

exposing with a flash of light, when a shadowgraph of the columns of balls may be obtained.

Where a histogram is required for several conditions, one motor and gear box (the most expensive parts) may be used to drive a series of belts each producing a histogram under the required conditions. Alternatively, a series of the 'Perspex' strips with holes may be placed one at a time, in suitable order, under a single belt and magnet.

The method is not limited to recording time-intervals. With modifications, it may be used to record the number of events occurring in time. An example would be the number of vehicles passing a check point against time of day. For this purpose, either the hopper of balls or the 'Perspex' display is made to move at a constant (generally slow) speed. Whenever an event occurs to be included, a ball is released, and thus a histogram is built up against a linear time-base which may be in terms of minutes, hours or even days.

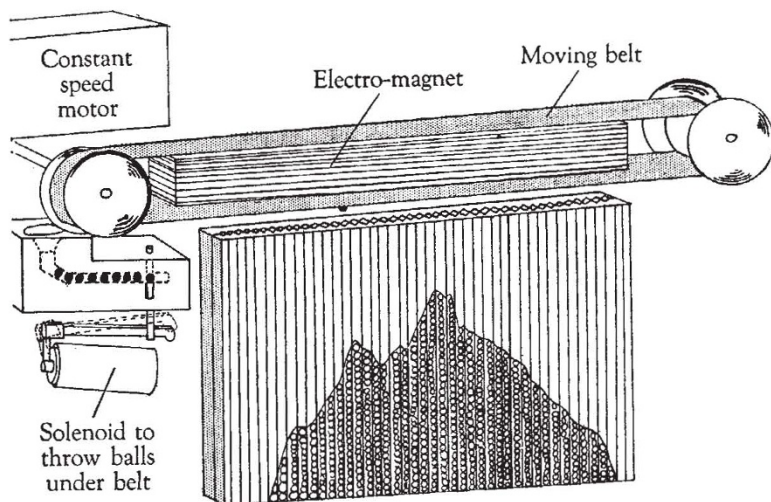


Fig. 1. Histogram recorder. A ball is held by the magnetic field to the underside of the moving belt

The method is not limited to time-intervals. For example, in psycho-physical experiments involving judgments of length, or intensity of light or sound, positions of a wedge or angles of rotation of a shaft can be represented by dropping a ball into a slot, the supply of balls being shifted across the display either mechanically or with *M* motors to link the wedge or shaft to the recording device. It can be used for any such purpose where the serial order of judgments is not required. Similarly, it might be used for industrial process control, to give the distribution of sizes or weights of machined parts.

The device is in the prototype stage, but the essential principle has been tested and found to work satisfactorily. It should be possible to find the mean of a distribution by balancing the display, and the variance by finding its moment of inertia.

The arrangement is described in patent application No. 28308/61 filed on August 3, 1961.

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R. L. GREGORY
T. M. B. ELLOART

Psychological Laboratory,
Downing Street, Cambridge.

"Productivity in Letterpress Printing"

I HAVE read with interest the review in *Nature* of December 23, 1961 (p. 1143), of the report on *Productivity in Letterpress Printing*.

The report covered letterpress printing only and was perhaps of greatest value in helping the Printing, Packaging and Allied Trades Research Association to realize the kind of problem that faces an industry still very largely on a conventional craft basis. A previous director of the Association did comment that it is easier to develop new processes than to improve old ones. It is also usually psychologically easier to make people use entirely new methods than to modify old techniques.

This report is five years old, and printing is to-day passing through a period of almost breakneck change. Chemically based printing (lithography) has made extremely rapid technical advance in the past few years with, as a result, vast improvements in quality and output. The application of photography, and in particular colour photography, to printing is rapidly dominating a large portion of the industry. There is great interest in electrostatic techniques (xerography and other processes) and these may become of increasing importance in the future. No doubt similar changes are occurring in other industries; but printing is perhaps exceptional in that, although the Research Association was founded before the War, science left the industry almost untouched until after it. The greatest change has occurred during the past five years. This is requiring a new approach to training and, of course, considerable mental adaptation of those in the industry. It is probably true to say that at the moment technical change is sufficiently rapid to make operational and similar studies of less urgency, as scientific and technical improvements can bring quicker results. Unfortunately, many of the scientific problems are quite complex, and the problems are so many that it becomes necessary to concentrate on those which are most rewarding either in net result or in ease of solution.

The advances in speed and the improvement in colour illustration are probably obvious to everyone. Unfortunately, these have not greatly benefited small editions without illustrations which would be typical of much scientific printing. New typesetting methods so far devised offer no economies over conventional machine setting as has been practised for more than sixty years. A number of new ideas is being experimented with involving the use of computers, which may ultimately substitute some better method than the conventional letter-by-letter keyboard operation with time-consuming hand-work and checking by readers. The latter will probably never be entirely eliminated as the reader has to correct not only errors made by the printer but also to detect slips by the author!

H. JOHN JARROLD
(President)

British Federation of Master Printers,
11 Bedford Row, London, W.C.1.