No. 881,167. PATENTED MAR. 10, 1908.

W. H. THOMAS.

PRINTING MACHINE.

APPLICATION FILED MAR. 11, 1907.

3 SHEETS—SHEET 1.

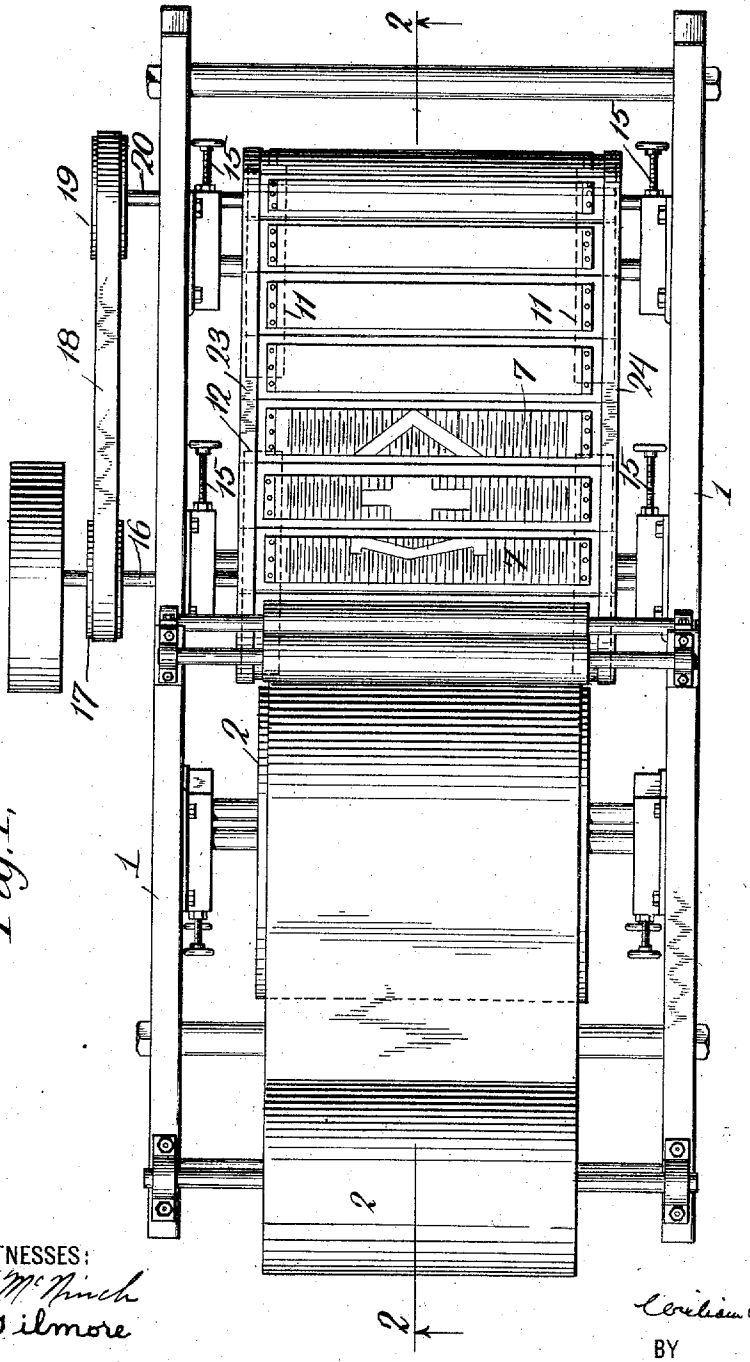


Fig. 1.

WITNESSES:
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G. V. Gilmore

INVENTOR
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BY
Munn & Jones
His ATTORNEYS.

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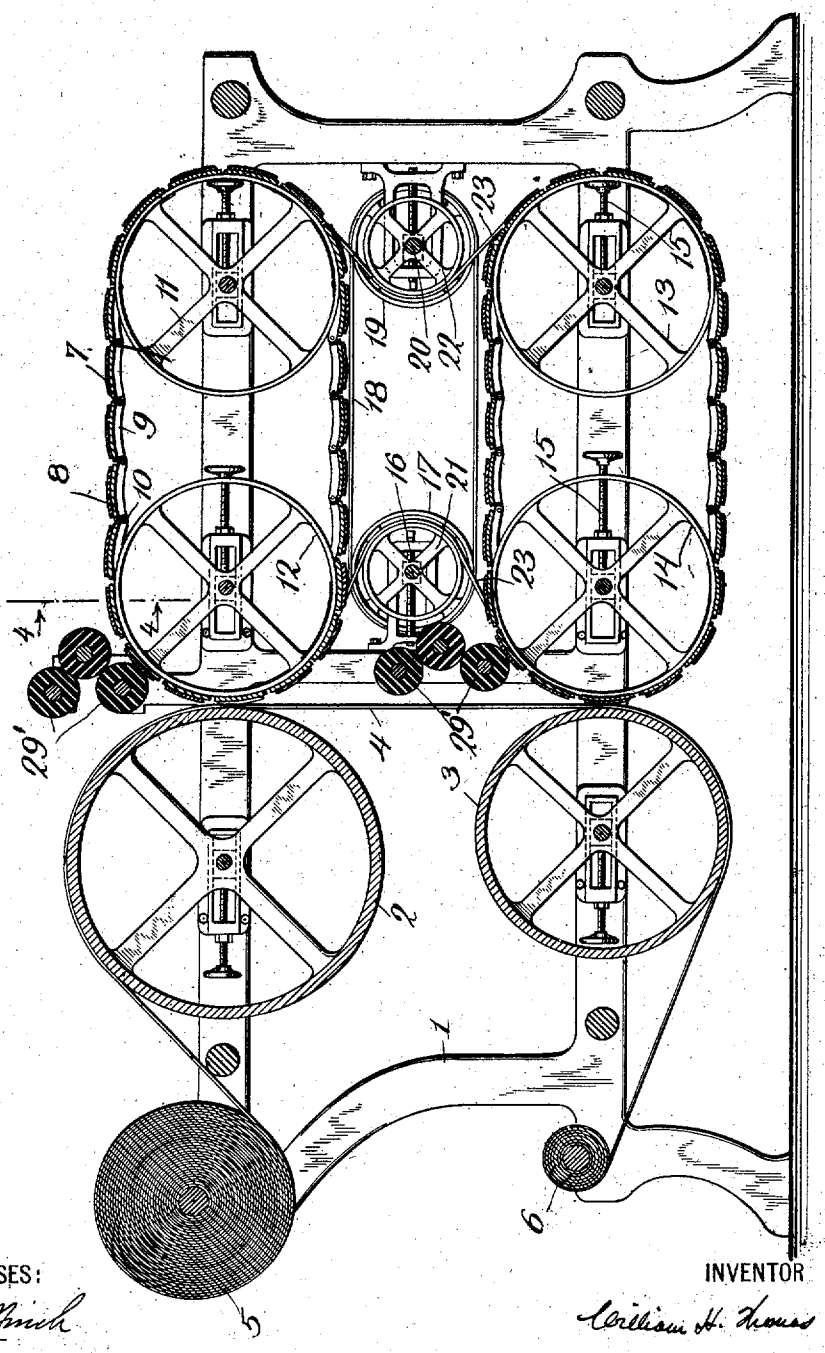
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

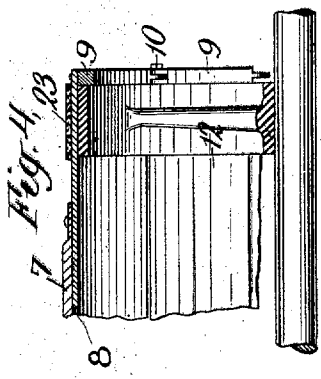


Fig. 4.

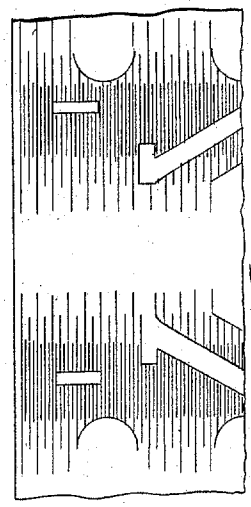


Fig. 8.

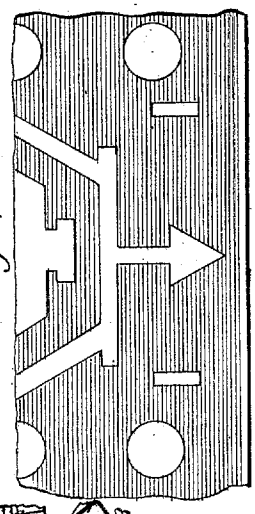


Fig. 9.

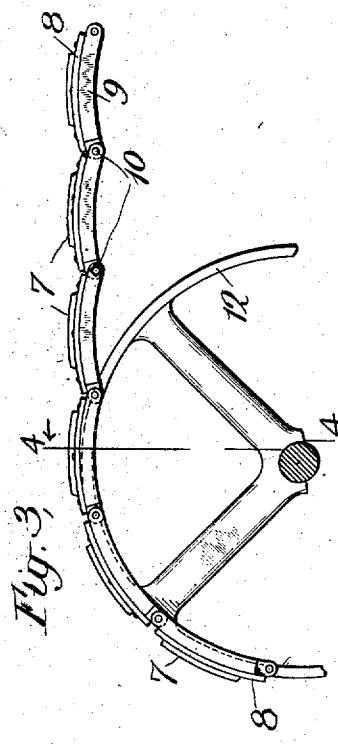


Fig. 3.

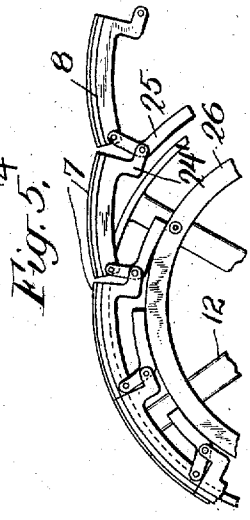


Fig. 5.

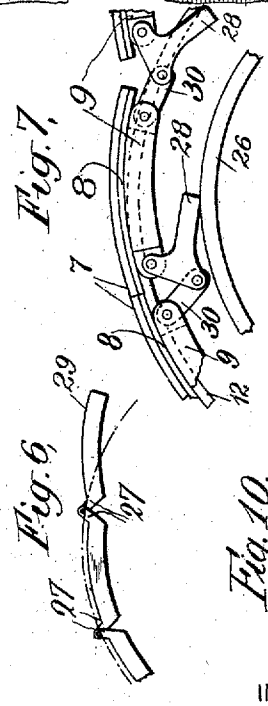


Fig. 7.

Fig. 6.

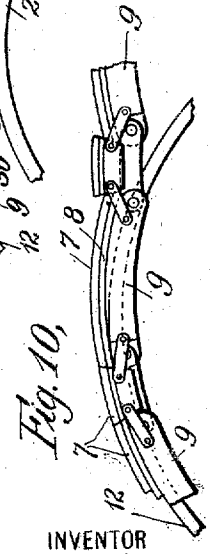


Fig. 10.

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WILLIAM H. THOMAS, OF NEW YORK, N. Y.

PRINTING-MACHINE.

No. 881,167. Specification of Letters Patent. Patented March 10, 1908.

Application filed March 11, 1907. Serial No. 361,708.

To all whom it may concern:

Be it known that I, WILLIAM H. THOMAS, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

The present invention relates to a printing machine intended more particularly for the printing of designs upon paper, linoleum, cotton cloth and other fabrics, wood, tin plate and other materials.

The printing of designs upon a continuous web of paper or cloth has heretofore been generally done by means of engraved rollers from twelve to eighteen inches in circumference, and, necessarily, the design repeats itself with each revolution of the roller.

Until the present invention, so far as I am aware, there has been no means of printing wall paper, calico or other fabric with repeats so long as to be unnoticeable, except the very expensive block printing process by hand work. The unnatural, conventional and artificial character of this class of work cannot be avoided by the present practices.

In the printing of handkerchiefs, rollers of very large circumference may be used, but in practice the inconvenience of using large rollers is so great that designs are rarely if ever seen which do not repeat in less than twenty-five inches.

In typographic printing, such as newspaper work, the engraving being "forms" which are fastened to the surface of a suitable cylinder, the size of cylinder used may be somewhat greater and hence the repeat longer, in practice about fifty or sixty inches. Anything much greater than this, however, is impracticable so far as cylinder printing is concerned.

I am aware that prior to my invention certain machines have been devised for printing infrequent repeats. These machines employ some form of flexible belt, such as leather or rubber, upon the surface of which the type or printing forms are fastened. These machines are used, however, for printing broken matter, such as letters, but they cannot be usefully employed for the printing of an unbroken design such as is desired for wall paper, calico or other fabric. The flexible character of the belt employed limits the work to low grade, simple printing, with frequent spaces due to the stretching apart of the engraved forms.

The disadvantages attending a belt of flexible material I have overcome by employing a chain, the sections of which are of iron, steel or similar material. By such means I obtain a solid, unyielding base for the printing forms with all the advantages of cylinder printing. At the same time I am able to make the repeat of any length desired by connecting said plates by links to form a chain.

The invention will be understood by reference to the accompanying drawings in which Figure 1 is a top view of a machine embodying my invention; Fig. 2 a central longitudinal section thereof; Fig. 3 a side view of a portion of the chain of form plates and one of the rollers or drums over which it is passed; Fig. 4 a longitudinal sectional view on the plane of the line 4—4 of Fig. 3; Figs. 5, 6, 7 and 10 detail views of modifications relating particularly to the method of connecting the form plates; Fig. 8 a portion of a surface printed by two plates of the upper press of Fig. 1; and Fig. 9 a portion of a complete printed surface.

Similar reference numerals indicate similar parts in the several views.

In its simplest form the invention comprises an impression cylinder and a series of plates connected together by links so as to constitute a chain, the printing forms being secured to said plates. While I have shown in Figs. 1 and 2 two such chains, one serving as a complement to the other to print the complete design, I do not wish to restrict myself to such use. It is obvious that for many purposes a machine having a single chain of form plates may be employed. The illustration of a multiple press, however, enables me to give a description of the invention as applied to such press and at the same time of a press having but a single chain.

Referring now to the drawings the frame 1 of the machine supports the several parts of the printing mechanism which, as shown in Figs. 1 and 2, comprises two impression cylinders 2 and 3, the latter being supported below the former and so disposed that the web of paper, cotton cloth or other fabric 4 may pass from the upper to the lower cylinder in proper working relation thereto. The

material to be printed upon is fed from a suitable drum or roll 5 around the impression cylinders and is wound upon a drum or roll 6, or otherwise disposed of after the printing operation.

The essential feature of my invention resides in the construction and disposition of the several form plates. As shown, the forms 7 are secured upon the convex side of plates 8 of rigid material, said plates in practice having been made of iron or steel of sufficient thickness as not to be flexed or distorted when in use, the purpose being to present the printing forms to the impression cylinder upon a solid, unyielding base or support. In order to secure the advantages of a belt for repeats of indefinite length I connect the plates 8 by links constituting thus a chain which may be mounted upon rollers and the sections of the chain presented to the impression cylinders in succession. The plates 8 may be secured together, so as to form an endless chain, by suitable links 9 riveted to the under sides thereof and pivotally connected with each other by studs 10.

In the machine illustrated in the drawings the upper chain of plates is supported upon and passes around two pairs of rollers 11 and 12, and the lower chain passes around similar rollers 13 and 14. The pairs of rollers 12 and 14 in reality constitute printing cylinders. The shafts of these rollers are carried in journal boxes which may be adjusted in their blocks by screws 15 as will be readily understood.

The plates 8 are curved on the arc of a circle corresponding to that of the rollers over which they pass so that when advanced to printing position they will conform to and bear firmly against the peripheries of rollers 21 and 14.

Any suitable arrangement of belting or gearing may be provided for driving the chains. As shown in the drawings, the power shaft 16 carries a pulley 17 which is connected by belt 18 through pulley 19 with a shaft 20. The shafts 16 and 20 have adjustable bearings in the machine frame and have keyed thereon two pairs of pulleys 21 and 22 respectively, one pair of said pulleys being shown in Fig. 2. Passing around one of the pulleys 21 and 22 at one side of the machine is an endless belt 23 which is caused to travel in the direction of the arrow in engagement with one end of the form supporting plates 8 as seen in Figs. 1 and 4; that is, from pulley 22 around the ends of the form supporting plates 8 as the latter engage roller 11, and in engagement with said plates until they leave the forward roller 12, thence around pulley 21 into engagement with the ends of plates 8 on the lower chain. A similar belt 24 is in engagement with the pulleys 21 and 22 and the form supporting plates 8 on the opposite side of the machine. The belts 23 and 24 bear upon the ends of plates 8 with sufficient force to cause them to move forward to printing position without lost motion. The means described for driving the chains is, however, not essential, as other means may be employed with equal facility. Whatever driving means may be employed it is essential that the plates of the lower chain shall be so disposed as to register properly with the portion of the design printed by the upper plates, both horizontally and vertically.

In Fig. 8 I have shown a portion of a conventional design printed by two contiguous plates of the upper series, and in Fig. 9 a portion of the complete design, it being understood that these are only fragments. Fig. 8 shows a portion of the design as appearing at one end of the plate, and Fig. 9 a complete design as it appears at the other end of the plate. In practice the plates of the two series are so adjusted relatively to each other that the design will be completed by a plate of the lower series printing between the portions printed by two contiguous plates of the upper series. By making the chains of suitable lengths, that is within practical working conditions, the length of the repeat may be anything desired. In a press constructed by me the chains are about ten feet in length and the individual form plates 8 about five by thirty inches and the engraved forms 7 about three by twenty-four inches. These proportions, however, may be varied at will.

When using two series of form plates the connecting links 9 may be such as to permit the plates of a given series to abut or approach each other when traveling between the supporting rollers. That portion of the chains passing around the printing cylinders is drawn taut, the plates being at that time their maximum distance apart as indicated in Fig. 3.

As before stated, my invention contemplates the use of a single series of form plates. In such case provision is made for drawing the plates together as they pass into working relation with the impression cylinder so as to prevent any break in the printing surface. This is easily accomplished by some form of link connection such as shown in Figs. 5, 6, 7 or 10. In the form shown in Fig. 5 each plate 8 is formed with a depending ear 24′ carrying a stud by which said plate is pivotally connected to an elbow link 25 on the immediately following plate. When passing between the supporting rollers the links 25 assume the position indicated at the right-hand of Fig. 5. In order to properly position the form plates I secure curved guides 26 to the spokes of the rollers constituting the printing cylinder. The guide 26 is so positioned that as the form plates pass into engagement with the rollers 12 the lower ends of the links 25 will be thrown up-

ward thereby causing the corresponding plate to close upon the immediately preceding plate thus forming a continuous cylindrical surface as clearly indicated at the left of Fig. 5. In Fig. 6 a slightly different form of link connection is illustrated. In this form the plates are connected by links 29 having integral lugs or projections 27 pivotally connected at a point above the periphery of the plates. When traveling in their horizontal position the links 29 will be drawn apart but when the plates pass into contact with the rollers 12 the links 29 will be drawn together thus closing the gap between contiguous plates.

In Fig. 7 another form of link connection is illustrated somewhat similar to that shown in Fig. 5. In this form the links 9 are connected together by a couple consisting of a substantially T-shaped link 28 and a short link 30. The curved guide plate 26 is used for the purpose of rocking the link 28, or causing it to assume such position as to draw the plates together. The chain of Fig. 10 is similar to that of Fig. 3, the gap between two contiguous plates being bridged by a wedge-shaped plate 31 as they pass around the rollers 12. The bridge plates 31 are forced above the periphery of plates 8 when the chain is horizontal and are gradually drawn down into place as a chain passes around the printing cylinder.

The ink or coloring matter is furnished to the forms through suitable rolls 29'.

The present invention secures the solidity and rigidity of cylinder printing, and at the same time enables the making of the repeat as long as may be desired within practical working conditions. When in printing position the chain is as rigid as the surface of a cylinder, whereas when not in printing position the chain is as flexible as need be. Furthermore, there is nothing indefinite or uncertain as to the relative positions of the various sections of the chain when ready to print as is the case with belts of leather, rubber or other flexible material. Each section of the chain or form plate falls into position without noticeable deviation, hence the various parts of the design register properly.

While I have shown two chains of form plates, it is to be understood that I may use three or more such chains each constructed and mounted in the manner above described, and coöperating with a corresponding impression cylinder. A press having three or more chains is more suitable for color work.

What I claim and desire to secure by Letters Patent is:—

1. In a printing machine, an impression cylinder, an endless chain consisting of a plurality of form plates connected together by links, means for bringing said plates successively into working relation with the impression cylinder, and means for moving adjacent plates into abutting relation when in printing position to present an unbroken cylindrical surface.

2. In a printing machine, impression cylinders, an endless chain adapted to coöperate with each of said cylinders, each of said chains consisting of a plurality of connected form plates, and means for moving said chains so as to bring the plates thereof into working relation with a corresponding impression cylinder, the plates of one chain being disposed relatively to those of the other that the impressions from one series of plates are complemental to those of the other.

3. In a printing machine, an impression cylinder, an endless chain consisting of a plurality of form plates connected together by a couple consisting of a substantially T-shaped link and a short link, said links being pivotally connected together, and means for rocking the T-link to cause contiguous plates to abut.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM H. THOMAS.

Witnesses:

ROBERT W. ASHLEY,

CHARLES S. JONES.