

March 31, 1925.

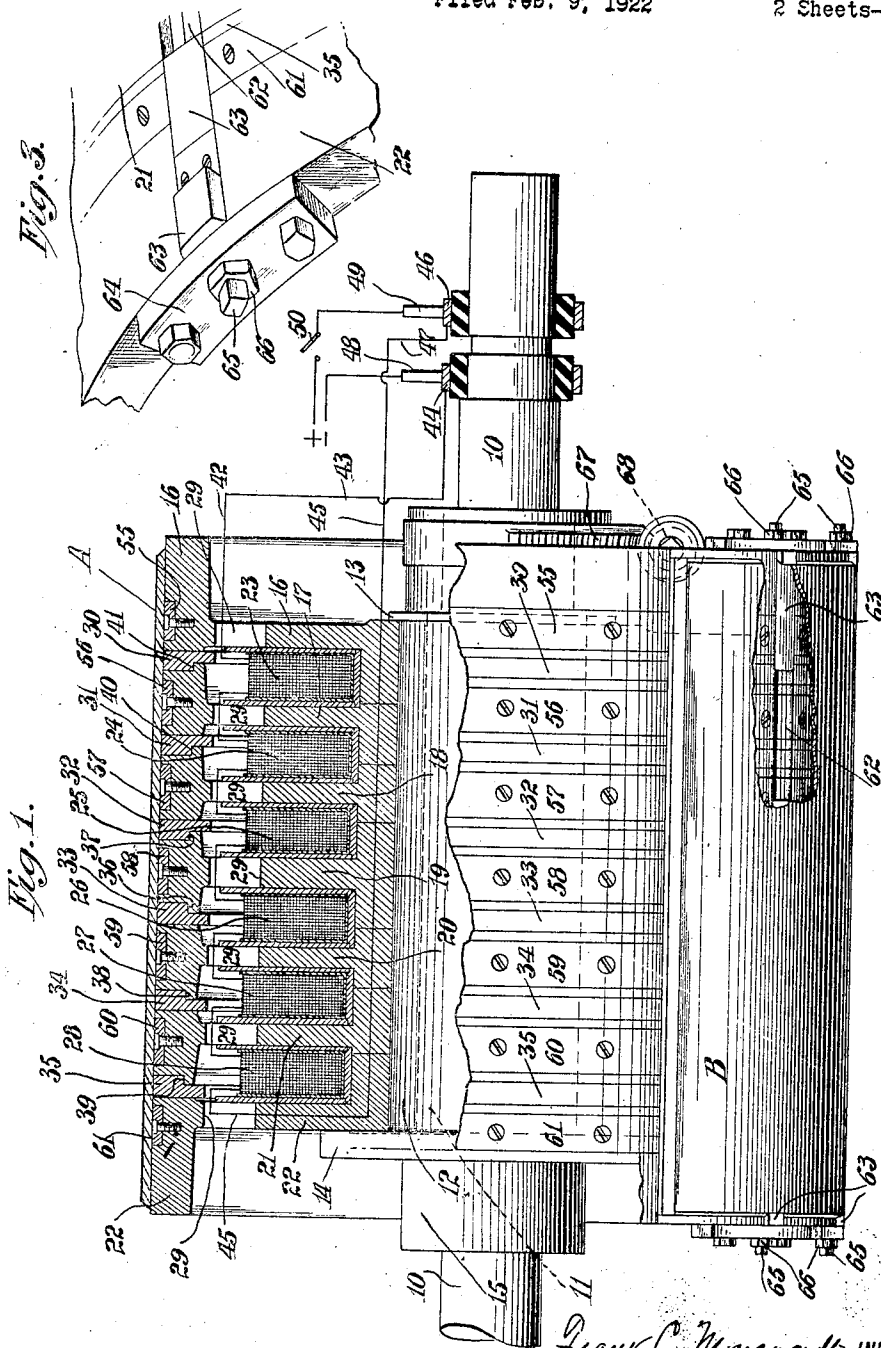
F. C. MARQUARDT

1,531,492

FORM OR PLATE CYLINDER

Filed Feb. 9, 1922

2 Sheets-Sheet 1



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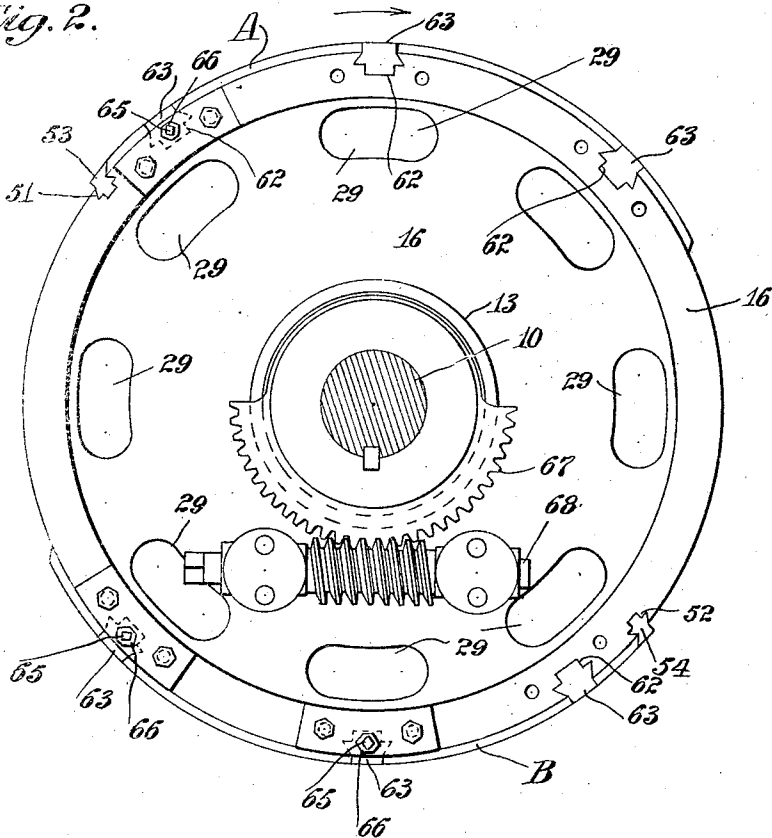
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2 Sheets-Sheet 2

Fig. 2.



WITNESSES
W. M. Hatcher

Frank C. Marquardt INVENTOR

Frank J. Westworth BY
his ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK C. MARQUARDT, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN BANK NOTE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FORM OR PLATE CYLINDER.

Application filed February 9, 1922. Serial No. 535,158.

To all whom it may concern:

Be it known that I, FRANK C. MARQUARDT, a citizen of the United States, residing at the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Form or Plate Cylinders, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to form or plate cylinders, and more particularly to a cylinder of this type for use upon under surface steel plate printing machines.

Heretofore in this art it has been the common practice to attach the previously formed, segmental, hardened, steel plates to the cylinder by means of an end cleat against which the chamfered rear edge of the plate is adapted to abut, and adjustable dogs engaging the chamfered side edges of the plate, a construction which necessitated a heavy cleat and a considerable number of grooves for the retaining dogs arranged with more or less mathematical accuracy so as to permit the mounting of plates of different lengths upon the cylinder. Furthermore, owing to severe frictional stresses to which the plate is subjected, particularly during the action of the wiping cloths thereon, a considerable number of these side dogs were used, sometimes eight or ten upon each side, so as to relieve the end cleat as much as possible from the shearing action from the hardened edge of the plate resulting from the tendency of the plate to creep circumferentially of the cylinder as a result of such friction stresses.

In actual practice, it has been found that with the loosening of the dogs, the friction stresses are apt to be sufficiently great to cut even a heavy end cleat, flush with the adjacent surface of the cylinder, and thus necessitate the shut-down of the press and a complete readjustment thereof before the run can be resumed. Even though the shearing action does not cut completely through this cleat, it will readily be appreciated that any circumferential displacement of the plate will result in unsatisfactory or imperfect work, particularly when, as in fine line work, the shifting of a thou-

sandth of an inch will have the effect of disturbing the precision of the relation of parts necessary to secure good work.

With the above conditions in mind, I have provided a form or plate cylinder wherein the end cleat and the side dogs will be substantially relieved from their function of binding the plate to the cylinder, and will serve mainly as guides for securing accurate positioning of the plate for purposes of adjustment for register, the holding of the plate upon the cylinder in any adjusted position being secured by means of electromagnets. Such magnets will afford large and continuous traction areas, the plate itself being the armature and the cleats and dogs merely being required to prevent magnetic slippage, due to possible air gaps between the plate and the cylinder, resulting from possible imperfections in the under surface of the plate, or in the perimeter of the cylinder. The mechanical holding means are also utilized in accurately positioning the plate during the make-ready and for shifting the plate upon the cylinder before the electromagnets are energized.

The plate may be conveniently mounted upon and removed from the cylinder by merely de-energizing the magnet.

In conjunction with the utilization of an electro magnet or magnets, I provide means whereby minute movement of the plate longitudinally of the cylinder for facilitating adjustment of the plate for lateral register, is possible, and transmit power to the cylinder through a worm gear and shaft connection between the cylinder and the power shaft, which will permit minute circumferential adjustment of the cylinder and the plate or plates thereon for longitudinal register.

The last named mechanism is also adapted for use in imparting rotary movement to the cylinder with relation to the impression cylinder or D-roll to permit the use of plates of different lengths upon different runs of the press. The positioning of the side dogs with plates of different lengths is immaterial, since the forward edge of the plate, and in fact the plate in its entirety, will be rigidly held by the magnetic flux upon the cylinder independently of said dogs.

The invention consists primarily in a form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder, and form a part of a smooth cylindrical surface; and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, and means controlling the circuit to said magnet, and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a view partly in elevation and partly in section, with a portion of one of the printing plates broken away, showing a form or plate cylinder embodying my invention;

Fig. 2 is an end view thereof from the right of Fig. 1; and

Fig. 3 is a detail view of a portion of the cylinder showing one of the side dogs.

Like numerals refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, the form or plate cylinder shaft 10 is provided with an enlarged portion 11 rotatable therewith. Rotatably mounted upon the enlarged portion 11 is a hub 12 of the form or plate cylinder having at one end thereof a flange 13 and at the other end thereof a removable flange 14 having a hub 15 bearing upon the shaft 10.

Arranged side by side upon the hub 12 are a sequence of rings 16, 17, 18, 19, 20, 21 and 22, these rings being formed of cast iron or other magnetic material. The adjacent side faces of each of said rings are so recessed as shown, within the perimeter of the ring and adjacent the hub 12 as to form in the assembled cylinder, a series of annular pockets adapted to receive electromagnets 23, 24, 25, 26, 27 and 28 which are annular in form and extend circumferentially about the entire cylinder within said pockets respectively. At different points about the cylinder are transverse openings 29 which extend through all of the rings 16 to 22, between the heads thereof and said pockets.

While the portions of the rings 16 to 22 adjacent the hub 12 are in electrical contact, the perimeters of said rings are so formed as to be spaced apart to provide gaps between the heads of the rings or that portion thereof adjacent the surface of the cylinder, the portions of the rings upon opposite sides of said gaps respectively forming the opposite poles of the electromagnets so that in the assembled structure that portion of the perimeter of the cylinder adapted to receive the steel engraved, intaglio, or

under-surface printing plate is formed of a plurality of circumferentially extending opposed magnetic poles, the plate itself forming an armature common to all of said poles.

The form or plate cylinder for an under-surface printing press is subjected to varying, and at times severe, stresses applied through the printing plate, and to avoid possibility of distortion of the plate from the presence of gaps in the surface upon which the plate lies, I close the gaps between succeeding rings by means of shouldered rings 30, 31, 32, 33, 34 and 35 of brass or other non-magnetic material, which will provide an uninterrupted bearing surface upon the cylinder without interfering with the magnetic flux or the traction at the poles of the various magnets, upon the printing plate.

To simplify the construction of the cylinder, I support and maintain the various rings 30 to 35 in relation to the rings 16 to 22 by means of shoulders formed upon said last named rings adapted to receive the shoulders upon said first named rings.

The arrangement of the co-operating abutting shoulders upon the magnetic and non-magnetic rings may be varied at will, the arrangement in the drawings being one prompted by convenience in the assembling of the cylinder structure, the construction shown contemplating the mounting of the cylinder 19 upon the hub 12 in the first instance and the building up of the cylinder by mounting the other rings upon opposite sides of the this central ring. With the construction shown, the head or rim of the magnetic ring section 19 is provided with shoulders 36 and 37 upon opposite sides thereof adapted to be engaged by the shoulders of the non-magnetic rings 32 and 33. The magnetic ring sections 20 and 21 are provided with shoulders 38 and 39 respectively, presented toward the end of the cylinder to the left, which shoulders receive the shoulders upon the non-magnetic rings 38 and 39, while the magnetic rings 17 and 18 are provided with shoulders 40 and 41 presented toward the end of the cylinder to the right, which shoulders co-operate with the non-magnetic rings 30 and 31.

In the construction above described, each of the rings 16 to 22 consists of an enlarged hub portion, an enlarged rim or perimeter, and a connecting reduced flange, the space between adjacent flanges forming pockets for the electromagnets. The hub portions of the several rings are in contact while the heads are spaced apart by rings of non-magnetic material so as to provide a continuous bearing surface for the plate or plates and present well defined magnetic poles. The rings of non-magnetic material are rigidly supported by the rings of mag-

netic material, so as to secure the desired continuous rigid backing for the plates.

The plates above referred to are indicated at A and B, two plates being shown upon the cylinder illustrated in the drawings.

The various rings 16 to 22 are keyed or otherwise mounted upon the hub 12 so as to be rotatable therewith, said hub in its entirety being rotatably mounted upon the shaft 10 or the enlarged cylindrical portion 11 thereof, but receiving power therefrom in a manner to be hereinafter described.

The detailed construction of the various magnetic coils 23 to 28 is immaterial to the invention, and may be varied indefinitely according to the size of the cylinder and the potential of the current used. The coils may be connected in multiple or in series as desired, or as may be required to secure the desired attractive force in the magnet. The electrical conditions are matters of skill in the art of electromagnets and except in those mechanical details by which the magnetic flux is so controlled as to adapt the magnet for use in a rotating plate cylinder, and when considered in their broader aspects, form no part of the present invention.

In the accompanying drawings, I have shown the electrical connections of the several magnets merely diagrammatically, the lead 42 being connected by means of a terminal wire 43 with a collector ring 44 carried by, rotatable with, and insulated from the shaft 10, and the lead 45 being electrically connected with the collector ring 46, also carried by, rotatable with, and insulated from said shaft by means of a terminal wire 47.

The current is conducted from any desired source of power to said collector rings by means of the brushes 48 and 49, there being arranged in the circuit to said brushes any desired form of switch 50 so as to permit the electromagnets to be energized or de-energized at will.

The perimeter of the composite cylinder constructed as above described, has a longitudinally extending undercut groove therein adapted to receive a cleat against which the rear edge of the printing plate A or B is adapted to abut. One such cleat is used with each plate so that when the cylinder is adapted to carry two plates as shown in the drawings, there will be two such grooves 51 and 52 and two such cleats 53 and 54 mounted in said grooves respectively.

Since the traction of the magnet upon the printing plates A and B will be sufficiently great to positively hold them against displacement under the stresses thereon from the wiping cloths or the impression cylinder, particularly the former, said cleats 53 and 54 may be made of non-magnetic metal or other material which will not inter-

fere with the magnetic flux, compressive strength not being a material factor in said cleats since any stresses which they will be subjected to will be those resulting from magnetic slippage between the magnets of the cylinder and the plate constituting the armature. In actual practice, I have found no tendency of the development of any severe shearing stresses upon said cleats by the plate, and attribute this to the substantially total absence of any such slippage.

I have found in actual practice, that I secure better results by channeling the outer face of the several rings 16 to 22 and inserting therein respectively curved plates or interrupted rings 55, 56, 57, 58, 59, 60 and 61, said rings being secured in place by means of screws, or in any other desired manner. These plates are used because with the construction shown, the polarity of opposite sides of each ring is dissimilar and the presence of an uninterrupted magnetic circuit throughout and adjacent the entire surface of the periphery of each of the rings 16 to 22 was found to interfere with the magnetic flux, through the plate as an armature. By the use of such plates, I have found that with the construction shown, the magnetic flux is limited to a path across the rings 30 to 35 and that the traction of the various magnets upon the plate A or B was made more effective.

Extending longitudinally of the cylinder are a plurality of undercut grooves 62, three of such grooves being shown associated with each of the grooves 51 and 52. These grooves 62 are adapted to receive edge clamps or dogs 63 which are slidably mounted therein and adapted to engage the side edges of, and position, the plates A and B laterally thereof upon the cylinder, the cleat 53 or 54, positioning the plate lengthwise thereof.

The clamps or dogs 63 are used upon opposite sides of the press, and to permit the use of plates of different widths and also to permit adjustment of the plate for lateral register, I provide means co-operating with each of said clamps, whereby it may be positively adjusted laterally with a more or less minute adjustment for securing such register. The adjusting means above referred to consists of a plate 64 carried by each of the end rings 16 to 22 extending across the end of each undercut way or groove 62. Said plate has a screw-threaded opening therein adapted to receive an adjustment screw 65, the inner end of which is adapted to bear upon the clamp or dog 63. The end of the screw is squared as shown to permit the use of a wrench thereon, and mounted thereon is a lock nut 66.

No precision is required in the location of the grooves 62, their arrangement merely being such as to provide sufficient range in

the action of the side clamps upon the plate to ensure the desired side barriers or edge guides.

5 The edges of the clamps or dogs 63 and of the cleats 61 are undercut in the usual manner so as to engage the chamfered or rounded edge of the plate and force it toward the surface of the cylinder.

10 Longitudinal adjustment of the plate or its adjustment circumferentially of the cylinder is secured by bodily rotation of the cylinder with relation to the shaft 10, this result being secured by means of a circular rack 67 carried by and rotatable with the shaft 10, 15 and a worm shaft 68 carried by and rotatable with the composite magnetic form or plate cylinder. In this manner the power for rotating said cylinder is transmitted thereto from the shaft 10 through said worm gear and shaft, and minute circumferential movement of the cylinder about said shaft 20 10 may be secured, it being necessary, of course to stop the machine while such adjustment is being made.

25 The operation of the herein described mechanism is substantially as follows:—

In assembling a cylinder made in accordance with my invention, the various rings 16 to 22 are successively mounted upon the 30 hub 12, the ring magnets 23 to 28 and the non-magnetic rings 30 to 35 being positioned as the said rings are being assembled. By having the flange 13 removable as well as the flange 14, the central ring 19 may be 35 mounted first upon the cylinder, and the other rings mounted upon opposite sides thereof. The manner of assembling the cylinder, however, is one largely of convenience, it being necessary to form the 40 cylinder in magnetic sections separable one from the other in order to permit the mounting of the spools carrying the windings therein.

When the various non-magnetic rings 45 have been assembled and the cylinder properly mounted in a press, with the cleats 54 in position, an undersurface, engraved, or intaglio steel printing plate or plates may be placed upon the cylinder so formed and 50 secured temporarily in place by means of the said clamps or dogs 63 which will suffice to permit the making of proofs for the purpose of securing proper adjustment of the printing plate for register. The move- 55 ment of the printing plate for register lengthwise thereof is secured by means of the worm gear or segment 67 and its co-operating worm shaft 68, while lateral adjustment thereof is secured by means of the 60 dogs or clamps 63 and the screws 65 acting thereon.

When the proper register has been secured, the lock nut 66 may be tightened to avoid possible loss of register through shift- 65 ing of the plate laterally thereof.

While the side clamps or dogs 63 and the cleat 54 will, by reason of the bevelled overhang thereon, force the printing plate into engagement with the face of the cylinder, the clamping action is not sufficiently 70 strong to hold said plate against circumferential movement as a result of the constantly repeated longitudinal stresses due to the contact of the wiping cloths and the impression cylinder therewith. 75

When the plates A and B, or either of them if only one plate be used, have once been properly positioned, the switch 50 is closed, thus energizing the several magnets 23 to 28 which will attract the steel plates 80 A and B to the cylinder throughout a sufficiently large area of the plate to ensure a positive holding of the plate upon the cylinder irrespective of said cleats or clamps, the attraction being sufficiently great to prevent 85 any displacement of the plate as a result of the stresses of the wiping cloths or the impression cylinder above referred to.

The presence of the rings 30 to 35 of non-magnetic metal will form the necessary gap 90 between those portions of the outer faces of each of the rings 16 to 22, which form the poles of the magnet to ensure the magnetic flux passing through the plate as an armature, and will at the same time afford a 95 rigid backing for the plate intermediate said poles and flush therewith. The plates 55 to 61, which are made of brass or other non-magnetic material, will divide the outer 100 face of each of the rings 16 to 22 in a manner to form two well defined poles of the desired area at the side edges of each of said rings 16 to 22 solely, these plates also being flush with the face of the poles with which the plate A or B engages. 105

It will thus be observed that the steel plates A and B are afforded a continuous backing which will resist any deformation thereof as a result of the heavy pressures to which they are subjected, particularly dur- 110 ing the impression interval, and during the impression interval will thus cause a continuing equal pressure throughout the entire surface of the plates A and B with a resultant clean imprint. 115

The terminal wires 43 and 47 may be connected with the collector rings 44 and 46 in any desired manner to permit that small circumferential adjustment of the composite cylinder with relation to the shaft 10 by 120 means of the segmental worm wheel 67 and its co-operating shaft 68 in the manner above referred to. The particular manner of wiring is immaterial to the invention, and is not therefore shown in detail in the 125 accompanying drawings.

If it be desired to further adjust the printing plate for register, it is merely necessary to interrupt the circuit to the magnet which will permit the free movement of 130

the plate upon the cylinder by means of the dogs or clamps 63, which dogs or clamps will suffice to hold the plate upon the cylinder when the magnet is de-energized.

5 With a cylinder made in accordance with my invention, the mounting of the printing plate thereon during the make-ready of the press is very much simplified, not only because of the small number of side clamps
10 or dogs used, but of the absence of any necessity for any accurate positioning of these clamps circumferentially of the cylinder with relation to the plate. This latter is due to the fact that the attraction of the
15 magnet upon the plate extends to the forward edge thereof by reason of the circumferentially extending poles of the magnet, and hence under no conditions of pressure can there be any tendency of this forward
20 edge to move away from the cylinder, and hence no clamps or dogs are required adjacent this edge.

From the foregoing it will follow that steel plates of different lengths may be
25 readily mounted upon the cylinder irrespective of the location of the holding clamps or dogs.

It is to be observed that a cleat is used only at the rear edge of the plate in the
30 direction of rotation of the cylinder, and that by reason of the plate being held upon the cylinder by magnetic attraction, this cleat is relieved from practically all shearing stresses from the rear edge of the hardened steel plate.

This last characteristic of a cylinder made in accordance with my invention is of great importance, since the slightest circumferential creeping of the plate as a result of the
40 penetration of the rear edge thereof into the cleat, will result in a loss of register and may spoil considerable work before the error is detected and corrected. Experience has demonstrated that the side clamps
45 or dogs cannot be relied upon to prevent such creepage of the plate with certainty.

It is not my intention to limit the invention to the precise details of construction shown in the drawings; it being apparent
50 that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected
55 by Letters Patent, is:—

1. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder and form a part of a smooth cylindrical surface and are so arranged as to cause a plate
60 positioned upon the cylinder to be within the magnetic field, and means controlling the circuit to said magnet.

2. A form or plate cylinder embodying
65 therein an electromagnet, the poles of which

extend circumferentially about the cylinder and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, and a cleat positioned thereon so as to operatively engage the rear edge of a printing plate.

3. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, said cylinder having longitudinally extending slots in the face thereof, and dogs adjustably mounted in said slots and adapted to engage opposite edges of a plate upon the cylinder.

4. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, a cleat positioned thereon so as to operatively engage the rear edge of a printing plate, said cylinder having longitudinally extending slots in the face thereof, and dogs adjustably mounted in said slots and adapted to engage opposite edges of a plate upon the cylinder.

5. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, a cleat positioned thereon so as to operatively engage the rear edge of a printing plate, said cylinder being loosely mounted upon a power shaft, and adjustable means imparting circumferential movement to the cylinder with relation to the shaft and operatively connecting the cylinder with the shaft.

6. A form or plate cylinder embodying therein surface-forming means consisting of alternately arranged magnetic and non-magnetic areas extending circumferentially about the cylinder and forming a smooth cylindrical surface thereon, an electromagnet positioned in operative relation to the parts forming said magnetic areas, whereby a plate upon said cylinder will mechanically engage both said magnetic and said non-magnetic area and be within the magnetic field, and means controlling the circuit to said magnet.

7. A form or plate cylinder embodying therein a sequence of recessed pocket-forming rings of magnetic material, rings of non-

magnetic material positioned between said rings adjacent the surface thereof, a plurality of electromagnets in the pockets formed by said rings, whereby a magnetic flux is set up in the material of said pocket-forming rings and a plate upon the cylinder will be within the magnetic field, and means controlling the circuit to said magnet.

8. A form or plate cylinder embodying therein a sequence of recessed pocket-forming rings of magnetic material, rings of non-magnetic material positioned between said rings adjacent the surface thereof, a plurality of electromagnets in the pockets formed by said rings, whereby a magnetic flux is set up in the material of said pocket-forming rings and a plate upon the cylinder will be within the magnetic field, means controlling the circuit to said magnet, said rings of magnetic material having a circumferential recess therein, and plates of non-magnetic material seated in said recesses and arranged substantially flush with the surface of said rings, whereby the traction of said rings is concentrated adjacent the opposite edges thereof.

9. A form or plate cylinder embodying therein a sequence of recessed pocket-forming rings of magnetic material, said rings having longitudinally extending openings therethrough to permit a circulation of air about said magnets and said rings, rings of non-magnetic material positioned between said rings adjacent the surface thereof, a plurality of electromagnets in the pockets formed by said rings, whereby a magnetic flux is set up in the material of said pocket-forming rings and a plate upon the cylinder will be within the magnetic field, and means controlling the circuit to said magnet.

10. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder, and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, said cylinder having longitudinally extending undercut slots in the surface thereof upon opposite ends of the cylinder, edge clamps slidably mounted

in said slots, respectively, and means carried by the end of the cylinder adjacent each of said clamps adapted to act upon said clamps respectively to adjust them longitudinally of the cylinder.

11. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder, and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, said cylinder having longitudinally extending undercut slots in the surface thereof upon opposite ends of the cylinder, edge clamps slidably mounted in said slots respectively, a plate extending across each of said undercut slots and having a screw-threaded opening therein, and an adjustment screw mounted in said opening and adapted to engage the end of the clamp.

12. A form or plate cylinder embodying therein an electromagnet, the poles of which extend circumferentially about the cylinder, and form a part of a smooth cylindrical surface and are so arranged as to cause a plate positioned upon the cylinder to be within the magnetic field, means controlling the circuit to said magnet, a cleat positioned thereon so as to operatively engage the rear edge of a printing plate, said cylinder being loosely mounted upon its power shaft, and means transmitting power from said shaft to the cylinder while permitting adjustment of the cylinder circumferentially of the shaft, consisting of a worm gear carried by the shaft and a worm screw rotatably mounted upon the cylinder and co-operating with said worm gear, whereby minute circumferential adjustment of the cylinder with relation to the shaft may be accomplished.

In witness whereof I have hereunto affixed my signature, in the presence of two subscribing witnesses, this 1st day of February, 1922.

FRANK C. MARQUARDT.

Witnesses:

F. KARL SEITZ,

F. T. WENTWORTH.