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The Educated Workman

What He Is Contributing to Industry

By Karl Polanyi

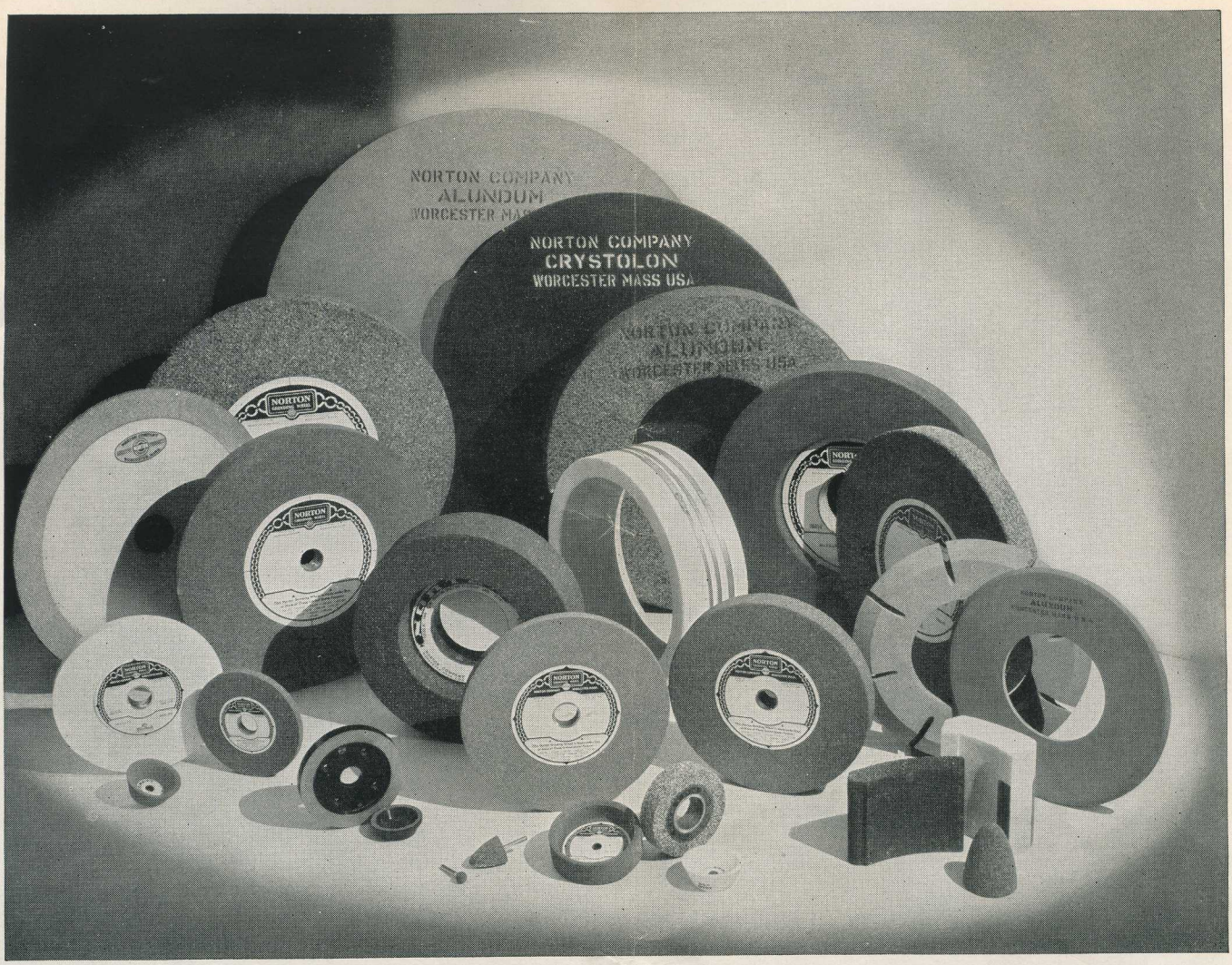
RECENTLY I heard a severe critic of Soviet Russia — and, incidentally, an eminent chemist — admire the new kind of link emerging between industrial and intellectual work in that country. The dispersion of education among factory workers begins to transform in a mysterious way the nature of their jobs, he said. Something similar is happening in the United States before our eyes.

All over the United States, the casual observer will find educated boys engaged in technical work of an industrial character. I do not mean the self-supporting boy, or girl, who earns his, or her, way through college. This is neither a new nor a specially vital phenomenon, nor is it unknown in Europe, where, on a minor scale, it finds its counterpart in the *Werkstudent* of post-War years. I mean the entirely different case of the young man in regular employment in the manufacturing or distributing trades or services, having procured his job on the strength of an education. I have visited one of the biggest American tool factories of the Middle West and found that it was giving preference in its workshops to college boys (at higher rates). The elderly foreman was storming in vain against this new-fangled practice; the management itself was steadily forging ahead with it. Usually only high-school education is required, but more and more frequently the boy with one or two years of college wins the race. This applies even to road jobs, where timekeepers, tool keepers and, of course, foremen are expected to have an education. Similarly it holds true of automobile mechanics in garages, in repair shops, especially if their jobs bring them into contact with the public. Add to this the army of office and shop clerks as well as those in other occupations regarded either as white-collar jobs or as belonging to the category of service, and everywhere you will find education as the decisive factor in securing employment. The depression undoubtedly greatly accelerated this development; however, it is important to realize that it neither started nor, in fact, entirely conditioned it. The slump has passed, but the process continues. And the wealthier a community grows, the more does it give room to that category of occupations (services) which is the spearhead of this development.

A modern industrial society needs two things which until now have proved mutually incompatible: a great mass of technical labor and a high average of education through the whole range of society. Education today turns a man either into a professional or into a dissatisfied manual worker. Moreover, the need for professionals is limited, and when supply exceeds demand, a shiftless intelligentsia arises which lacks any real productive functions in society. Attempts to take the educated man back to the land or the factory inevitably break down in the face of the poor character of the work he would be expected to perform. All efforts to overcome this antinomy must ultimately fail unless the nature of industrial work itself be transformed.

The cleavage between a rising level of general education and the need for work more easily performed by the uneducated than by the educated is one of the few industrial problems that not even a change in the property system can, by itself, remedy. The solution proposed by Continental Socialist Karl Kautsky was to "free the worker from work," *i.e.*, to shorten hours to the point of making life synonymous with leisure. This is obviously no solution; in fact, it serves only to indicate how deeply the problem is inherent in a civilization based on machines. No human existence can be regarded as sound that would have to seek for its essential meaning outside its normal productive functions. To shift the center of life into leisure hours is a suggestion that springs either from a superficial notion of life or is merely a counsel of despair. Adult education can provide no answer to this problem. Education which a man acquires in later life can never affect the basic requirements of his job. Such an education may assist him in bettering his position in his own walk of life, it may increase his earnings, improve his personal status, but it can effect these only by promoting him from his dull and dreary job to a higher type of work. The job itself remains what it was; it is merely waiting for another man to take it.

In America, the job itself is changing under the influence of the better education of those who perform it. The fact that education is becoming a requirement of employment proves this to all practical purposes. It happens in many different ways. A true and accurate record of work is required from the foreman on a road construction contract, the manager of a service station, the mechanic of a repair shop. More accurate methods of costing and a more complex method of administering taxation are factors in the situation. A statistical mind is encouraged in the employee to make him produce more and better material for the purposes of a varied accountancy. Incidentally, overhead costs are being cut down by shifting the burden of supervision onto the lower grades. The man in the local store cannot afford loose methods of accounting in the face of chain-store competition; he must face this fact in choosing his errand boy. Some measure of bookkeeping is now almost universally required where technical work is combined with some commercial activity. Accordingly, the system devised by the head office will look for appropriate qualities in the applicants. Once this method is established, overhead costs are reduced to develop it on the same lines, instead of increasing the personnel of supervision. As a result, the nature of the job itself is transformed. It will no more be run, as before, with that utter indifference to its place in (*Concluded on page 210*)



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in the head. An automatic switching device illuminates each tube alternately, producing images that, when seen through a stereoscope viewer equipped with a rotating shutter, produce the effect of the third dimension. This method has many advantages for locating foreign bodies in the body and for diagnosis, but requires more equipment than the conventional x-ray photographic method in which the tube is displaced between photographs.

The versatility of the stereoscope is again demonstrated in its wide use in aerial surveying in which it makes possible very accurate plotting of large areas of territory in all dimensions. Viewed from a height of several thousand feet the earth appears to be flat, and except for very large objects, the effect of contour is missing. A single aerial photograph taken from such a height is flat and monotonous: All third-dimensional effects are reduced to a minimum and even towering mountain ranges are humbled. However, stereoscopic photographs taken from a plane flying a straight course at once reveal the earth in relief: Mountains lift their peaks again, valleys are revealed in their familiar form, and such small objects as houses and automobiles become solid shapes. The interval between stereoscopic photographs taken in the air is deliberately calculated to exaggerate the third-dimensional effect. Here again the observer is endowed with the vision of a giant. Skyscrapers appear to be twice as high as they are actually, the stature of trees increases, and every small contour in the land stands out in sharp relief, producing the general effect of a grotesque plastic model.

Stereoscopic photography proved of great value in the World War to spot trenches, dugouts, and artillery positions. A gun, so cleverly camouflaged that observers could not detect it from the air, became a conspicuous mound in a stereoscopic photograph. Even shrubbery carefully arranged to hide the searing telltale marks of the muzzle blast could be clearly seen. Many such photographs were made from altitudes of 20,000 feet for safety, yet the stereograms clearly revealed objects in relief that could not have been seen by any other method of observation.

It is in the more peaceful task of land surveying, however, that the principles of the stereoscope are playing such an important part in aerial photography. Aside from its value for visual examination and precise measurement of aerial photographs, the stereoscopic principle makes it possible to draw maps from such photographs. Thirty-six years ago Dr. Carl Pulfrich, a German scientist, began experimenting with stereoscopy for the purpose of learning the underlying principles of the phenomenon of vision in the third dimension, and through his research he became one of the world's great authorities on the principle and application of the phenomenon. He developed a means of applying the stereoscopic method to mapping, and the highly accurate and effective methods of aerial and land stereoscopic surveying of today sprang from his pioneering achievements.

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the eye corresponding to the lens of the stereoscopic camera through which it was taken. In simple, if the effect of relief is to be attained, the right eye must see only pictures taken by the right lens, and the other, only those pictures taken through the left lens. There are several methods of showing stereoscopic motion pictures, but nearly all require some form of auxiliary viewing device, such as various types of spectacles or shutter mechanisms. As long as 20 years ago a theater in New York was equipped with motor-driven synchronizing shutter devices for viewing stereoscopic motion pictures.

An interesting method of stereoscopic projection, however, which would require no viewing device has been studied by Dr. Herbert E. Ives of the Bell Telephone Laboratories. This method — not yet practical — involves the principles of the parallax stereogram developed by his father, Frederic E. Ives, some 30 years ago. The conventional stereoscopic pair of pictures is used, but instead of being mounted side by side, the pictures are divided into extremely narrow strips and arranged alternately. The effect of the third dimension is produced by looking at the parallax stereogram with the aid of an opaque line grating mounted a short distance in front of the picture.

The possibilities of the anaglyph method have been explored for many years. This system requires a pair of stereographic films, one dyed red and the other, green. Projected on the screen the image is blurred, but clarity of vision and the effect of relief are achieved when the spectator views the picture through spectacles with red and green lenses. Thus, the eye behind the red lens sees only that picture projected from the red film and the left eye, only images from the green film, and the mental merging of the two produces the third-dimensional effect. Because this method could not be used for pictures in natural colors, it has never been accepted as a satisfactory solution of the problem.

One of the most hopeful approaches to the use of motion-picture stereoscopy is the polarized-light method which was examined by earlier workers and is now the subject of reawakened interest because of the development of Polaroid, a relatively inexpensive material which polarizes light. The method, recently demonstrated, requires two motion-picture films taken by a stereoscopic camera with lenses eye-distance apart. In projection the films are placed one over the other and projected through Polaroid disks. The image from one film reaches the screen polarized vertically, while the other is polarized horizontally. Equipped with spectacles with lenses set at corresponding angles, the spectator sees the picture in the third dimension, an effect so startling in its reality that he feels he might reach out and touch the characters on the screen. A few years ago an enterprising New York theatrical producer introduced several stereoscopic effects in his show with the unexpected result that members of the audience injured themselves dodging balls that appeared to be thrown directly at them. An automobile or locomotive rushing toward an audience in a stereoscopic motion picture might well create panic the first (*Concluded on page 210*)

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time it happened. However, in fairness to the possibilities of stereoscopic motion pictures, it should be understood that the third dimensional effects produced so far have usually been greatly exaggerated for purposes of showmanship.

If and when the stereoscopic effect is finally added to motion pictures, as many people believe it will be, the principle that found its first popular application in a form of entertainment and has since become so useful in many fields will join sound and color on the screen in a triumph of realistic entertainment undreamed of in its Victorian heyday.

At any rate Oliver Wendell Holmes was right: The stereoscope is not a toy.

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the scheme of the business, but it will become a job performed by intelligent people, conscious of the technological and commercial implications of their work, *i.e.*, possessing some measure of real understanding of the consumers' needs to which the job caters and of the factors governing its discharge.

An observant person traveling through this country at random must be amazed at the number of educated people he meets in all walks of industrial and commercial occupations. The man wiping his windshield, the bellboy in the hotel, the waitress in the restaurant, the electrician doing a repair job, the operator of the long-distance bus, as well as the taxicab driver in the towns of the West are obviously people of education. Purely technical as their jobs seem, they are in fact performing them on a level unknown in Europe (and probably until recently in America itself). The responsibilities of the man are wider, his functions more varied, his job altogether different from what it was even a short time ago. Obviously there still exists a hard core of resistance to this process of intellectualization of human work, such as in the standardized methods of the Henry Ford type. However, this may soon prove a mere side line of development that will have to take care of itself.

If this effect of education on industrial labor continues, the United States is well on the way to solving one of the most vexing problems of an industrial society.