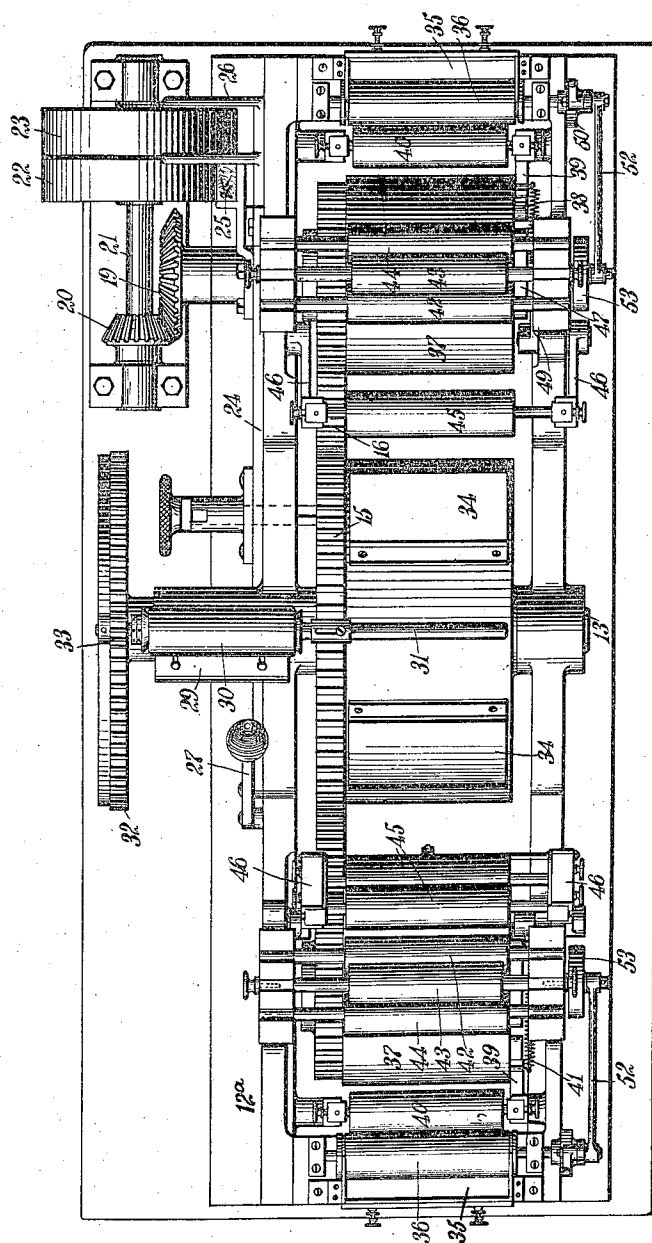


G. H. NEIDLINGER.
 MULTIPLE COLOR TUBE PRINTING MACHINE.
 APPLICATION FILED DEC. 30, 1909. RENEWED DEC. 16, 1910.

1,033,824.

Patented July 30, 1912.

3 SHEETS-SHEET 1.



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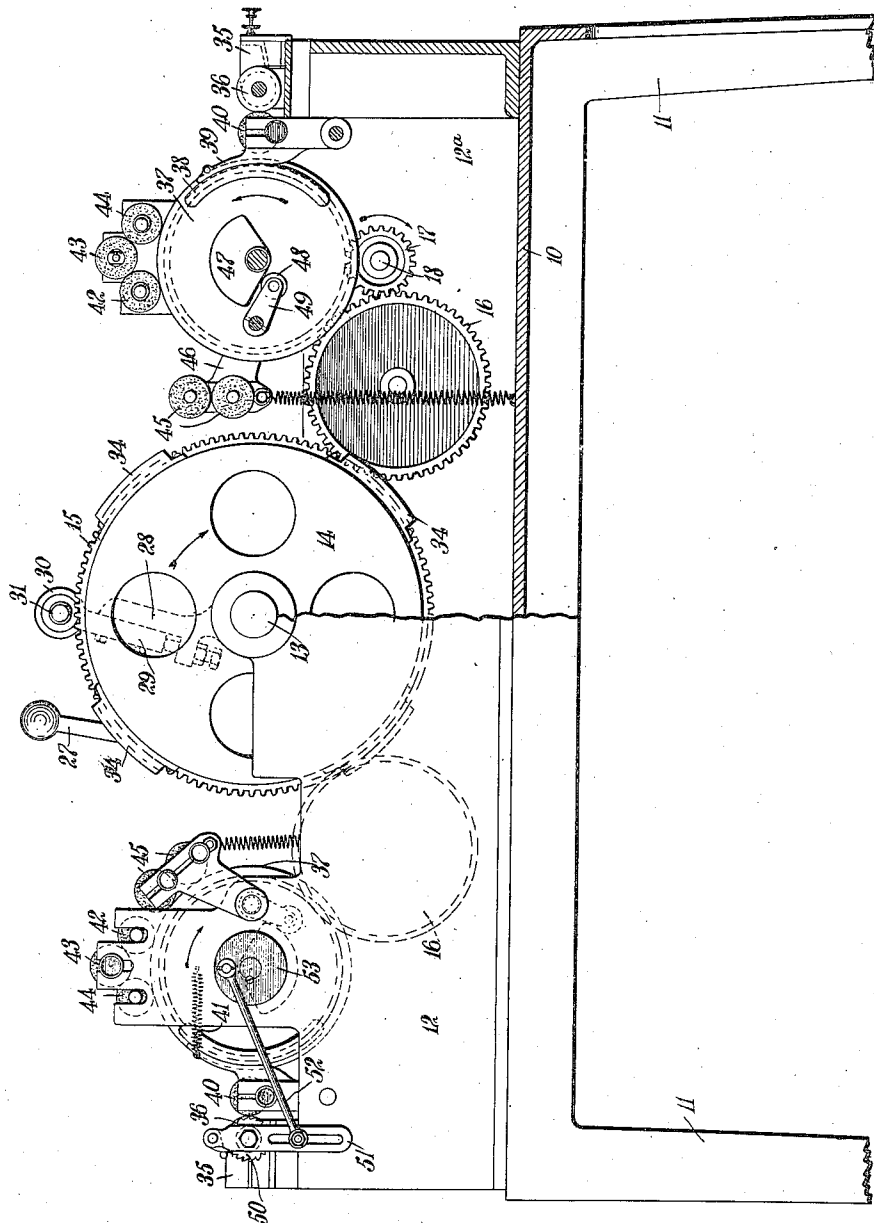
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3 SHEETS—SHEET 2.

Fig. 2.



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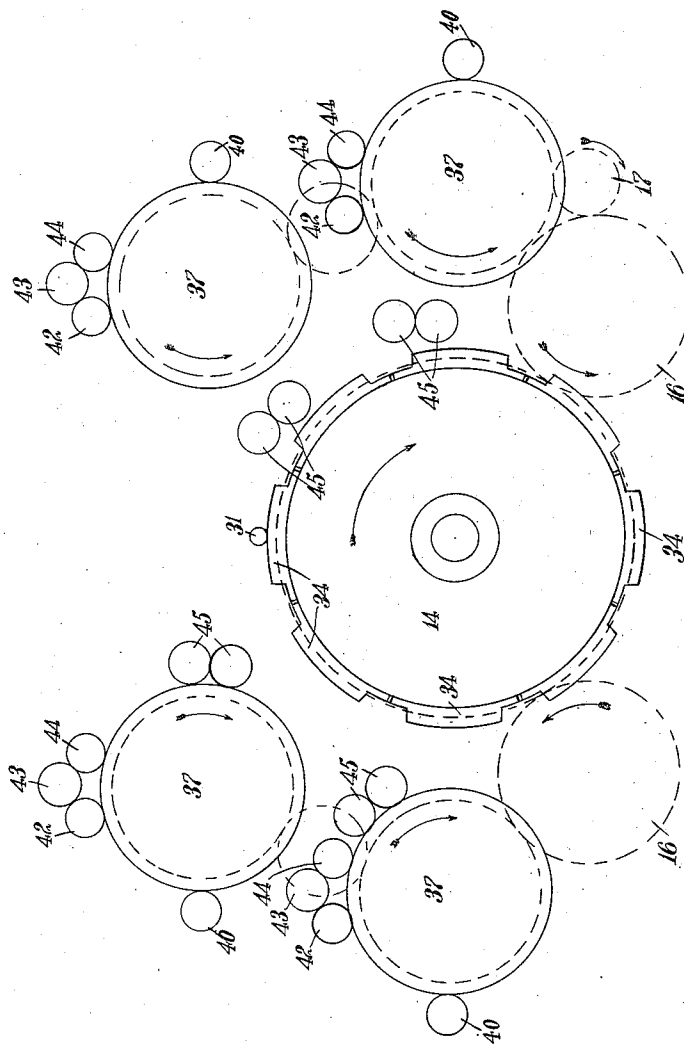
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3 SHEETS-SHEET 3.



7293

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UNITED STATES PATENT OFFICE.

GEORGE H. NEIDLINGER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO PEERLESS
TUBE CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MULTIPLE-COLOR TUBE-PRINTING MACHINE.

1,033,824.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed December 30, 1909, Serial No. 535,541. Renewed December 16, 1910. Serial No. 597,722.

To all whom it may concern:

Be it known that I, GEORGE H. NEIDLINGER, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a new and Improved Multiple-Color Tube-Printing Machine, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in machines for printing upon the outer surface of cans, jars, tubes or other substantially cylindrical bodies, and the main object of the invention is to print the articles in a plurality of colors properly registering and applied during a single operation of the machine.

In my improved machine, the articles to be printed upon are caused to rotate about their own axes, and closely adjacent the surface of a printing cylinder, the rate and direction of surface travel of the printing cylinder and the article to be printed upon, being the same. The printing cylinder carries a plurality of printing plates, so spaced in relation to the relative diameters of the printing cylinder and the article printed upon, that the printing produced by one printing plate and in one color, will bear a definite and predetermined relationship to the printing produced in a different color by the next printing plate. In connection with the printing cylinder, automatic inking apparatus is employed, by means of which the proper colored ink is applied to each printing plate on the cylinder independent of the other printing plates.

The invention consists in the combination and relative arrangement of parts herein-after defined in the claims; and one embodiment of which is described in detail in this specification.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a top plan view of a machine constructed in accordance with my invention and adapted to print in two colors; Fig. 2 is a side elevation thereof, a portion of the machine being broken away; and Fig. 3 is a diagrammatic view showing the relative arrangement of certain parts for printing in four colors.

In the specific machine illustrated in Figs. 1 and 2, I employ a main frame or table 10, having suitable supporting legs 11 and having upwardly-extending substantially parallel side walls 12 and 12^a, which serve to journal the various parallel-rollers and shafts embodied in the machine. Arranged substantially centrally of the platform or table 10, is a transverse shaft 13, journaled in the two walls 12 and 12^a and supporting a large drum or printing cylinder 14. At one end of this cylinder is a gear 15, intermeshing with a gear 16 mounted on a stub shaft or on the side wall 12^a. This gear 16 serves to transmit motion to the printing cylinder from the pinion 17 on a main drive shaft 18. The main drive shaft extends through the wall 12^a, and has upon its outer end a bevel gear 19, intermeshing with a bevel pinion 20 on a countershaft 21. This countershaft has fast and loose pulleys 22 and 23 with which the belt from any suitable power shaft or prime mover may engage. On the rear side of the wall 12^a, is a sliding bar 24, having a brake 25 and belt-engaging arms 26 at one end, and at the other end an upwardly-extending lever 27, by means of which the bar 24 may be moved longitudinally. With the parts in the position indicated in Fig. 1, the brake will hold the fast pulley and the entire machine against rotation, while the belt runs the loose pulley. By swinging the lever 27 to the left, the brake is moved out of engagement with the pulley 23, and the belt is brought on to the pulley 22 to run the machine.

Directly above the shaft 13 and in the rear of the wall 12^a, is an upwardly-extending stationary arm 28, shown in dotted lines in Fig. 2. The arm has an upper movable section 29 bolted thereto and having at its upper end a sleeve 30 through which extends a spindle 31. The spindle lies parallel to the shaft 13, and directly above the same, and may be adjusted vertically in respect to said shaft by varying the position of the detachable section 29 with respect to the stationary portion of the arm 28. The arm 28 is preferably integral with an outwardly-extending journal box of the shaft 13, and on the rear end of the shaft is a removable gear wheel 32 of substantially the same diameter as the printing drum. The spindle 31 extends through the sleeve

30 and upon its rear end it is provided with a removable pinion 33 meshing with the gear wheel 32. The gears 32 and 33 cause the printing cylinder and spindle 31 to rotate simultaneously and at predetermined relative speeds. The spindle 31 is adapted to receive the hollow tube, can, jar or other article which it is desired to print, and the gears 32 and 33 are of such relative proportions that the rate of surface travel of the article on the spindle, will be the same as the rate of surface travel of the printing plates on the printing cylinder. The printing cylinder carries a plurality of these printing plates, there being four such plates 34 employed in the form illustrated in Figs. 1 and 2. If the printing is to completely encircle the tube or other article to be printed, each printing plate is of a width substantially equal to the circumference of said tube or other article, and the printing plates are spaced apart a sufficient distance to permit the spindle to make one or more complete revolutions from the time the rear edge of one printing plate passes the spindle, until the front edge of the next printing plate arrives in operative position.

The form shown in Figs. 1 and 2 is adapted for printing two separate colors on the tube, and thus each alternate printing plate will be made somewhat different than the remaining printing plates. For instance, one printing plate may bear an ornamental design and the border for a panel, which are to be printed in one color, and the next printing plate will bear type for printing the reading matter in an ink of a different color. The spindle is unsupported at its front end, so that a tube may be readily slipped thereon and may fit friction tight, so as to rotate with the spindle. The tube is placed in position either while the spindle is stationary or after the time one printing plate leaves the spindle and before the next one reaches said spindle. As one printing plate passes the spindle, the tube on the spindle is rotated in contact with the printing plate, to transfer the impression to the outer surface of the tube, and the tube remains in position until after the next printing plate comes into operative engagement with the tube and passes the same. The tube is then removed and replaced by another before the third printing plate arrives in operative position. Thus, two tubes will be printed, each in two colors during each rotation of the printing cylinder. In case printing or ornamentation in three different colors is to be applied to the tube, one of the four plates shown in Fig. 2 would be removed and the tube would be left on the spindle during a complete revolution. The number of printing plates, their character and their distance apart, will depend upon the character of printing which it is desired

to produce and the size of the tube, which may vary somewhat in practice.

It is, of course, understood that a separate inking mechanism is provided for each different kind of printing plate. In the form shown in Figs. 1 and 2, in which there are two forms of printing plates, and two plates of each form, two separate sets of inking mechanism are employed and these operate each upon its own kind of printing plate. Each inking mechanism includes an ink or color trough 35, having a roller 36 rotatable therein. A larger roller 37 is mounted in the two side plates 12 and 12^a, and is positively rotated from the pinion 17 on the main shaft 18. The roller 37 upon one end, carries a cam section 38, which intermittently engages with a pivoted lever 39, which latter carries a roller 40. With the cam in engagement with the lever, the roller 40 is held in engagement with the roller 36, to receive ink or color from the latter, and as the cam passes out of engagement with the lever, a spring 41 swings the lever to such a position that the roller 40 engages with the large roller 37 and delivers the ink or color to the latter.

Directly above the roller 37 are three rollers 42, 43 and 44, in engagement with each other and with said roller 37, and which serve merely as distributing rollers to bring the ink or color into an even and uniform coat. The large roller 37 is spaced a short distance from the printing cylinder, and between the roller 37 and the printing cylinder are one or more rollers 45. These rollers are carried by arms 46 pivoted to the two plates 12 and 12^a, and are capable of swinging upwardly into engagement with the roller 37, as shown at the left-hand side of Fig. 2, or of swinging upwardly past the position shown at the right-hand side of Fig. 2, into engagement with the roller 37. These rollers 45 act to transfer the color, and are so controlled that they swing into operative engagement with the printing cylinder only when the particular or predetermined printing plate of the latter is passing the point of tangency with the transferring roller. This controlling mechanism may include a cam 47 on the shaft of the roller 37 and adapted to engage with a small roller 48 on an arm 49 connected to one of the arms 46. The shape of this cam determines the position of the transferring rollers 45, and each cam is so disposed that the transferring rollers will intermittently swing across the intervening space between the roller 37 and the printing cylinder, and deliver ink or color to the desired printing plate. The shaft of the roller 37 may serve, not only to rotate the cam which swings the transferring rollers, but also be used for intermittently and slowly rotating the rollers 36 in the color troughs. As shown at the

left-hand side of Fig. 2, the roller 36 is provided with a ratchet 50 and a depending slotted arm 51. A link 52 connects this arm to a crank disk 53, on the outer end of the shaft of the roller 37. A suitable pawl engages with the ratchet 50, to prevent the rotation of the roller 36 in one direction, while the oscillation of the arm 51 causes its intermittent rotation in the opposite direction.

As I have previously stated, I do not wish to be limited in any way to the use of only two different kinds of color plates, and the use of two sets of inking mechanisms, as any number may be employed by slightly adjusting the relative positions of the parts. In Fig. 3, I have shown somewhat diagrammatically, a printing cylinder with eight printing plates thereon and four separate sets of inking mechanisms, each with its two transferring rollers for intermittently engaging with the roller 37 or with the desired printing plate. Any other number than four could of course be employed.

The specific machine illustrated is designed for printing upon the outer surface of collapsible tubes before the latter are filled. The spindle is made of such size as to fit friction tight within the tube, and thus positively rotates the latter at the desired speed. It is, of course, evident that the spindle could be made of larger size and the device used for printing upon cans, jars, or any other similar containers. By inclining the axes of the spindle and printing cylinder, the machine may be used for printing upon conical instead of cylindrical walls.

Hereinafter in the claims I wish the term "tube" to be considered as covering any form of container, upon the cylindrical or approximately cylindrical walls of which it is desired to print.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A multiple color tube printing machine having a printing cylinder, a shaft for supporting the same, an arm formed of two adjustably connected sections, one of said sections carrying a sleeve, a spindle mounted within said sleeve and disposed adjacent to and substantially parallel with the periphery of said printing cylinder, and means for rotating said spindle and said printing cylinder at substantially the same rate of surface travel.

2. A multiple color tube printing machine, having a printing cylinder provided with a gear wheel and a plurality of printing plates, separate inking mechanisms for said separate plates and operated from said gear wheel, an arm extending upwardly adjacent one end of said printing cylinder and formed of a stationary section and a

section adjustably secured thereto and provided with a sleeve, a spindle mounted in said sleeve and disposed adjacent to and parallel with the periphery of said cylinder and movable toward or from the same upon the adjustment of said last-mentioned section, and removable intermeshing gears carried by the shaft of said cylinder and by said spindle.

3. A multicolor tube printing machine having a printing cylinder, a plurality of printing plates carried thereby, a plurality of separate inking mechanisms, the number of printing plates being a multiple of the number of inking mechanisms, means controlled by the rotation of the cylinder for bringing each inking mechanism into operation a plurality of times during each rotation of said cylinder, a spindle adjacent the periphery of the cylinder and supported at one end only and adapted to receive upon the opposite end thereof the tube to be printed, and means for rotating said spindle and said printing cylinder to print the desired number of colors upon the tube during a fraction of a rotation of said printing cylinder.

4. A multicolor tube printing machine having a printing cylinder, a plurality of printing plates carried thereby and projecting outwardly therefrom to leave recesses between adjacent plates, a plurality of inking mechanisms for said inking plates, and a spindle extending substantially parallel with the periphery of the cylinder and adapted to carry a tube in printing relationship to said plates, said tube being removable from said spindle when a recess of the printing cylinder is opposite said spindle.

5. A multicolor tube printing machine having a printing cylinder, a plurality of printing plates carried thereby and extending outwardly therefrom and spaced apart to leave recesses therebetween, a plurality of inking mechanisms, the number of inking mechanisms corresponding to one-half the number of printing plates and each plate on said cylinder being a duplicate of the plate diametrically opposite thereto, means for bringing each printing mechanism into operation twice during each revolution of the cylinder, a spindle supported at one end and extending substantially parallel to the periphery of the cylinder and adapted to receive a tube to be printed, said tube being removable from said spindle when said spindle is opposite a recess between adjacent printing plates, and means for rotating said spindle and said printing mechanisms at the same rate of surface travel.

6. A multicolor tube printing machine having a printing cylinder, a plurality of printing plates carried thereby, each print-

ing plate being a duplicate of the printing
plate diametrically opposite thereto, an ink-
ing roller, means for rotating the same
twice during each rotation of the printing
5 cylinder, an ink transmitting roller, a cam
connected to said inking roller for swinging
said transferring roller into and out of en-
gagement with a printing plate during each
revolution of the inking roller, and means
0 adapted to support a tube to be printed and
permit the rotation of the latter in rolling

contact with said printing plates, a half
revolution of said printing cylinder serving
to complete the printing operation upon
said tube.

15

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

GEORGE H. NEIDLINGER.

Witnesses:

CLAIR W. FAIRBANK,
PHILIP D. ROLLHAUS.