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Mammoth Cylinder Lithographic Machine.

Our engraving is a representation of the largest lithographic press in America. It was manufactured by Hughes & Kimber, of London. Victor E. Mauger, No. 110 Reade street, New York, is agent for the sale not only of this machine, but also of the Wharfedale two-feeder printing press, not long since illustrated and described in this journal, together with lithographic materials, improved engines, cutting machines, etc., full particulars of which are specified in our advertising columns, to which the reader is referred.

Although this is the largest-sized machine of the kind yet built, the manufacturers are prepared to build still larger if desired. Such large presses are very useful in the printing of posters, maps, etc. We are informed by the firm in whose establishment the monster press is now running, that independent of a low bid for a government contract for map printing, they were awarded the contract because they could, on this press, print the map on a single sheet, and thus avoid subsequent piecing, which could not be done with any other press in the country.

Various sizes of this press are made, running down to those much smaller than the particular one under consideration. They are all precisely similar except in size, although size will, in the sequel, be shown to be a very important point. It will, of course, be impossible to go into minute details. Our purpose will be sufficiently accomplished by a comparison of the old method of lithographic printing with the present. To do this we will attempt to place before the reader a general outline of the art of lithography, than which no process has more points of general mechanical and scientific interest. We have before given a brief sketch of this process, but at the risk of repetition we will, at this time, dwell somewhat more minutely on its details.

The word lithography means the art of tracing letters, figures, and other designs on stone, and transferring them to paper by impression. This art has really nothing in common with engraving, as the surfaces printed from are perfectly smooth, having neither lines in relief nor lines sunk into the surface of the stone, except such as are uniformly distributed over the entire surface, by what is called the "graining" process—a slight roughening done by rubbing the surface with a muller of the same kind of stone, and silver sand of various degrees of fineness. For some kinds of work the stones are polished with pumice stone.

The stones employed are fine *oolite*, obtained chiefly from the interior of Germany. After graining, the design is drawn upon the stone with oily ink or crayons. If different colors are to be used in the same design, as many different stones as colors must be employed; and no single one of the stones has traced upon it the entire design, but only such a portion as is to be printed in one particular color.

The printing from stone in different colors has been appropriately called chromo-lithography, an art which has, through the aid of the press under consideration, risen to a rank second only to fine oil-painting.

The stones, having the designs drawn upon them in the manner described, are next treated with a mixture of dilute nitric acid and gum arabic. The acid attacks the portions of the stone not covered by the tracings of the design and dissolves its substance in a peculiar manner, the dissolved portions being replaced by the gum, so that the surface remains as smooth and uniform as before the acid is used.

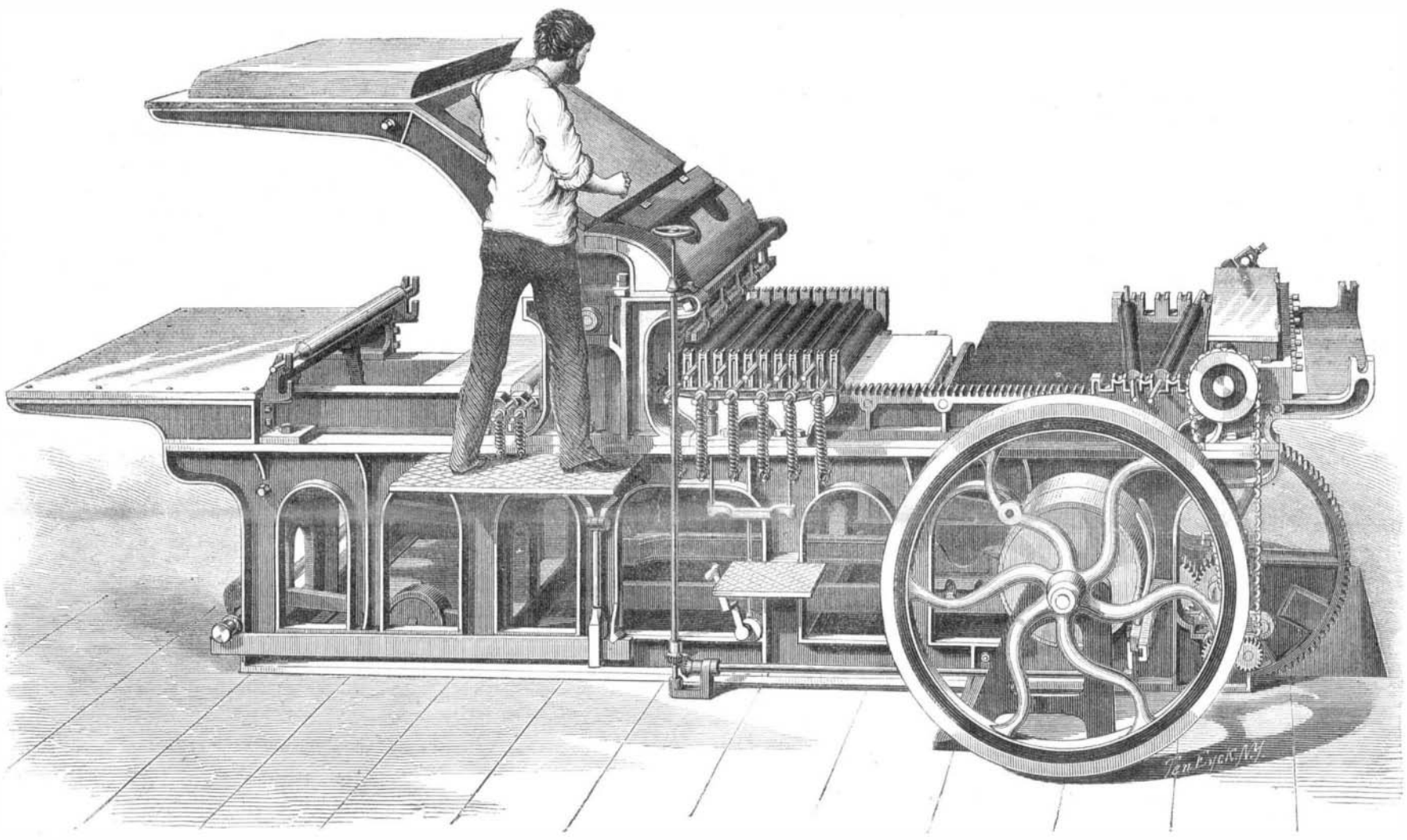
The block or plate is now ready to be used in printing. The kind of press exclusively used before the introduction of the cylinder press, was called the scraper press. This press is still employed, but is slow in operation, liable to break the plates, and has many other defects, which do not exist in the cylinder press.

The scraper press consists essentially of a roller, the bearings of which are connected with a toggle joint and lever, by which the roller may be pressed up with considerable force, and a scraper fixed directly over and parallel to the roller. The scraper is made of apple-tree wood with a blunt edge at the bottom faced with leather.

In printing, the stone plate, prepared as described below, is placed with one edge between the scraper and the roller, and the roller being forced upward, by the lever and toggle joint, raises the stone till it is brought into forcible contact with the scraper. The roller is then turned by a winch which carries the stone along until its entire surface has been passed under the scraper and back again to its former position.

The preparation of the stone previous to submitting it to pressure, consists, first, in moistening it with water. Those parts acted upon by the nitric acid and gum, absorb water readily, while the parts not acted upon, being greasy, do not take water. Immediately after moistening the stone, the ink is rolled in, the moistened parts not taking the ink, which only adheres to the greasy portions constituting the design. The paper is then laid upon the stone, and a tympanum of zinc or leather laid upon the paper. This tympanum is brought in contact with the scraper, and the pressure transmitted through it to the paper. The paper having thus received the impression of the design, is removed, and the process described repeated for each subsequent impression.

Now on the cylinder press every detail of this process is in its essential features performed automatically, except that the pressure is obtained by the weight of a heavy roller and powerful compound leverage connected therewith, which roller carries the paper and rolls over the surface of the stone in lieu of the roller, tympanum, and scraper, above described. The moistening of the stone, and the inking of the plate, are done by ingenious self-acting devices which perform the work in the most thorough manner, the dampening of the stone and the inking being done two or more times for each impression, as may be desired. Any kind of work is performed better than it can be done by the old means, and from twenty to thirty times faster. The press from which our engraving has been made will print blocks 60 by 40 inches, and as good lithographic stones of this size are difficult to obtain and handle, zinc is now much used as a substitute. The zinc is grained substantially in the same manner as the stones. The zinc plates are much cheaper, and may be obtained of any desired size.



HUGHES & KIMBER'S MONSTER CYLINDER LITHOGRAPHIC MACHINE.

The use of such plates—rendered possible by the large-sized cylinder presses—introduces the printing of life-sized pictures and portraits, and large posters, into the domain of the fine arts. Some of this kind of work now done at the establishment owning the press illustrated, is far superior to anything of the kind ever before produced in this country.

A peculiar advantage of the cylinder over the scraper, is, that the cylinder wears the stone much less than the scraper, so that from 20,000 to 30,000 impressions may be taken from a single transfer.

The press herewith illustrated is a model of strength, finish, and symmetry, and requires but little power. A great variety of sizes are manufactured, and a large number are in use in the principal cities of this country and Europe. The future of printing in this country will doubtless necessitate the combination of lithographic printing with type printing, as is already the case in Europe. The Hughes & Kimber lithographic press is admirably adapted to work in combination with the "Wharfedale," (illustrated in the SCIENTIFIC AMERICAN, June 25, 1870), by the same house; and it may furthermore be used for ordinary printing if desired.

The great advance made in the art education and instruction of the masses of late years, is perhaps due more to the advance in lithography, resulting from the introduction of these cylinder presses, than any other cause. Our readers will be gratified to see, and our engraving gives an accurate representation of, the press to which the public is greatly indebted for the general supply of cheap and good pictures.