he was not doing right by the boy, was not giving him a broad enough experience of life. So he said, "My boy, we will go down to Duluth," and they drove out through the clearing and got a train. On the train the boy said, "Dad, what is that?" The father said, "My boy, that is a woman. Now take good notice of her because the chances are that some day you will marry a woman. In fact, when we get to Duluth, I want you to meet some nice young ladies, marry one and bring her back to the ranch. I will give you the ranch and you can bring her back—the ranch will be yours. I will go down East, visit around the old homestead, and then come back to see you." The father's program went through beautifully, but when he returned he found the boy looking very blue and downcast. He asked, "What is the matter? Where is the wife?" And the boy said, "Dad, it's a darn shame; a couple of days ago she went out here after a pail of water, fell over that stump and broke her leg and I had to shoot her." This boy knew nothing but horses, horses, horses; and that illustrates, you see, very neatly, the danger of over-specialization. Now it so happens that when a man seizes upon some particular field as his to till, and tills it diligently, he has to keep his eyes on the ground, he cannot go galivanting away across the fields. And in that situation he is apt to forget that there is a New Jerusalem beyond the hills and a House of Sorrow down in the valley. The newspaper man can never forget those things.

In the present situation we find that specialists have been multiplying at a rapid rate and that generalists are getting more and more scarce. They are as scarce as pessimists at a chamber of commerce dinner. And that is rather a pity, because with every development

in a specialty we get back sooner or later to the truth that life is still a unity, that it is still one and cannot be taken apart any more than Judd Hawkins could take it apart when he tried.

That establishes the point of view from which I want to speak to you on Mills and Minds. I cannot profess to give you an expert opinion on machinery, on psychology, on sociology or anything else; but where these cross in the tangled skein of existence it has been my lot to stand, and perhaps my testimony may be of some interest, if not of particular value. I am quite sure that you think it may be of some value, or you would have not taken the bother to invite me down here; and that the world in general is becoming interested in this problem may be due in part to the reaction to certain articles of mine which appeared in the *Atlantic Monthly*. Those articles were written under the conviction of necessity, with the idea, not that I was particularly fitted to do the job, but that it needed doing and nobody else seemed to have done it. In other words the author had no particular authority, but the ideas, at that particular time, had some authority. A good many people, I think, must have been reflecting upon one of the great problems of our age, the conflict between a mechanized civilization on the one hand, and, on the other, that culture of the active soul which Emerson says is the finest flower of democracy. Now the major implications of these articles have not been seriously questioned. I have had a great deal of correspondence about some of the minor points therein, but on the other hand, verification of many points has come from a good many quarters in the industrial field.

It is quite obvious that manufacturing is getting to be a contradiction in terms, since the hand, the *manus*, is being left out of the equation and the machine is being substituted for it. The Germans, with their penchant for verbal exactness, seem to have gotten nearer the reality in their word *Mechanofabrik* to define the quantity production of standardized goods through the control of natural forces and mechanical processes. There are two important elements in *Mechanofabrik*. One is a division of labor and the other is the transfer of skill from the man to the machine. Adam Smith said that in his opinion the corporate form of management could be applied successfully only to banking, life insurance companies and other activities that could be easily routinized. He did not see that the application of machinery to production would permit the routinizing of practically all lines

of business to such an extent that we can now say that the corporation is the standard organization for manufacture.

The transfer of skill from the man to the machine first appears as an idea with Sir Samuel Bentham, brother of Jeremy Bentham, the philosopher of pleasure and pain. Sir Samuel Bentham was in Russia about 1785. That was twenty years after the invention of the steam engine, and about ten years after Wilkinson had made the steam engine a practical force, not only in producing goods but also in pushing civilization, by inventing his boring machine with which, in 1776, he produced fifty cylinders machined closely—to the standard of a thin sheet of paper. That was the great year also when the search for freedom was begun on these shores of ours. Ten years thereafter Bentham was in Russia, commissioned to build a fleet for the empress of Russia on the Black Sea. He had no skilled labor at his disposal; he was one Englishman alone in Russia, out of his proper element, an engineer, a man of force, intelligence and vigor. He conceived the idea of making wood-working machinery so that the raw Russian labor could be applied to the production of the required vessels. He was unable to make his dream come true there, but on his return to England he became First Lord of the Admiralty, and was in a financial position to succeed. In certain patents, filed first in 1793 and again in 1795, he outlined a complete series of woodworking machinery for the manufacturers of ships, blocks and tackle.

He was unable to put government funds into this work, by reason of being First Lord of the Admiralty, and, with the help of Brunel, a French engineer with some experience, those machines were built in the shops of Henry Maudsley, the great British tool maker, and installed at Portsmouth. This installation begun in 1805 and completed in 1808, represents the first factory of interchangeable machinery in the world. That machinery immediately multiplied the working power of the individual by ten; that is, to say, one man could produce as much in blocks and tackle as ten men had produced before. That was one great influence in helping the British sweep the seas of foreign shipping and bring Napoleon to St. Helena, a prisoner. In fact, then and there England's position as the creditor nation of the world was consolidated.

In this country Eli Whitney, after being bilked of the profits of his cotton gin, came north, borrowed money and in New Haven established his arms plant,

which plant is still in existence greatly enlarged. There, in the manufacture of small arms, he too applied his wonderful mind to the transfer of skill from man to the machine; and in 1812 his plant was in such a condition that in applying to the government at Washington for an arms contract, he could describe it as follows: "Its great leading object is to substitute correct and effective operation of machinery for that skill of the artist which is acquired wholly by long practice and experience—a species of skill which is not possessed in this country to any appreciable extent."

From these beginnings skill has been transferred from man to machine until, in all industrial operations, which are of the utmost social significance because of the large numbers employed and the great quantity of goods produced and consumed, the rank and file of workers are coming to have less opportunity to express personality through toil or to escape from monotony imposed by machine cycles beyond their control. The fires of competition have distilled skill from the broad lower reaches where the common man works, and have concentrated it in the higher thought compartments. Executives, managers, engineers, inventors, designers, tool-makers, shop organizers—all must think more quickly, work more accurately and be of broader views than their predecessors. But not so the machine tenders; in some cases they need scarcely think at all.

Now there are some 5,000 occupations at which men and women earn their living, such is the complexity of modern life. Of course, not all of these are in any danger of being automatized to the extent that I have mentioned. Some of them never will be. In others, the advance will be very slow; but in all those which are of the most social significance because of the large numbers employed, I think it is self-evident that economic pressure will force the further transfer of skill from man to the machine to lengths which we are scarcely capable of comprehending at the present time.

With these points in view let us observe some of the results and tendencies. Quantity production has lifted the standard of living, but it has not equally lifted the standard of conduct; it has increased wealth enormously, but it has not to the same extent increased human happiness; in fact, I think it is safe to say that the sum total of human happiness, compared to the population, is rather less than it was. I cannot challenge the statement of an eminent British phy-