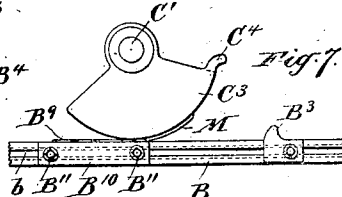


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3 SHEETS—SHEET 1.



Inventor:
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by his attorney,
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UNITED STATES PATENT OFFICE.

STEPHEN L. MORGAN, OF RUTHERFORD, NEW JERSEY.

PRINTING-MACHINE.

No. 824,190.

Specification of Letters Patent.

Patented June 26, 1906.

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To all whom it may concern:

Be it known that I, STEPHEN L. MORGAN, a citizen of the United States, residing in Rutherford, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Printing-Machines, of which the following is a specification.

The invention relates more particularly to that class of printing-machines known as "plate-printing" presses, in which the impression is made from an engraved plate.

An important object of the invention is to provide for the passage over the plate of a long wiping-surface and for maintaining such surface in condition for efficient service.

Another object is to provide a simple inking mechanism.

A further object is to provide, operate, and maintain an effective polishing-surface, with means for presenting it to the plate.

Another important object is to provide a throw-off or stop motion adapted to be operated either automatically after each impression or by hand; and generally the object of the invention is to provide a machine adapted to be driven by hand or power, in which the operations of inking, wiping, and polishing necessary in conditioning the plate for an impression and also the operation of making such impression shall be automatically and successfully performed and which shall be economical in first cost and in space occupied and also in operation and maintenance.

The invention consists in certain novel features and arrangements of parts and in details of construction by which the above objects are attained, to be hereinafter described.

The accompanying drawings form a part of this specification and show a preferred manner of carrying out the invention.

Figure 1 is a side elevation of a machine of the D-roller type constructed in accordance with my invention. Fig. 2 is a corresponding view of the opposite side, showing the working parts; and Fig. 3 is a plan view, partly in horizontal section. Fig. 4 is a view from below, showing a portion of the inking mechanism. Fig. 5 is a cross-section on the line 5 5 in Fig. 2, showing a portion of the wiping mechanism on a larger scale. Fig. 6 is an end view, partly in vertical section, showing a portion of the inking mechanism. Fig. 7 is a side elevation of a portion corresponding to Fig. 1. Fig. 8 is a diagram, partly in vertical section, showing the D-

roller and the arrangement of the wiping and polishing mechanisms relatively thereto. Fig. 9 is a rear elevation, partly in vertical section, showing the D-roller and immediately adjacent parts. Fig. 10 is a vertical section, partly in side elevation, showing the clutch and a portion of its operating mechanism. Fig. 11 is a corresponding rear elevation. Fig. 12 is a front elevation of another portion of the clutch mechanism, and Fig. 13 is a side view of certain parts of the same mechanism. Fig. 14 is a vertical section on the line 14 14 in the preceding figure. Fig. 15 is a vertical section on a still larger scale, showing a means of attaching the plate to the D-roller.

Similar letters of reference indicate the same parts in all the figures.

The machine as illustrated is constructed on the general lines of a D-roller plate-press.

The frame is marked A and comprises two vertical side frames A' A², provided with legs and connected by suitable braces, between which is mounted a reciprocating bed or "plank" B, supported on antifriction-rollers B' B'. Below the plank is a strong supporting-roller B², mounted in bearings in the side frames, and above the plank is the segmental printing or D roller C on a shaft C', extending through boxes guided in the frame, supported on springs and adjustable toward and from the upper face of the plank by screws C². Connected with the D-roller is a segmental flange C³, corresponding to the contour of the D-roller and lying just beyond the margin of the plank. This flange carries an arm C⁴, adapted to engage an adjustable lug B³, secured to the edge of the plank and initiate the movement of the latter against the force exerted by a weight B⁴, suspended from a strap B⁵, attached to the rear end of the plank and running on a pulley B⁶, mounted on the same shaft as the rear rollers B'.

The driving-shaft E is supported in bearings in brackets A³, extending rearwardly from the side frames, and carries at one end a driving-pulley E' and at the other a sprocket-wheel E³, from which motion is communicated through the sprocket-chain E⁴ to the sprocket-wheel C⁵, of the same diameter as the wheel E³ on the D-roller shaft. A clutch E² on the driving-shaft permits the transmission of motion to be controlled, while the pulley E' may run continuously.

The engraved plate or analogous printing-surface (marked M) is mounted on the con-

vex face of the D-roller, to which it is curved to conform, and the card or other surface to be printed upon is placed on the plank and receives the impression in its passage under the D-roller.

The inking device is preferably located horizontally in rear of the D-roller above the plank, and the ink is supplied and distributed by the reciprocations of the plank.

F is a flat bar extending rearwardly from a transverse brace A⁴ between the side frames and supported at the rear end upon a spring A⁵ or other slightly-yielding support. On the upper face of the bar near the rear end are two horizontal disks or circular ink-plates F¹ F², arranged to rotate axially. The rearmost F¹ has an ink-fountain F³, in which is a roller F⁴, rotated by its frictional contact with the ink-plate and delivering ink thereto from a supply in the fountain, controlled by a scraper F⁵. The fountain is supported by a bracket F⁶, attached to the bar F and overhanging the rear portion of the ink-plate. In adjustable housings B⁷ on the edges of the plank is carried a pair of ink-distributing rollers F⁷ F⁸, which at each reciprocation of the plank traverse the inner ink-plate F², and one, the roller F⁷, partially traverses the ink-plate F¹, taking ink therefrom and delivering to the plate F², whence it is carried by the roller F⁸ to a revolving roller F⁹, mounted in stationary bearings on the bar F. From the roller F⁹ the ink thus uniformly distributed is taken by an oscillating roller F¹⁰ and presented at proper intervals to the printing-plate M. The motion of the roller F¹⁰ is induced by the action of one or more removable blocks C⁷, arranged segmentally on a disk C⁶, carried by the overhanging end of the shaft C⁵ and serving as a cam working against an arm F¹¹ on the swinging frame F¹², in which the roller F¹⁰ is mounted. The series of blocks holds the roller F¹⁰ against the roller F⁹ in opposition to a spring F¹³, which on the release of the arm F¹¹ swings the roller into contact with the plate M. A greater or less number of blocks C⁷ correspondingly increases or lessens the length of the cam and enables the period of contact of the roller F¹⁰ with the plate M to be changed as required in accordance with the length of the printing-surface.

The ink-plates F¹ F² are slowly rotated, step by step, by pawls F¹⁴ F¹⁴, carried by arms F¹⁵ F¹⁵ and engaging the ratchet-wheels F¹⁷ F¹⁷ beneath the bar F. The required swing of the arms is imparted by the contact with the longer arm F¹⁶ of a pin B⁸, carried by the plank, and the motion is transmitted to the shorter arm F¹⁵ by a link F¹⁸. The ink-plates are held against movement in the reverse direction by pawls F¹⁹ F¹⁹ on the under face of the bar F, as will be understood.

My experiments show that the delicate op-

eration of wiping the plate to remove the surplus ink and leave the engraved lines just sufficiently filled is best accomplished by a long wiping action with a properly-conditioned wiper in strong contact with the plate. I employ for the wiping a strip of muslin or similar fabric arranged to be fed forward and taken up a short distance at each revolution of the D-roller and provide means for drawing a long portion of such strip across the face of the printing-plate in the direction opposite to the movement of the latter and also for supporting such strip in its passage. G is an oscillating hollow cylinder or carrier mounted in rearward extensions A⁶ A⁶ of the side frames on a shaft G¹, carrying a gear-wheel G², in mesh with an idle gear-wheel G³, which is driven by a gear-wheel G⁴, mounted on a stud A⁷ on the side frame, to which an oscillating motion is imparted by a link G⁵, pivoted thereto at G⁶ and having a longitudinal slot g' at its lower end, in which is loosely received a pin G⁷, set adjustably in an arm C⁸ on the shaft C⁵ of the D-roller. The arm C⁸ revolves with the D-roller; but by reason of the lost motion provided for by the slot g' the desired oscillations of the gear-wheel G⁴ are produced, the length of arc described by such oscillations being determined by the distance the pin G⁷ is set from the shaft C⁵. The oscillating motion is transmitted through the train of gearing to the cylinder or carrier G. The latter is cut through transversely at one point g in its periphery, and adjacent to such cut, on either side thereof on the inner face of the carrier, are fastened the ends of a strong band H or strip of heavy fabric which extends through the cut, separates, and follows the contour of the carrier in opposite directions until led away tangentially at two points in the circumference.

On leaving the front face of the carrier the band H passes behind a tightener-roller H¹, adjustably secured to the side frames A¹ A², thence over a guide-roller H² in such frames above the D-roller, and under and partially around a similar roller H³ immediately in rear of the D-roller, from which it passes to the rear face of the carrier, being subjected in such passage to the pressure of a pad H⁴. The latter is mounted in a swinging frame H⁵ and held against the band by a spring H⁶ except at such times as the pressure is relieved, as will appear.

D¹ D² are rolls mounted within the carrier in cross-bars G⁸, extending diametrically of the ends thereof, with their axes parallel with the shaft G¹. One, the roll D¹, carries wound thereon a long strip D of muslin or other suitable fabric, the end of which is passed through the cut g, along the outer face of the band H throughout its length, except at the tightener-roller H¹, which it preferably passes on the opposite face, and enters the cut g and is attached to the take-up roll D². The latter is

equipped with a ratchet-wheel D^3 , operated by a pawl D^4 on a lever D^5 and subject to the force of a spring D^6 . The lever is moved in opposition to the spring by contacting at each oscillation of the carrier with a pin A^8 , set in its path in the extension A^6 of the side frame A^2 . A pawl D^7 , mounted on the cross-bar G^8 , holds the roll D^2 against moving in the direction to unwind. The let-off roll D' is held during the wiping operation by the frictional engagement of a wedge-shaped portion D^8 of the lever D^5 with a V-groove in the periphery of a disk D^9 on the shaft of the roll D' .

The oscillating movement of the carrier is so timed as to drag a long length of the strip D , backed by the stronger band H , along the face of the plate M at each revolution of the D -roller in the direction opposite to the movement of the plate, thus providing the long wipe desired. The return movement of the strip and band takes place after the passage of the plate M and during the period in which the cut-away portion of the D -roller is presented to the strip and band. The tension of pad H^4 is relieved at the same period by the rearward swing of the frame H^6 , in which it is mounted, caused by a cam-surface C^{10} on a wheel C^9 , to be described, striking the arm H^7 , and thus tilting the frame. During such return movement the take-up roller D^2 is partially rotated by its pawl D^4 to wind up a short length of solid strip and draw from the roll D' a similar short length of clean strip. The wedge D^8 being at this time out of contact with the disk D^9 allows the let-off movement to take place. By taking up a little of the soiled strip and correspondingly adding at the other end a small quantity from the clean supply the wiping-surface is kept at the same length and in a uniform condition, just sufficiently soiled with ink to produce the most efficient wiping, and is taken up before it has become so filled with ink as to be imperfect in its action.

J' J^2 are rolls mounted in the extensions A^6 A^6 in rear of the carrier G . The roll J' carries a strip or wide ribbon J of muslin or other fabric similar to the strip D wound thereon, and J^2 is a take-up roll therefor operated by a pawl J^3 on a lever J^4 subject to the tension of a spring J^5 and actuated by an arm G^9 on the shaft G' of the carrier G . This ribbon J extends forward and downward from the roll J' , over the face of the pad H^4 , under and partially around a roller H^8 on the axis of the swinging frame H^6 , and thence to the take-up roll J^2 . The ribbon J supplies fresh surfaces for the pad, removes a portion of the ink from the strip D , and also performs the function during the passage of the strip D over the pad of blending or spreading the ink taken up thereby in the wiping operation, and thus conditions the strip for better wiping and longer service.

The polishing of the plate following the wiping operation and immediately preceding

the impression is effected by an endless belt K , running on a roller K' at the upper ends of the side frames and driven by a sprocket-wheel K^2 , on which runs a sprocket-chain K^3 , in mesh with a larger sprocket-wheel K^4 , mounted on a stud A^9 in the side frame A^2 and carrying a spur gear-wheel K^5 , meshing with a larger spur gear-wheel C^9 , above referred to, on the shaft of the D -roller and carrying the cam C^{10} for the pad H^4 . The belt K is of strong fabric, as duck, and is stretched from the roller K' around the rollers K^6 K^7 , mounted in a frame K^8 , pivoted at k within the side frames A' A^2 in front of the D -roller and arranged to be lifted or swung on its pivots to permit free access thereto. The frame is held in the lowered position by hooks A^{10} on the side frames, engaged with pins K^9 on the frame. The desired tension is maintained on the belt by an idle roller K^{10} subject to the force of the springs K^{11} K^{11} .

The portion of the moving polishing-belt K between the rollers K^6 K^7 is in strong frictional contact with the plate M during the passage of the latter and effectually polishes it by the rapid movement of the belt in the direction opposite thereto ready for the impression.

The belt K is filled with suitable material and conditioned for service before it is put in position, and the supply of whiting necessary to the polishing operation is applied by a roller L , mounted in a swinging frame L' , pivoted at the upper portion of the side frames and oscillated by the contact with its arm L^2 of a pin G^{10} on the carrier G . The frame L' is subject to the force of a spring L^3 tending to hold the roller L against the belt K upon the periphery of the roller K' , and the throw of the frame, due to the action of its arm and the pin G^{10} , brings the roller L into contact with a mass of whiting L^4 on a spring-platform L^5 , from which it takes up the small quantity required and transfers it to the belt, the spring L^6 permitting the platform to yield to the pressure of the roller L .

A pad L^7 , having a weight L^8 , is mounted in forks A^{11} on the side frames above the roller K' and lies in contact with the belt, serving to distribute the whiting and work it uniformly into the surface of the belt as the latter traverses beneath it.

It is important to the successful operation of the inking mechanism as herein shown that the plank make a complete reciprocation at each revolution of the D -roller irrespective of the length of the plate M , so that the ink-rollers F^7 F^8 may make the required traverse of the ink-plates F^1 F^2 , and it is also imperative that the plank be free to move at a rate determined by the peripheral travel of the plate in making the impression. These results are accomplished by the frictional contact of the flange C^3 with a surface on an adjustable block B^{10} on the plank. The block has a dovetailed rib matching a simi-

larly-shaped groove *b* in the edge of the plank and is held by screws *B*¹. On the upper face of the block is fastened a strip *B*² of leather or other material, and the block is so placed relatively to the position of the plate *M* on the *D*-roller as to present the rear end of the strip *B*² in position to be frictionally engaged by the flange *C*³ at the instant the impression is completed, (see Fig. 7,) and the frictional surface *B*² is of sufficient length to insure such engagement during the whole passage of the remaining portion of the segmental part of the flange, thus causing the required full rearward movement of the plank without in any degree interfering with the motion of the plank while under the pressure of the plate *M* in making the impression.

The grooves *b b* along the edges of the plank also receive the lug *B*³ and the housings *B*⁷, carrying the bearings for the ink-rollers *F*⁷ *F*⁸, and permit these parts to be adjusted forward and rearward, as required.

Continuous rapid rotation is imparted to the ink-roller *F*⁹ by a spur gear-wheel *F*¹⁰ on its shaft, meshing with the gear-wheel *C*³ on the *D*-roller shaft.

The engraved plate *M* may be secured to the *D*-roller in a variety of ways. I have shown a band of sheet metal *I* drawn tightly around the convex surface and secured by clamps *I*¹ on the plane portions of the roller and carrying transverse ribs *I*² *I*³ of less thickness than the plate *M*, undercut on the inner edges (see Fig. 15) to receive and engage the correspondingly-beveled ends of the plate and hold the latter to the band.

The clutch *E*² on the driving-shaft is operated by the movements of a vertical lever *E*³, pivoted to one of the brackets *A*³ on the side frames and having its lower end forked and inclosing an eccentric *N*¹, mounted on the rear end of a rod *N*, extending longitudinally of the machine alongside the plank. At the forward end is a hand-lever *N*², by which the rod may be partially rotated to tilt the lever *E*³ and through its jaws engage or disengage the clutch. The rod is inclosed in a hollow square bar *P*, capable of sliding longitudinally in guides *A*¹³, attached to the frame of the machine. The bar is omitted at one point, (see Figs. 13 and 14,) at which the adjacent ends are joined by a bridge *P*¹. In the space thus provided the rod *N* is exposed, permitting the application thereto of means for preventing its movement longitudinally with the bar. The means shown is a collar *N*³, fixed on the rod between two bearings *A*¹², fixed to the frame. Space is here also afforded for an arm *N*⁴, fixed on the rod and subject to the pull of a spring *N*⁵, tending to turn the rod in the direction to release the clutch and stop the machine. This tendency is resisted by the engagement of a lug *N*⁷ on a spring-dog *N*⁶, attached to the hand-lever *N*², with an adjustable finger *P*² on the front end

of the bar. The latter is reciprocated at each revolution of the driving-shaft *E* by a swell or cam *E*⁶ on the body of the clutch or other convenient surface acting upon an arm *P*³, extending upwardly from the rear end of the bar and moving the latter in opposition to a spring *P*⁴ tending to move it toward the hand-lever *N*². When conditioned as shown in the drawings, the finger *P*² is so set that the hand-lever is continuously engaged, the finger riding idly along the outer face of the lug *N*⁷, and the machine will run until the finger is freed by retracting the spring-dog by the hand of the attendant, permitting the rod to partially rotate and release the clutch. By shortening the reach of the finger the lug *N*⁷ will escape therefrom at each revolution after the impression is made, and thus stop the machine automatically. It is started again for another impression by reversing the movement of the hand-lever and again engaging the finger *P*². Thus the machine may be run continuously if the character of the work is such as to permit the laying-on and removal of printed material between impressions or may automatically stop between impressions to permit the removal and laying-on to be effected. In either condition the machine may be stopped at the will of the attendant by grasping the hand-lever and spring-dog and releasing the latter from the finger *P*².

The several ink-rollers may be all of sufficient length to supply ink to the widest plate; but I prefer to use a roller *F*⁸ of a length conforming approximately to the width of the engraved portion of the plate to be printed, for the reason that a saving in the amount of ink applied is thus effected and also less surplus ink is required to be taken up by the wiping-strip *D*. Another advantage of this arrangement is an increased uniformity in applying the ink to the plate. For example, if a full-length roller be substituted for the short roller *F*⁸ it will be seen that the succeeding rollers will tend to "build up" or increase in diameter uniformly by the accumulation of ink thereon, excepting the swinging roller *F*¹⁰, which by continually losing its ink in a band or zone corresponding to the width of the plate becomes gradually higher at each side of such zone. Thus conditioned the higher parts of the swinging roller continue to build up, while the low part or zone is held away from the surface of the revolving roller and is prevented from receiving its proper allowance of ink. The employment of the short roller *F*⁸ lessens or entirely obviates this difficulty by supplying ink only to those portions of the rollers *F*⁸ and *F*¹⁰ from which they again deliver it.

The oscillating carrier *G* provides the long wiping action, and by taking up a very short length of the soiled strip after each impression a uniformly-conditioned wiping-surface

is insured until the strip is exhausted. My experiments indicate that with a wiping action of three feet it is amply sufficient to let off and take up about one-eighth of an inch for each impression, that short advance being enough to provide a sufficiently-clean wiping-surface, especially when the cleaning-ribbon J is employed.

By reason of the vertical arrangement of the wiping and polishing mechanisms floor-space is economized and easy access to the D-roller in applying a plate or for inspection is easily afforded, and the face of the plank on its return movement is unobstructedly presented to the attendant for the removal and laying on of the material to be printed.

The spring A⁵, supporting the bar F, provides the yielding quality necessary to the proper contact of the ink-distributing rollers with the ink-plates and the uniform distribution of the ink, and by operating the inking mechanism by the reciprocations of the plank this mechanism is simplified and favorably presented for supervision by the attendant.

Although I have described the machine as designed to be operated by power, the various mechanisms are easily actuated and the machine may be advantageously run by hand.

Modifications may be made in the forms and arrangements of parts without departing from the principle of the invention or sacrificing its advantages, and parts of the invention may be used without the whole.

Other means for inducing the long wiping action may be substituted for the cylindrical carrier-shown and for inducing the short take-up or advance of the wiping-strip, and the inking mechanism may be differently located. For reasons of economy of space and ease of operation I prefer the whole as shown.

I claim—

1. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface, and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip.

2. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface, and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip, means for guiding said strip and presenting it to said printing-surface, and means for controlling the tension of said strip.

3. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with

said printing-surface and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip, means for guiding said strip and presenting it to said printing-surface, and a cleaning-surface yieldingly presented to the soiled face of such strip during the movement of the latter.

4. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip, and means for letting off a portion of said strip at one end and taking it up at the other.

5. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip, and means for automatically letting off a portion of said strip at one end and taking it up at the other.

6. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip, and means for automatically letting off a portion of said strip at one end and taking it up at the other after each wiping operation.

7. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip while out of contact with said printing-surface.

8. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and means for returning said strip by moving it in the opposite direction into position for a succeeding wiping operation by the soiled portion of said strip while out of contact with said printing-surface, and means for automatically letting off a portion of said strip at one end and taking it up at the other during such return movement.

9. In a machine of the character set forth, a printing-surface, a wiping-surface therefor

in the form of a weak flexible strip, means for moving said strip in one direction in contact with said printing-surface and for returning said strip by moving it in the opposite direction, and a strong flexible belt moving with
5 and supporting said strip.

10. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, a carrier to
10 which the ends of said strip are secured, and means for moving said carrier alternately in opposite directions.

11. In a machine of the character set forth, a printing-surface, a wiping-surface therefor
15 in the form of a flexible strip, a cylindrical carrier to which the ends of said strip are secured, and means for oscillating said carrier, whereby said strip is moved alternately in opposite directions.

12. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, a carrier, rolls
20 mounted therein on which the ends of said strip are wound, means for moving said carrier alternately in opposite directions, and means actuated by such movements for automatically taking up a portion of said strip on one of said rolls and letting off a portion
25 from the other of said rolls.

13. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, a cylindrical
30 carrier, rolls mounted therein on which the ends of said strip are wound, means for oscillating said carrier and thereby moving said strip in opposite directions, and means actuated by such oscillatory movements for automatically taking up a portion of said strip on one of said rolls and letting off a portion
35 from the other of said rolls.

14. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, a cylindrical
40 carrier, rolls mounted therein on which the ends of said strip are wound, a belt having its ends secured to said carrier and serving as a support for said strip, means for oscillating said carrier on its axis and thereby moving said
45 belt with its strip alternately in opposite directions, and means for automatically taking up a portion of said strip on one of said rolls and letting off a portion from the other of said rolls.

15. In a machine of the character set forth, a printing-surface, a wiping-surface therefor
55 in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and for returning said strip by moving it in the opposite direction, means for guiding said strip and presenting it
60 to said printing-surface, and a cleaning-surface held in yielding contact with the soiled face of said strip.

16. In a machine of the character set forth,
65 a printing-surface, a wiping-surface therefor

in the form of a flexible strip, means for moving said strip in one direction in contact with said printing-surface and for returning said strip by moving it in the opposite direction, means for guiding said strip and presenting it
70 to said printing-surface, a cleaning-surface in the form of a flexible ribbon held in yielding contact with the soiled face of said strip, and means for moving said ribbon to present fresh surfaces of the latter to said strip.

17. In a machine of the character set forth, a printing-surface, a wiping-surface therefor in the form of a flexible strip, means for moving said strip in one direction in contact with
75 said printing-surface and for returning said strip by moving it in the opposite direction, means for guiding said strip and presenting it to said printing-surface, a cleaning-surface in the form of a flexible ribbon held in yielding
80 contact with the soiled face of said strip, take-up and let-off rolls for said ribbon, and means for automatically actuating said rolls to shift said ribbon at intervals to present fresh surfaces of said ribbon to said strip.

18. In a machine of the character set forth,
85 a printing-surface in the form of a flexible strip, a carrier, rolls mounted therein on which the ends of said strip are wound, means for moving said carrier alternately in opposite directions, means actuated by such
90 movements for automatically taking up a portion of said strip on one of said rolls and letting off a portion from the other of said rolls, a cleaning-surface in the form of a flexible ribbon held in yielding contact with the
95 soiled face of said strip, take-up and let-off rolls for said ribbon, and means automatically actuated by the movements of said carrier for letting off and taking up a portion of said ribbon at intervals to present fresh sur-
100 faces of said ribbon to said strip.

19. In a machine of the character set forth, a D-roller, a curved printing-surface thereon,
105 a wiping-surface in the form of a flexible strip, means for moving said strip in the direction opposite to the movement of said printing-surface, and for returning said strip by moving it in the opposite direction during the period in which the cut-away portion of said roller is presented to said strip and the ten-
110 sion of the latter thereby lessened.

20. In a machine of the character set forth, a polishing-belt, guide-rollers therefor, a
115 swinging roller arranged to contact at one end of its motion with a supply of whiting or analogous material, and at the other with said belt, and means for inducing the movements of said swinging roller.

21. In a machine of the character set forth, a polishing-belt, guide-rollers therefor, a
125 yielding platform carrying a supply of whiting or analogous material, a swinging roller arranged to contact at one end of its motion with said whiting, and at the other with said belt, and means as a pad for distributing the
130

whiting thus received upon the surface of said belt.

22. In a machine of the character set forth, a printing-roller, a polishing-belt, a driving-roller therefor, a swinging frame adjacent to said printing-roller, guide-rollers for said belt in said frame, and pivots on such frame whereby the latter may be tilted to allow access to said impression-roller.

23. In a machine of the character set forth, a polishing-belt, a driving-roller therefor, a yielding platform carrying a supply of whiting or analogous material, a swinging roller arranged to contact at one end of its motion with said whiting, and at the other with a portion of said belt in contact with said driving-roller, and a weighted pad lying upon said belt and supported by said driving-roller.

24. In a machine of the character set forth, a printing-roller, a curved printing-surface thereon, a horizontally-disposed reciprocating plank, a horizontally-disposed ink-distributing mechanism operated by the reciprocations of said plank, an ink-roller carried by said plank and arranged to supply ink to said curved printing-surface, a wiping mech-

anism located above said plank and printing-roller arranged to contact with said curved printing-surface, and a vertically-disposed polishing mechanism in front of said printing-roller and arranged to contact with said curved printing-surface.

25. In a machine of the character set forth, a printing-roller and shaft therefor, a plank beneath said printing-roller, arranged to be moved in one direction by the frictional contact between a printing-surface and a surface to be printed upon, carried by said printing-roller and plank, an adjustable friction-surface on said plank, and a flange on said shaft adapted to engage said frictional surface at the termination of such impression and complete the movement of said plank in the same direction, and means for returning said plank.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

STEPHEN L. MORGAN.

Witnesses:

CHAS. A. HAUCK,
CHARLES R. SEARLE.