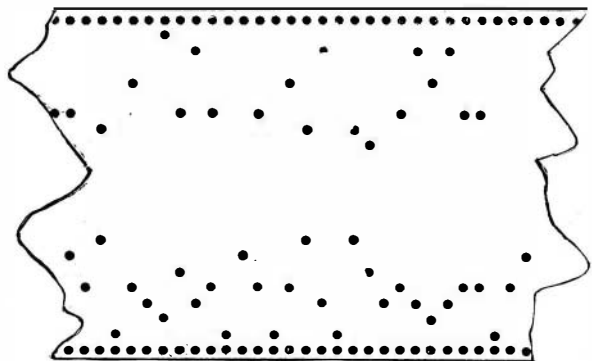


### AN INGENIOUS MACHINE WHICH GREATLY SIMPLIFIES THE PROCESS OF PRINTING.

The discovery a few years ago that aluminium was a good substitute for lithographic stone furnished a great impetus to the art of lithography. The flexibility of the metal plate permitted it to be used on rotary presses, whereas the stone could only be used on the fiat press. Not only pictures, but reading matter was impressed on the plates, so that books and newspapers were printed by the lithographic process. Briefly described, the process consists of printing the matter with greasy ink on a prepared sheet. This is then pressed down on the aluminium plates, transferring the design thereon. A solution of acidulated gum arabic is flowed over the aluminium plate, and is absorbed by the bare portions while the acid combines with the grease of the design to produce a fatty aluminium salt which has a great attraction for ink. In the press the plate is first moistened, by means of a roller, with water which adheres to the gum surface, but is repelled by the greasy design, while the ink roller which follows inks only the greasy design, because the moistened portions repel the ink. The impressions taken from the plate correspond perfectly to the original design.

A few years ago it occurred to Mr. Walter S. Timmis, a Brooklyn inventor, that the process could be much simplified by providing a small mechanism, something like a typewriter, to print the original transfer sheet, and such a machine he set about to design. At the very outset of the undertaking he was



THE PERFORATED TAPE.

met with the problem which has baffled many another inventor in the typesetting field, namely, that of justification, or spacing the words to exactly fill out the line. But Mr. Timmis bravely attacked the difficulty and succeeded in overcoming it by means of a won-

derfully ingenious mechanism. With the justification problem solved, the remainder of the task was comparatively easy, and the result of these labors is shown in the accompanying illustrations.

The "Lithotype," as the invention is called, com-

prises two separate machines, one which perforates a strip of paper, and the other which prints the transfer sheet under control of the perforated tape. The first machine is provided with a keyboard of a hundred keys. On depressing a key two electrical contacts are

made which close the circuits of two of the electromagnets in the perforator mechanism shown at the right. The two magnets thus actuated attract their respective armatures which operate corresponding punches to perforate the paper. The perforator mechanism comprises twenty electromagnets which may be operated in a hundred different combinations to correspond with the keys of the keyboard. After each combination is perforated the paper strip is moved forward a unit's distance, presenting a fresh surface to the next combination. The justification mechanism is shown, in our illustration, between the perforator and keyboard. Normally this is set to allow for a nine-units space between each word—a space equivalent to one and a half ems and obviously much greater than would ordinarily be required. In other words, a certain portion of the length of the line is reserved for spacing. This reserved portion varies, of course, with the number of words in the line, being equal to nine units times the number of spaces required. As the perforation of the strip continues, in time a point will be reached where the aggregate length of the words in the line exceeds this variable spacing reserve, and thereupon the selector arm begins to move. The selector arm, which may be seen

in the illustration, moves over two series of contacts, one representing units of space, and the other tenths of units. When the reserve begins to be encroached upon, a calculating device determines the width of each encroaching character struck and deducts this

from the normal reserve. At the same time the selector arm is automatically swung about until it lies over the contact representing the quotient of the remaining reserve divided by the number of spaces required in the line. As soon as the selector arm be-

gins to move, the operator adds to his line sufficient characters to complete his syllable or word, and then touches the line key, which produces a line-closing perforation in the paper strip. As the last character in the line is struck, the selector arm is moved over the contacts representing the amount of space which must be used between each word to completely fill out the line, and when the line key is struck a switch is closed connecting the justifier contacts with the electric circuit and the selector arm is pressed against these contacts, which cause a corresponding combination of perforations to be punched in the paper strip.

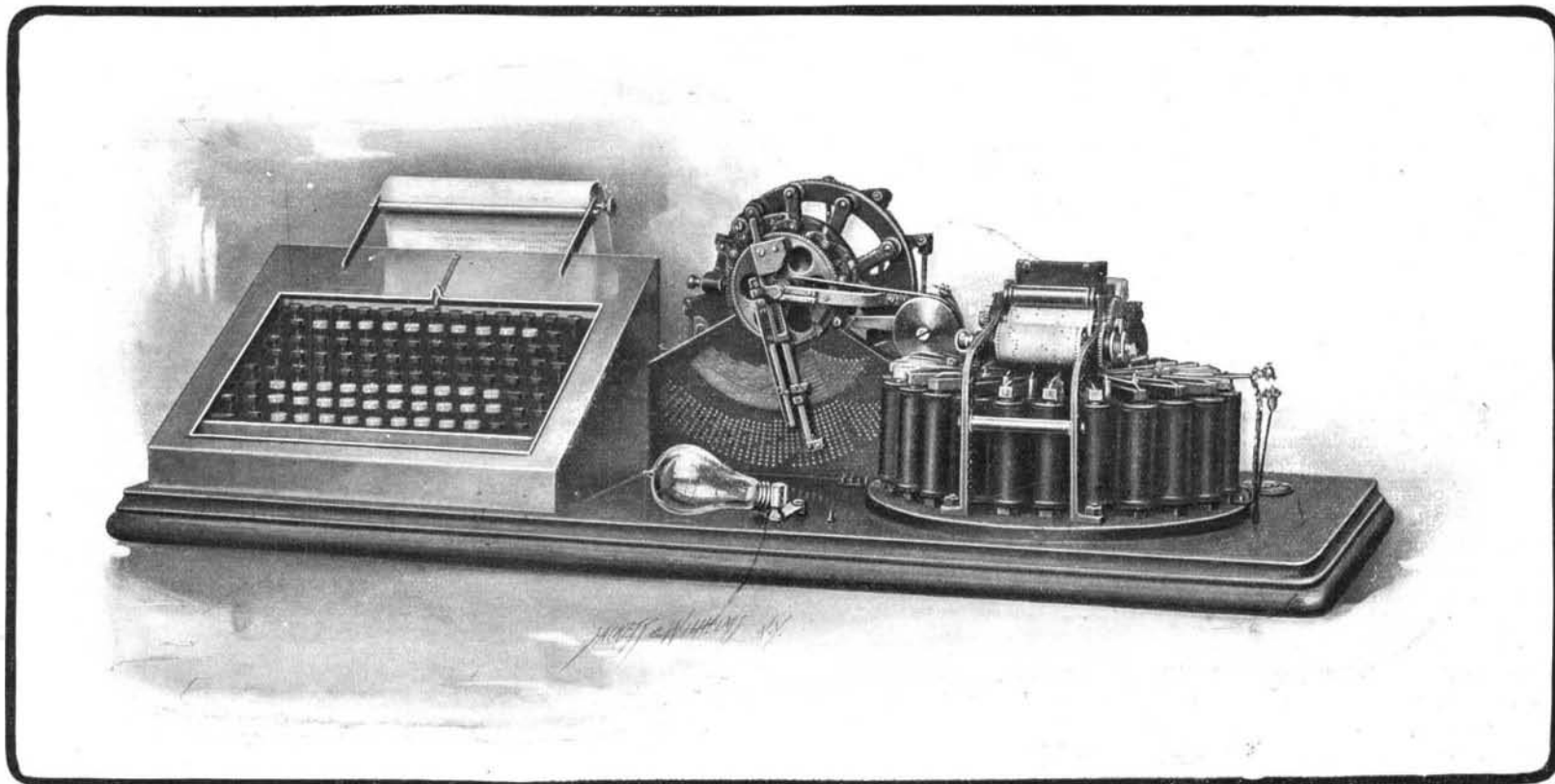
After the desired matter has been recorded upon the tape, the latter is passed through the second machine. In this machine two series of contact fingers bear against opposite faces of tape, and the fingers make contact with each other through the perforations as the tape travels between them. The tape is passed backward through this machine; that is, the end of the line is first to pass between the contact fingers. Consequently, the first contact made is that of the justifier.

In a new machine which is being perfected, the tape passes directly from the perforator through the type-printer without being passed backward. Patents on this machine, however, are still pending, and we are not at liberty to describe the mechanism at this time.

The process of printing from a flat surface is vastly interesting, but probably familiar to not more than one person in a thousand. It is done on the simple principle that oil or grease and water won't mix. The design to be printed from lithographic stone or aluminum plate is defined in ink the basis of which is grease. Over the rest of the plate a roll, moist with water is passed, and when the surface of the plate comes in contact with the paper nothing prints except that portion previously marked out in grease. The process, hitherto confined exclusively to lithograph work, may now by the use of the aluminum plate be made available for use on fast web-perfecting presses such as are used now by modern newspapers.

### A FACSIMILE OF PRINTING DONE BY THE MACHINE.

The justifier contacts close the electric circuit to the justifying mechanism, setting the latter to give the proper spaces in the line. The characters are printed on a transfer sheet of paper, by means of a type sleeve, which is given two movements, one a ro-



MACHINE WHICH PERFORATES THE TAPE AND CALCULATES THE SPACES REQUIRED TO JUSTIFY THE LINES.

tary movement, and the other a horizontal axial movement. When a character contact is made, the type sleeve starting from normal is operated by two springs, one tending to move the sleeve through a semi-rotation,

(Continued on page 118.)