

No. 637,599.

Patented Nov. 21, 1899.

E. HETT.

MACHINE FOR MAKING PRINTING SURFACES.

(Application filed Jan. 5, 1899.)

(No Model.)

4 Sheets—Sheet 1.

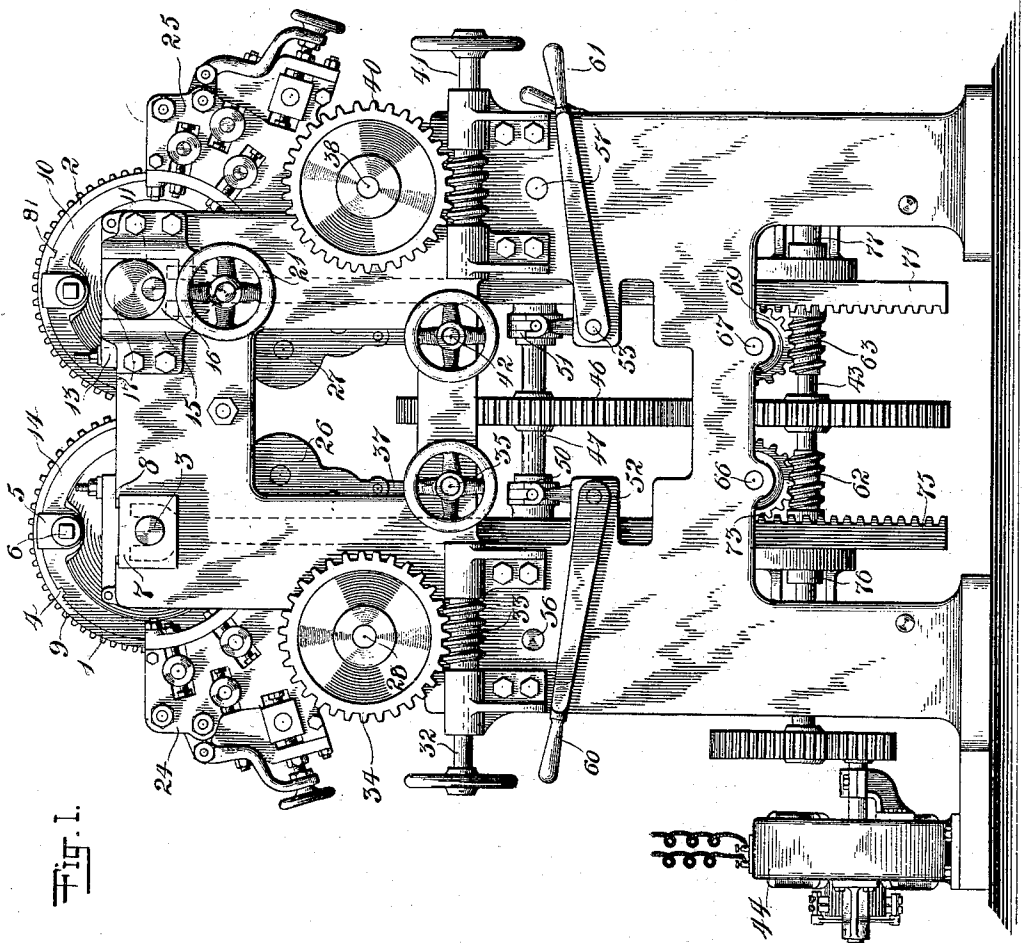


Fig. 1.

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INVENTOR

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ATTORNEYS

No. 637,599.

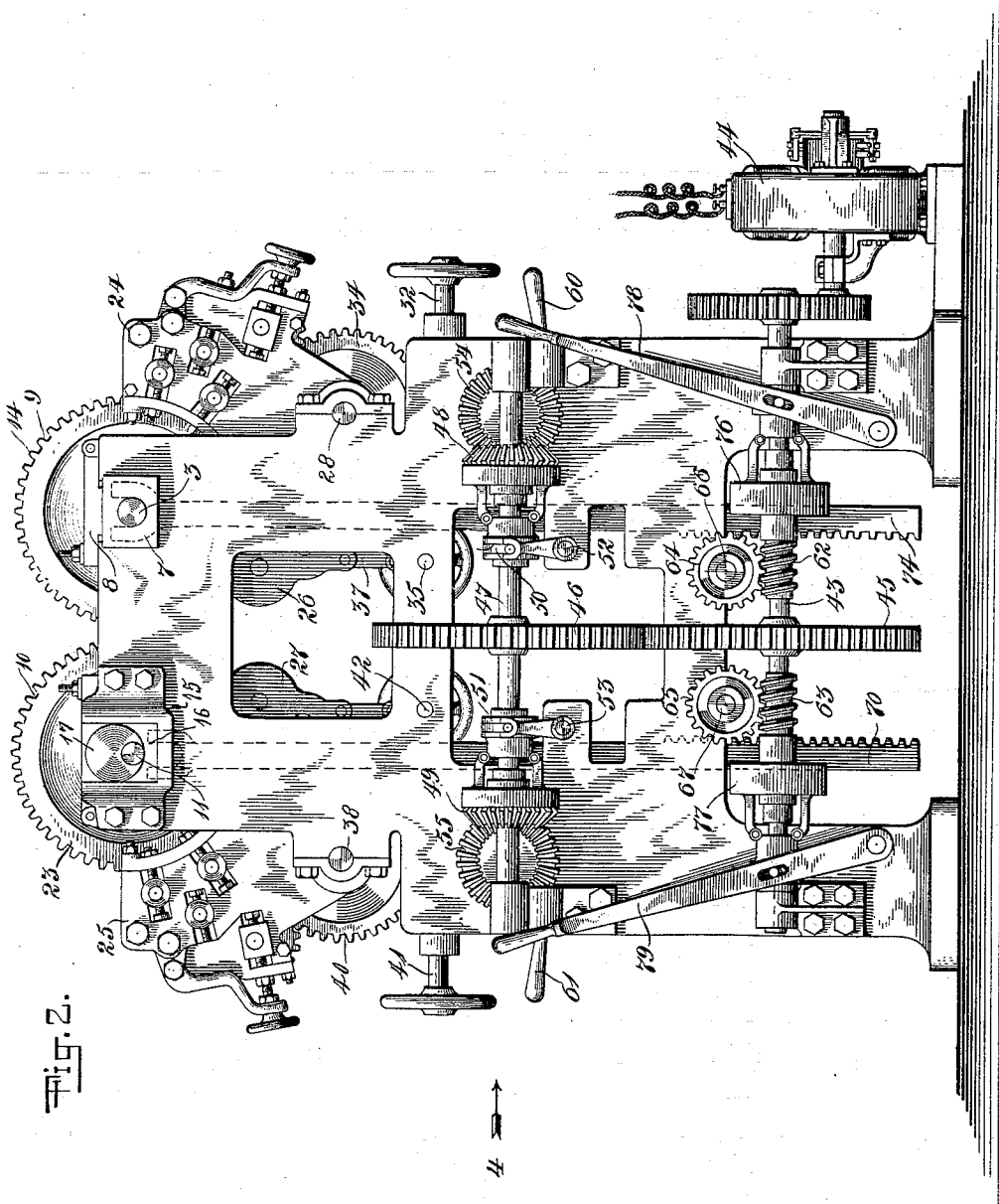
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4 Sheets—Sheet 2.



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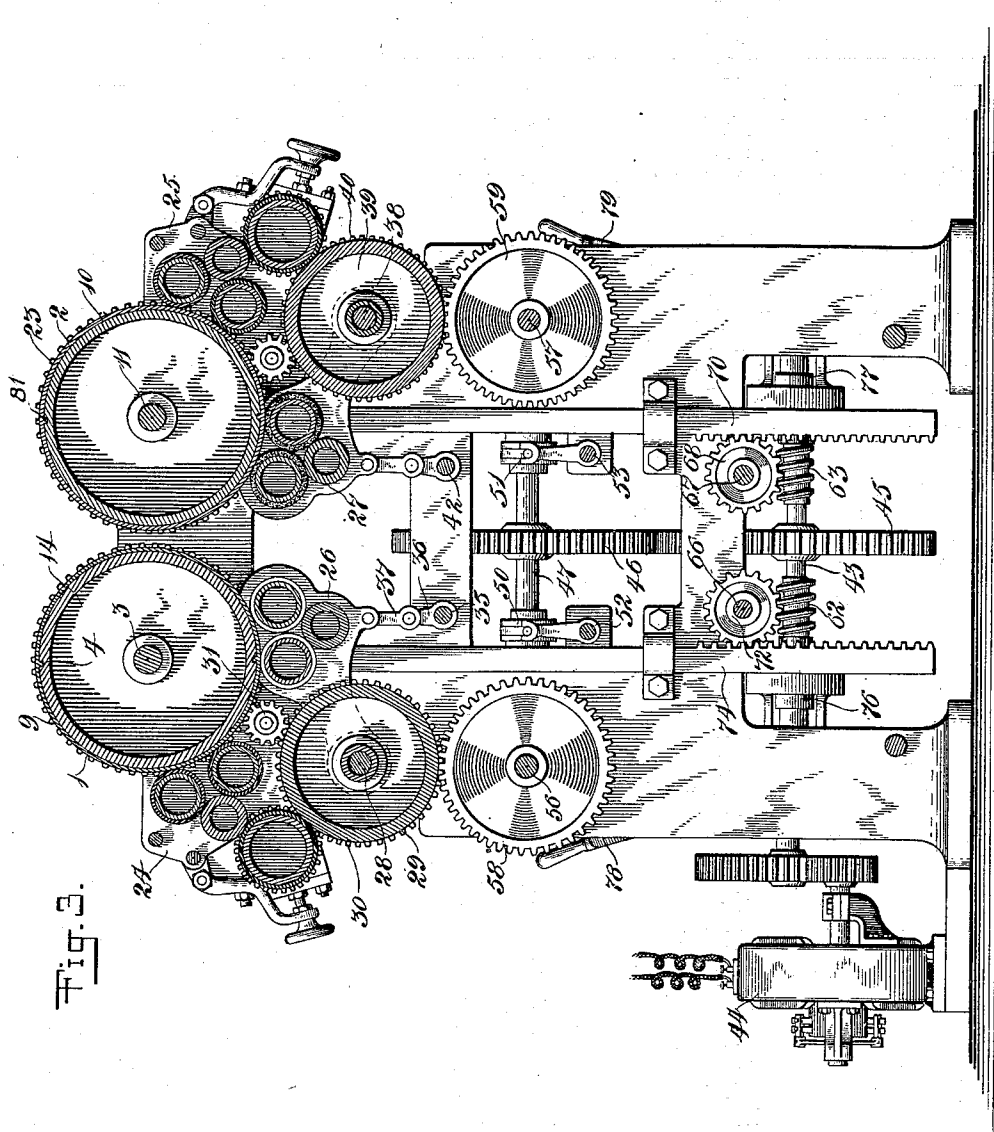


Fig. 3.

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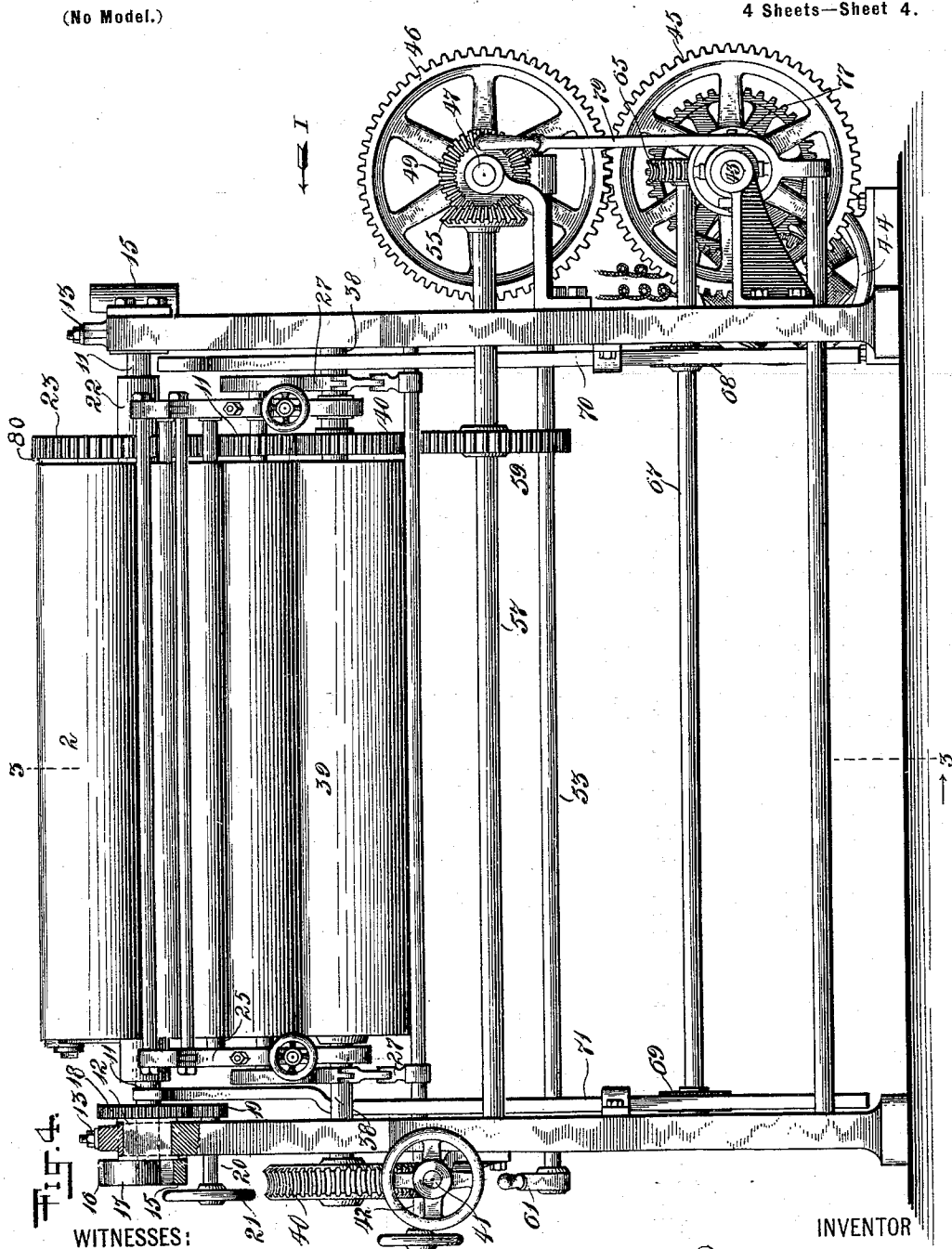
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MACHINE FOR MAKING PRINTING SURFACES.

(Application filed Jan. 5, 1899.)

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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

MACHINE FOR MAKING PRINTING-SURFACES.

SPECIFICATION forming part of Letters Patent No. 637,599, dated November 21, 1899.

Application filed January 5, 1899. Serial No. 701,193. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, and a resident of New York, (New Dorp,) in the county of Richmond, State of New York, have invented a new and Improved Machine for Making Printing-Surfaces, of which the following is a specification.

This invention relates to a new and improved machine designed and adapted for use in making printing-surfaces, whether planographic, relief, intaglio, or otherwise, in accordance with my new process set forth in an application filed by me on October 4, 1899, Serial No. 732,439.

The invention consists principally of a surface prepared for printing a design and herein called the "primary surface" or "primary printing-surface," combined with a surface herein called a "secondary surface," adapted to be made into a printing-surface by being brought directly into printing contact with the primary surface, whereby the design of the primary surface is imparted to the secondary surface, which may then be suitably developed. The secondary surface when developed is herein called the "secondary printing-surface."

The invention further consists of the various features and combinations of features hereinafter set forth.

By means of this invention great economy in time, labor, and painstaking care is effected in making printing-surfaces, and the operation of separately and independently preparing and sticking up the setting-up plate heretofore required in making each printing-surface is dispensed with.

In the drawings forming part of this specification I have shown an organized machine in which the invention is embodied in the best manner now known to me.

Referring now to the particular views of the drawings, in which like characters designate corresponding parts, Figure 1 is a side elevation of the machine, looking in the direction of the arrow 1, Fig. 4. Fig. 2 is a side elevation looking in the opposite direction to Fig. 1. Fig. 3 is a sectional elevation on the line 3 3, Fig. 4; and Fig. 4 is an end elevation looking in the direction of the arrow 4, Fig. 2.

1 and 2 are respectively the primary and secondary surfaces. They may be of any

convenient form, but are preferably curved or cylindrical in shape and shell-like and continuous tubes, as shown. The primary surface is carried by a supporting-cylinder 14, fixed on a shaft 3, and is preferably removable from its cylinder 14. The primary surface 1 has an accurate preestablished seat in the machine, so that it and successive primary surfaces may be mounted therein in accurate predetermined position both longitudinally and transversely. The seat for the primary surfaces is on the supporting-cylinder 14. The ribs 4, formed on the inner side of a primary surface, and the corresponding longitudinal grooves formed on the cylinder 14, in which the ribs fit, a marked rib in a marked groove, determine the transverse and circumferential location of the primary surface in its seat. The longitudinal position of the primary surface on its support is determined by a stop formed on one end of the support 14, similar to the stop 80. (Shown in Fig. 4 in connection with the secondary surface 2.) Thus preestablished guides for quickly and accurately seating the primary surface are provided. Of course various other forms of preestablished guides for this purpose may be employed. The primary surface is forced to its seat by the blocks 5, adjustably held against the end of the cylinder and primary surface by the bolts 6. The shaft 3 is carried in boxes 7, fitting in recesses open at their upper ends and closed by the locking-bars 8. Fixed on the shaft 3, on the end opposite the block 5, is a gear 9, by which the primary surface is positively driven. The secondary surface is carried by the supporting-cylinder 10, from which it is preferably removable. It has an accurate preestablished seat on the supporting-cylinder 10 similar to that described for the primary surface, in which it and successive secondary surfaces may be mounted in accurate predetermined position both longitudinally and transversely and with reference to preestablished guides, these guides consisting of the ribs 81, which, with their corresponding grooves in the support 10, determine the circumferential position, and the stop 80 on one end of the support 10, which determines the longitudinal position. The cylinder 10 is mounted loosely on a shaft 11, carried in hori-

zontally-sliding boxes 12, locked in place by the locking-bars 13. On the outside of the frame and carried in brackets 15 are vertically-sliding boxes 16, provided with eccentrics 17, fixed on the ends of the shaft 11. Fixed on one end of this shaft 11 is a gear 18, meshing with a gear 19 on the short shaft 20, having a hand-wheel 21. By turning the hand-wheel 21 the cylinder, with its secondary surface 2, may be moved laterally, so as to bring the secondary surface into contact with the primary surface and whereby the required pressure may be applied to such contact. Fixed on the sleeve 22 of the cylinder 10 is a gear 23, adapted to mesh with the gear 9 on the shaft 3, whereby the two surfaces may be positively driven together.

The primary and secondary surfaces are provided, respectively, with inking-frames 24 and 25, carrying inking-rollers, and with dampening-frames 26 and 27, carrying dampening-rollers. The inking and dampening rollers of the frames 24 and 26 are for the purpose of inking and dampening the primary surface 1, so that it may make an impression on the secondary surface 2. The inking-frame 24 is fixed on a shaft 28, on which is sleeved, so as to rotate thereon, the main ink-distributing cylinder 29. A gear 30, secured to the main ink-distributing cylinder 29, meshes with the first of the ink-rollers in the frame 25 and with an idle-gear 31, meshing with the gear 9, whereby the cylinder 14 may be driven with its inking and dampening rollers. The inking-frame is moved to and from the cylinder 14 by the hand-shaft 32, carrying a worm 33, meshing with a gear 34, fixed on the shaft 28. The dampening-frame 26 is mounted loosely on the shaft 28 and is operated by the hand-shaft 35, having cranks 36, connected with the frame by the links 37. The inking and dampening frames 25 and 27 are mounted, equipped, and operated in the same manner as the frames 24 and 26, just described, as clearly shown. The frame 25 is fixed and the frame 27 is loose on the shaft 38, on which is loosely mounted the inking-cylinder 39, driven by the gear 40. The inking-frame 25 is moved by the hand-shaft 41 and the dampening-frame 27 by the hand-shaft 42 in the same way as the frames 24 and 26 are moved.

The main driving-shaft 43 may be actuated by any suitable motor, as the electric motor 44. Fixed on the shaft 43 is a gear 45, meshing with the gear 46, fixed on the shaft 47, on which are two loose gear-wheels 48 and 49, arranged to be locked thereon by the clutches 50 and 51, operated, respectively, by the clutch-shafts 52 and 53. The gears 48 and 49 mesh, respectively, with the gears 54 and 55, fixed, respectively, on the shafts 56 and 57. The shafts 56 and 57 have fixed thereon the gears 58 and 59, which respectively mesh with the gears 30 and 40, secured to the cylinders 29 and 39, loose on the shafts 28 and 38, respectively, as before described. The

clutch-shafts 52 and 53 are operated by the levers 60 and 61. Loose on the main shaft 43 are two worms 62 and 63, meshing with the gears 64 and 65, fixed on the shafts 66 and 67. Fixed on the shaft 67 are two gears 68 and 69, which mesh with the rack-arms 70 and 71, provided with forks at their upper ends adapted to engage and lift the shaft 11 from its place. Fixed on the shaft 66 are two gears 72 and 73, meshing with the rack-arms 74 and 75, respectively provided with forks at their upper ends and adapted to engage and lift the shaft 3 from its place. The worms 62 and 63 are locked on the shaft 43, when required, by the clutches 76 and 77, operated by the levers 78 and 79.

The operation of the machine is as follows: The primary surface having been inked and the inking and dampening rollers of both primary and secondary surfaces moved back out of the way the secondary surface is moved by operating the hand-wheel 21, so as to bring the gears 9 and 23 into mesh and the secondary and primary surfaces into contact under the pressure required, a marked tooth for the one always in the same marked recess of the other. The motor is then started and the shaft 43 actuated to drive the shaft 47. The clutch 50 having locked the gear 48 on the shaft 47, the shaft 56 is therefore rotated and, through the gears 30, 31, 9, and 23, the primary and secondary surfaces are driven together in positive contact and the design of the primary surface is imparted to the secondary surface accurately and in the position thereon desired. The secondary surface is then moved back from the primary surface and the inking and dampening frames 25 and 27 moved so as to bring their rollers in contact with the secondary surface. The clutch 50 is then released and the clutch 51 operated to lock the gear 49 on the shaft 47. The motor is then started and the secondary surface and its inking-rollers are positively driven together through the gears 59 and 40, the dampening-rollers riding freely on the secondary surface. In this way the secondary surface is rolled up in the operation of developing it. The inking and dampening rollers for the primary surface are operated by their appropriate gearing in the same way, so as to supply ink to the primary surface and make it capable of printing on the secondary surface. In driving the primary and secondary surfaces in contact from the shaft 47 either the gear 49 or 50, or both, may be locked on the shaft. After the secondary surface is developed the hoisting-arms 70 and 71 are operated to lift the shaft 11, with its cylinder, and the secondary surface thereon from its place in the machine, so that the secondary surface may be slipped from its cylinder and mounted in a printing-press. In this operation I generally employ an apparatus such as is set forth in an application filed by me on July 12, 1898, Serial No. 685,764. The hoisting-arms 70 and 71 are operated

through the shaft 43, worm 62, gear 63, shaft 67, and gears 68 and 69. The primary surface is removed when required in the same way, and both the primary and secondary surfaces may be removed by removing their shafts and cylinders with them. If desired, of course the secondary surface may be removed and developed afterward, the inking and dampening rollers provided for this purpose in the machine being omitted or not used.

The same primary surface may be used in making a plurality of identical secondary surfaces successively supported in place in the machine in the same definite and predetermined position, whereby identical designs identically placed will be imparted to such printing-surfaces, and these secondary surfaces made from one primary surface may be and preferably are interchangeable with one another and with their coacting primary surface and constructed and designed to fit in a preestablished seat or seats in a printing-press. A series of primary surfaces designed and constructed for register may be successively supported in the same definite and predetermined position and each employed in making a plurality of secondary surfaces, so that from the series of registering primary surfaces a plurality of series of registering secondary printing-surfaces may be made. The supporting-cylinders for the primary and secondary surfaces are preferably identical, as shown, and it is evident that the primary and secondary surfaces may be supported on either one or the other. They will, however, be supported in the same definite and predetermined cooperating relation.

The primary and secondary surfaces may be made of any suitable material, but are preferably of metal, which may be electrolytically deposited upon a suitable base. I prefer to electrolytically deposit zinc upon copper. In developing the primary and secondary surfaces any suitable method may be employed—such as light or deep etching, routing out, &c.—and they may be developed so as to be planographic, relief, intaglio, or otherwise. The primary and secondary surfaces may be differently or similarly developed.

While of course it is important that the rolling contact of the primary and secondary surfaces be positive—that is, without slipping—it is not essential that intermeshing gears be employed for this purpose. Other means may be employed to accomplish the result and to drive the bodies in unison and the gears may be dispensed with. Again, while I make use of a marked tooth and a marked recess in the intermeshing gears as preestablished guides to bring the primary and secondary surfaces into accurate predetermined cooperating relation, it will be obvious that various other devices may be used for this purpose.

Various changes may be made in the mechanism herein shown and described for operating the primary and secondary surfaces

and their inking and dampening devices, and various changes may be made in the shape and arrangement of the primary and secondary surfaces.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a machine designed to be used in making printing-surfaces, the combination of a primary surface adapted to print a design, with a secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surfaces into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

2. In a machine designed to be used in making printing-surfaces, the combination of a curved or cylindrical primary surface adapted to print a design, with a curved or cylindrical secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surfaces into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

3. In a machine designed to be used in making printing-surfaces, the combination of a lithographic primary surface adapted to print a design, with a lithographic secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surface into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

4. In a machine designed to be used in making printing-surfaces, the combination of a curved or cylindrical, lithographic primary surface adapted to print a design; with a curved or cylindrical, lithographic secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surfaces into direct contact whereby the design

of the primary surface may be imparted to the secondary surface in accurate predetermined position.

5. In a machine designed to be used in making printing-surfaces, the combination of a continuous, shell-like, lithographic primary surface adapted to print a design, with a continuous, shell-like, lithographic secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surfaces into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

6. In a machine designed to be used in making printing-surfaces, the combination of a primary surface adapted to print a design; with a removable and replaceable secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; a support having an accurate preestablished seat thereon for the secondary surface and for successive secondary surfaces in which said secondary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

7. In a machine designed to be used in making printing-surfaces, the combination of a primary surface adapted to print a design; with a removable and replaceable curved or cylindrical secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; a support having an accurate preestablished seat thereon for the secondary surface and for successive secondary surfaces in which said secondary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

8. In a machine designed to be used in mak-

ing printing-surfaces, the combination of a primary surface adapted to print a design; with a removable and replaceable curved or cylindrical, shell-like, lithographic secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; a support having an accurate preestablished seat thereon for the secondary surface and for successive secondary surfaces in which said secondary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in accurate predetermined relation both longitudinally and transversely; and means for bringing a primary and secondary surface into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

9. In a machine designed to be used in making printing-surfaces, the combination of a removable and replaceable primary surface adapted to print a design; a support having an accurate preestablished seat thereon for the primary surface and for successive primary surfaces in which said primary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; with a removable and replaceable secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; a support having an accurate preestablished seat thereon for the secondary surface and for successive secondary surfaces in which said secondary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

10. In a machine designed to be used in making printing-surfaces, the combination of a curved, shell-like, removable and replaceable primary surface adapted to print a design; a rotary support having an accurate preestablished seat thereon for the primary surface and for successive primary surfaces in which said primary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; with a removable and replaceable curved or cylindrical shell-like lithographic secondary surface adapted and arranged to receive an impression from the primary surface by direct contact therewith and to be developed into a printing-surface; a rotary support having an

accurate preestablished seat thereon for the secondary surface and for successive secondary surfaces in which said secondary surfaces may be seated successively in the same predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface into direct contact whereby the design of the primary surface may be imparted to the secondary surface in accurate predetermined position.

11. The combination of a series of removable and replaceable primary printing-surfaces having registering designs; a series of removable and replaceable secondary surfaces; a machine having a support for the primary surfaces and a support for the secondary surfaces, each support having a preestablished seat in which the surfaces therefor may be seated in accurate predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in pairs in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface seated on their supports into direct contact whereby the designs of the registering primary surfaces may be imparted to the secondary surfaces in accurate predetermined position and with reference to register.

12. The combination of a series of curved, shell-like removable and replaceable primary surfaces having registering designs; a series of curved shell-like removable and replaceable secondary surfaces; a machine having a rotary support for the primary surfaces and a rotary support for the secondary surfaces, each support having a preestablished seat in which the surfaces therefor may be seated in accurate predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in pairs in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface, seated on their supports, into direct contact, whereby the designs of the registering primary surfaces may be imparted to the secondary surfaces in accurate predetermined position and with reference to register.

13. The combination of a series of continuous cylindrical lithographic removable and replaceable primary printing-surfaces having registering designs; a series of continuous cylindrical lithographic removable and replaceable secondary surfaces; a machine having a rotary support for the primary surfaces and a rotary support for the secondary surfaces, each support having a preestablished seat in which the surfaces therefor may be seated in

accurate predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in pairs in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface, seated on their supports, into direct contact whereby the designs of the registering primary surfaces may be imparted to the secondary surfaces in accurate predetermined position and with reference to register.

14. In a machine for making printing-surfaces, the combination of a primary surface having thereon a plurality of designs in accurate predetermined relation to each other and with reference to register in the subsequent printing of said designs; with a secondary surface adapted and arranged to receive an impression of said designs by direct contact with said primary surface and to be developed into a printing-surface for said designs; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surfaces, seated on their supports, into direct contact whereby the designs of the primary surface may be imparted to the secondary surface in accurate predetermined position and in the identical mutual relation as on the primary surface.

15. The combination of a series of removable and replaceable primary printing-surfaces having each a plurality of registering designs in accurate predetermined relation to each other and with reference to register in the subsequent printing of said designs; a series of removable and replaceable secondary surfaces; a machine having a support for the primary surfaces and a support for the secondary surfaces, each support having a preestablished seat in which the surfaces therefor may be seated in accurate predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in pairs in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface, seated on their supports, into direct contact whereby the designs of the registering primary surfaces may be imparted to the secondary surfaces in accurate predetermined position and in the identical mutual relation as on the primary surface.

16. In a machine for making printing-surfaces, the combination of a primary surface having thereon a plurality of designs in accurate predetermined relation to each other and with reference to register in the subsequent printing of said designs; with a curved lithographic secondary surface adapted and arranged to receive an impression of said designs by direct contact with said primary surface and to be developed into a printing-

surface for said designs; preestablished guides with reference to which said surfaces may be arranged in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing said surfaces, seated on their supports, into direct contact whereby the designs of the primary surface may be imparted to the secondary surfaces in accurate, predetermined position, and in the identical mutual relation as on the primary surface.

17. The combination of a series of curved, shell-like removable and replaceable primary printing-surfaces having each a plurality of registering designs in accurate predetermined relation to each other and with reference to register in the subsequent printing of said designs; a series of curved shell-like removable and replaceable secondary surfaces; a machine having a rotary support for the primary surfaces and a rotary support for the secondary surfaces, each support having a preestablished seat in which the surfaces therefor may be seated in accurate predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in pairs in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface, seated on their supports, into direct contact whereby the designs of the registering primary surfaces may be imparted to the secondary surfaces in accurate predetermined position and in the identical mutual relation as on the primary surface.

18. The combination of a series of continuous cylindrical lithographic removable and replaceable primary printing-surfaces having each a plurality of registering designs in accurate predetermined relation to each other and with reference to register in the subsequent printing of said designs; a series of continuous cylindrical lithographic removable and replaceable secondary surfaces; a machine having a rotary support for the primary surfaces and a rotary support for the secondary surfaces, each support having a preestablished seat in which the surfaces therefor may be seated in accurate predetermined position both longitudinally and transversely; preestablished guides with reference to which the primary and secondary surfaces may be arranged in pairs in accurate predetermined cooperating relation both longitudinally and transversely; and means for bringing a primary and secondary surface, seated on their supports, into direct contact, whereby the designs of the registering primary surfaces may be imparted to the secondary surfaces in accurate predetermined position and in the identical mutual relation as on the primary surface.

19. In a machine adapted for use in making printing-surfaces, the combination of a primary printing-surface developed and pre-

pared to print a design, and a secondary surface adapted and arranged to receive an imprint of the design directly from the primary printing-surface and to be subsequently developed into a printing-surface therefor, preestablished guides with reference to each primary and secondary surface whereby the surfaces may be brought together in accurate predetermined cooperating relation, both longitudinally and transversely whereby a reversed impression may be transferred directly from the primary printing-surface to the secondary surface in accurate predetermined position.

20. In a machine adapted for use in making printing-surfaces, the combination of the cylinders 14 and 10 adapted to carry primary and secondary surfaces, means for bringing said cylinders together and separating them, preestablished guides with reference to which the primary and secondary surfaces may be brought together in accurate predetermined cooperating relation, both longitudinally and transversely, and mechanism for driving the cylinders together in contact and the cylinder 14 separately.

21. In a machine adapted for use in making printing-surfaces, the combination of the cylinders 14 and 10 adapted to carry primary and secondary surfaces, inking-rollers for the cylinder 14, means for bringing said cylinders together and separating them, and mechanism for driving the cylinders together in contact and the cylinder 14 separately with its inking-rollers.

22. In a machine adapted for use in making printing-surfaces, the combination of the cylinders 14 and 10 adapted to carry primary and secondary surfaces, inking-rollers for the cylinder 14 carried in frames movable to and from the cylinder, means for bringing said cylinders together and separating them, preestablished guides with reference to which the primary and secondary surfaces may be brought together in accurate predetermined cooperating relation, both longitudinally and transversely and mechanism for driving the cylinders together without the inking-rollers and the cylinder 14 separately with the inking-rollers.

23. In a machine adapted for use in making printing-surfaces, the combination of a primary surface, a secondary surface carried on a support and removable therefrom, preestablished guides with reference to which the primary and secondary surfaces may be brought together in accurate predetermined cooperating relation both longitudinally and transversely, mechanism whereby they may be positively driven together in contact, and devices for inking the primary surface.

24. In a machine adapted for use in making printing-surfaces, the combination of a primary surface, a secondary surface carried on a support and removable therefrom, preestablished guides with reference to which the primary and secondary surfaces may be

brought together in accurate predetermined coöperating relation, both longitudinally and transversely, mechanism whereby said primary and secondary surfaces may be positively driven together in contact, and devices for inking the primary surface, said support for the secondary surface being provided with devices to insure that successive secondary surfaces may be mounted on said support in the same position.

25. In a machine adapted for use in making printing-surfaces, the combination of a rotating cylindrical support for a primary surface, a removable cylindrical primary surface mounted on said support, a rotating cylindrical support for a secondary surface, a removable cylindrical secondary surface mounted thereon, means for positively driving said surfaces in contact, and means for bringing said surfaces into and out of contact.

26. In a machine adapted for use in making printing-surfaces, the combination of a rotating cylindrical support for a primary surface, a removable cylindrical primary surface mounted on said support, a rotating cylindrical support for a secondary surface, a removable cylindrical secondary surface mounted thereon, means for bringing said surfaces into and out of contact, frames carrying inking and dampening rollers for said primary surface, mechanism for moving said frames so as to bring their inking and dampening rollers into and out of contact with the primary surface and mechanism for positively driving said surfaces in contact apart from the inking and dampening rollers and for driving the primary surfaces separately in conjunction with its inking and dampening rollers.

27. In a machine adapted for use in making printing-surfaces, the combination of a supporting-cylinder for a primary surface, a

removable primary surface carried by said cylinder, a supporting-cylinder for a secondary surface, a removable secondary surface carried by said cylinder, one of said cylinders being loosely mounted on its supporting-shaft, means for moving said shaft so as to carry its cylinder without rotating it and from the other supporting-cylinder, whereby the primary and secondary surfaces carried by said cylinders may be moved into and out of contact, and mechanism for positively driving said cylinders when the primary and secondary surfaces are in contact.

28. In a machine adapted for use in making printing-surfaces, the combination of a supporting-cylinder for a primary surface, a removable primary surface carried by said cylinder, a supporting-cylinder for a secondary surface, a removable secondary surface carried by said cylinder, one of said cylinders being loosely mounted on its supporting-shaft, means for moving said shaft so as to carry its cylinder without rotating it and from the other supporting-cylinder whereby the primary and secondary surfaces carried by said cylinder may be moved into and out of contact and mechanism for positively driving said cylinders when the primary and secondary surfaces are in contact, hoisting-arms for said cylinders whereby said cylinders may be moved from their working positions in the machine to permit the primary and secondary surfaces to be removed from said cylinders and other primary and secondary surfaces mounted thereon.

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

EDWARD HETT.

Witnesses:

EDWIN SEGER,
GEO. W. MILLS, Jr.