

That American engineers have in recent years taken the initiative in this direction will be admitted, but it is some consolation for English printers to observe that the home manufacturers are beginning to realise the situation, and are endeavouring to make amends and thus regain their position in the field.

In looking abroad it is customary to associate Messrs. Hoe's name with some of the best of American machinery, whilst for that of French origin the late M. H. Marinoni was looked upon as the best manufacturer of machinery especially adapted for newspaper or magazine work. To specify other names in either country would require space, although in fairness to Germany it must be said that many really good machines of various kinds are now before the trade and at work in this country.

To the lay reader it may be explained that the various classes of machinery used for letterpress printing are divided under certain heads, and may be broadly grouped as follows:—(1) rotary machines; (2) double cylinder perfecting machines; (3) single cylinder one-feeder machines; (4) single cylinder two-feeder machines; and (5) platen machines.

Commencing with the rotary kind, as its name implies, the action is that of continuous rotation whilst the machine is in motion. Although there are a few machines on the market with flat type beds that print from the reel, this class of machine generally prints from a surface made from either stereotype or electrotype plates, and curved to the cylinder similar to the one which gives the impression—the paper as it is unwound from the reel passing between the printing and impression cylinders continuously whilst the machine is running.

The paper is made to the required width and wound on reels; sometimes these webs contain paper two or three miles long, the length being regulated by the weight or thickness of the material. Such machines are used mostly for newspaper work, or magazines of a non-illustrated character, where a large number of copies are required, and each section or copy is cut and folded before it leaves the machine. They are also made in duplicate, quadruple, or even larger sizes, so that the machine is self-contained, and will produce just as many duplicate copies as it is constructed for.

It is true that illustrated work is now attempted on rotary machines, and whilst no doubt further improvements will be made in due course, the results are not altogether satisfactory so far, although illustrations in line are more successful than those produced by the half-tone process.

Perfecting machines have two cylinders, and are used mostly for newspaper or magazine work of shorter numbers, and occasionally for bookwork. These print both sides of the paper, which is in single sheets, before it leaves the machine, but the double impression is two distinct operations. Although this class of machine has been used for a great number of years, it is not adapted for the best class of bookwork owing to the difficulties of ink set-off. These machines, and all other than the rotary kind, print from a flat printing surface.

The single cylinder (one-feeder) is *par excellence* adapted for the best bookwork, whether illustrated or not. Of this class there is a great variety, the English make being called the "Wharfedale," and built on the stop-cylinder principle, that is, the cylinder over which the sheets of paper are carried, and which gives the impression to the printed sheet as it revolves, is stopped or locked on the return travel of the machine, when it is automatically released and revolves again as the type carriage or bed travels forward once more.

Other single cylinder machines are those of the two-

revolution kind, that is, the cylinder revolves continuously in the same direction, once whilst the sheet is being impressed and again whilst the type bed is travelling back to its original position, thus making two revolutions for each copy printed. This class of machine is well represented by the Miehle and Century, both of which are of American manufacture, and are admirably adapted for high-class illustrated work of the magazine order because the inking facilities are so well considered.

Another kind of single cylinder machine is the two-feeder, and it may be described as being somewhat similar to the ordinary Wharfedale, but it has a longer travel for its type carriage, with an arrangement at both ends of the machine for inking and rolling the forme. Unlike the stop-cylinder of a single feeder machine, which is stationary on the return travel, the impression cylinder of the two-feeder immediately reverses on the completion of the revolution on the principle of the old "tumbler" machine. In doing this a fresh sheet is seized by a second set of grippers or fingers attached to the cylinder. By this method a sheet is printed at each propulsion of the machine in either direction.

Those of the platen kind are used for smaller work, mostly of a commercial character, and the action is somewhat similar to that of the old hand press, because both type and paper are impressed on the flat. They are made in many sizes, and some will print almost as large a sheet as the old hand press. Although one operator only is required, he will, with the aid of power, produce at least three or four times as much as two men at hand press with equally good results, provided the worker is a skilled hand.

CHAS. T. JACOBI.

CANCER RESEARCH.

AS Dr. Bashford remarks in his introductory note to the report of the Cancer Research Fund,¹ the solution of the problem of the cause of malignant disease in man is really the logical destination and centre towards which all channels of cancer research must converge, rather than the starting point thereof. The zoological distribution of cancer has therefore formed one of the first lines of inquiry to be undertaken by the Cancer Research Fund, founded about two years ago, for investigating this dire disease. By the willing cooperation of many workers, a most interesting series of tumours has been obtained from the various domestic animals, from the mouse and hen, and from three species of fish, proving that malignant disease is not confined to man. The malignant growths of man seem to be incapable of transmission to animals, but a malignant new growth from one animal may occasionally be transmitted to another individual of the same species. This has been carried out by Jensen, of Copenhagen, and by Borrel, of Paris. Through the kind collaboration of Prof. Jensen, a specimen of epitheliomatous tumour of the mouse was obtained and successfully transplanted into mice, but not into other animals, thus confirming Jensen's results.

The last half of the report contains an account of Dr. Bashford and Mr. Murray's investigations on the cytology of malignant growths, illustrated with a number of drawings. The results obtained are practically the same as those of Prof. Farmer, Mr. Moore, and Mr. Walker, already detailed in these columns (NATURE, vol. lxi. p. 319), viz. that in the cancer process there is a transformation of the normal

¹ "Scientific Reports on the Investigations of the Cancer Research Fund. No. 1. The Zoological Distribution, the Limitations in the Transmissibility, and the Comparative Histological and Cytological Characters of Malignant New Growths." (Taylor and Francis, 1904.)

adult tissues into modified reproductive or "gametoid" tissue. This, however, does not completely explain malignancy; there may possibly be in addition conjugation of cells or of nuclei. Let us hope that before long Dr. Bashford and his colleagues may give us further information on these and other points so necessary for the complete solution of the cancer problem.

The reports of the cancer research laboratories of the Middlesex Hospital¹ contain several papers which are, however, for the most part of purely medical interest, e.g. cancer in certain organs, and various methods of treating the disease. A report by Prof. Karl Pearson on cancer statistics collected by Messrs. Hillier and Tritsch is of considerable interest. For this the histories of 3000 cases of cancer were carefully analysed, and the results of Prof. Pearson's mathematical analysis are:—(1) as regards age incidence frequencies, that cancer is far more likely to occur in childhood in the male than in the female; (2) as regards a family history of cancer (that is, heredity in cancer), there seems to be a slight correlation between a case of cancer and a family history of cancer, but this is so slight as to be within the probable error of random sampling; and (3) that there is little or no relation between the presence of cancer and a tubercular family history, but there is a relation between the presence of cancer and the presence of tuberculosis.

The first report of the Liverpool Cancer Research Fund² has also recently been issued. This fund has been instituted by Mr. Sutton Timmis, who has vested in two trustees a sum of 10,000*l.*, which is administered by a committee empowered to spend 1000*l.* to 1500*l.* per annum until the fund is exhausted or the cause of cancer discovered. A cytolytic milk has been prepared by injecting a cow with carcinomatous material, but the cases treated with it are not yet sufficiently numerous to allow an expression of opinion as to its value. Investigations are also being made into malignant growths of man and animals by Dr. Albert Grünbaum, who has been appointed director of these researches.

Mr. Cecil H. Leaf in a booklet³ discusses the clinical causes and prevention of cancer of the breast, with an analysis of 100 cases. Of the 100 cases, 84 were married and 16 single, and the author thinks that very early marriages and errors in lactation may act as exciting causes. In 35 of the cases there was a definite history of injury, and unsuitable corsets are suggested as taking some share in the production of mammary cancer. Diet, e.g. excessive meat eating, use of alcohol, and of salt, could not, as has been suggested by some, be ascribed as a cause of the disease. Finally, some suggestions are made with the view of prevention.

R. T. HEWLETT.

ELECTRICAL TRANSMISSION OF PICTURES AND SCRIPT.⁴

THE problem of distant electrical vision is one to which much speculation and experimenting have been devoted. Before this problem can be attempted with any hope of success, however, the preliminary one of the electrical transmission of photographs over a distance has to be solved. This problem, it may be

¹ "Archives of the Middlesex Hospital. Vol. ii. Second Report from the Cancer Research Laboratories." Edited by Alex. G. R. Foulerton, F.R.C.S. (Macmillan and Co., Ltd., 1904.)

² "First Annual Report of the Liverpool Cancer Research (The Mrs. Sutton Timmis Memorial Fund), Albert S. Grünbaum, M.D., Director." (University Press of Liverpool, 1904.)

³ "The Clinical Causes of Cancer of the Breast and its Prevention." By Cecil H. Leaf, M.A., M.B., F.R.C.S., Assistant Surgeon to the Cancer Hospital. Pp. 64. (Archibald Constable and Co., 1904.) Price 2*s.* net.

⁴ "Elektrische Fernphotographie und Aehnliches." By Dr. Arthur Korn. Pp. 66. (Leipzig: S. Hirzel, 1904.) Price 1 mark.

stated at once, has been mastered, and it is now possible to transmit photographs in this manner, and successful results have been obtained over telegraph and telephone lines 800 kilometres long.

It does not need much consideration to see how important such a process would be for journalistic and police work if it could be industrially exploited, and it were possible simply to hand a sketch or photograph in at the telegraph office and send the same as one now sends an ordinary telegram. The evening papers would be able then to publish photographs taken at the seat of war in Korea on the same day. Unfortunately, with the apparatus at present to be had, the time taken to transmit a half-plate photograph is half an hour. The cost of the use of a telegraph line of any length for half an hour would be it is needless to point out, prohibitive. The lessening of the required time of transmission is, however, simply a matter of further development, and no good reason can be seen why in a few years' time the process should not be an adjunct to every existing telegraph line.

The author of the present work has devoted considerable time to this subject, and his booklet consists of an exact description of the apparatus and processes he has worked out. The author is to be commended on the very precise and careful way in which he has described every detail, so that it would be possible for anybody, with the help of this book, to reproduce, without any original work, the same results as he has obtained himself.

The method shortly consists of the following:—A ray of light is made to pass systematically all over the transparent film to be transmitted. After passing through the film it impinges upon a selenium cell the resistance of which varies proportionally to the amount of light which passes through the photograph. These varying currents pass through the line and are received in a moving coil galvanometer the pointer of which, in moving, inserts or takes out resistance in a high tension circuit, according as the current flowing in the moving coil changes. In the high tension circuit a small vacuum tube is connected, and it follows that the illumination of this tube is proportional to the light passing through the plate at the transmitting end of the line. This vacuum tube now passes over the sensitised photographic paper in synchronism with the ray of light over the transmitted plate, and thus a reproduction of the same is obtained. The transmitted film and sensitised paper are each wrapped on a glass cylinder. These cylinders are rotated by motors, and synchronised once each revolution. Only one wire is needed for the transmission, with, of course, an earth return.

In the case of the transmission of handwriting and half-tone illustrations, the same are got up on metal foil with electrically non-conducting ink. A conducting point then travels over the metallic foil, and closes and opens the sending circuit according as it is travelling on a marked or an unmarked place. The receiver used by the author is a modification of that described above, the essential point being the use of the vacuum tube fed with the Tesla currents. The speed reached is 500 written words per hour. For a half-tone illustration a strip $\frac{1}{2}$ cm. wide and 10 cm. long can be sent in 100 seconds.

It would seem that there is not very much practical value in the transmission of handwriting; the type printing telegraph of to-day fulfils all ordinary requirements, and it would be only very seldom that a transmission of handwriting would be required. It is to be hoped, however, that this electrical "distant photography" will make rapid progress.

C. C. G.