Feb. 18, 1936. D. V. MAZZOCCO 2,031,222

MACHINE FOR TRANSFERRING DESIGNS

Filed Aug. 19, 1933 6 Sheets-Sheet 1

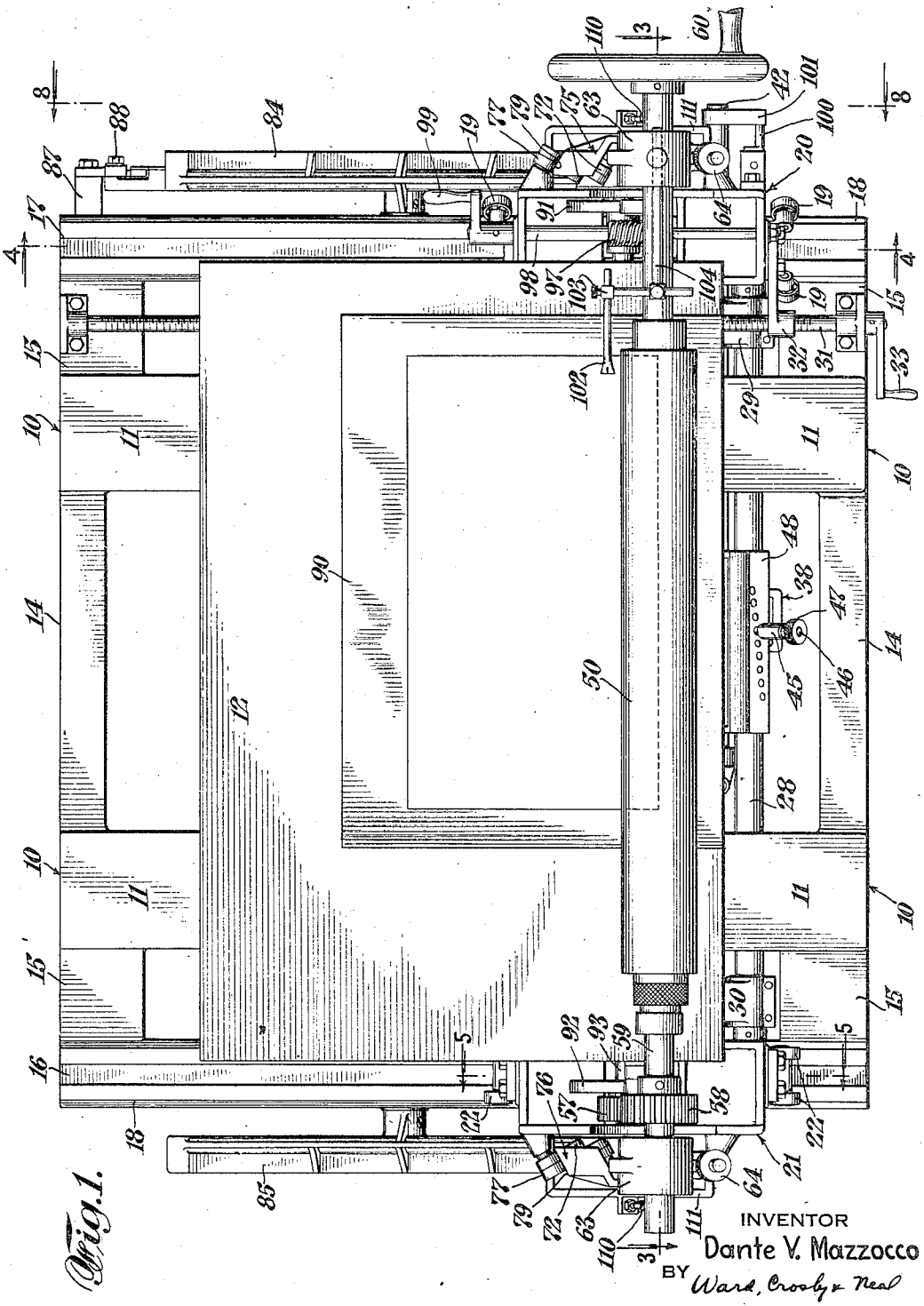


Fig. 1.

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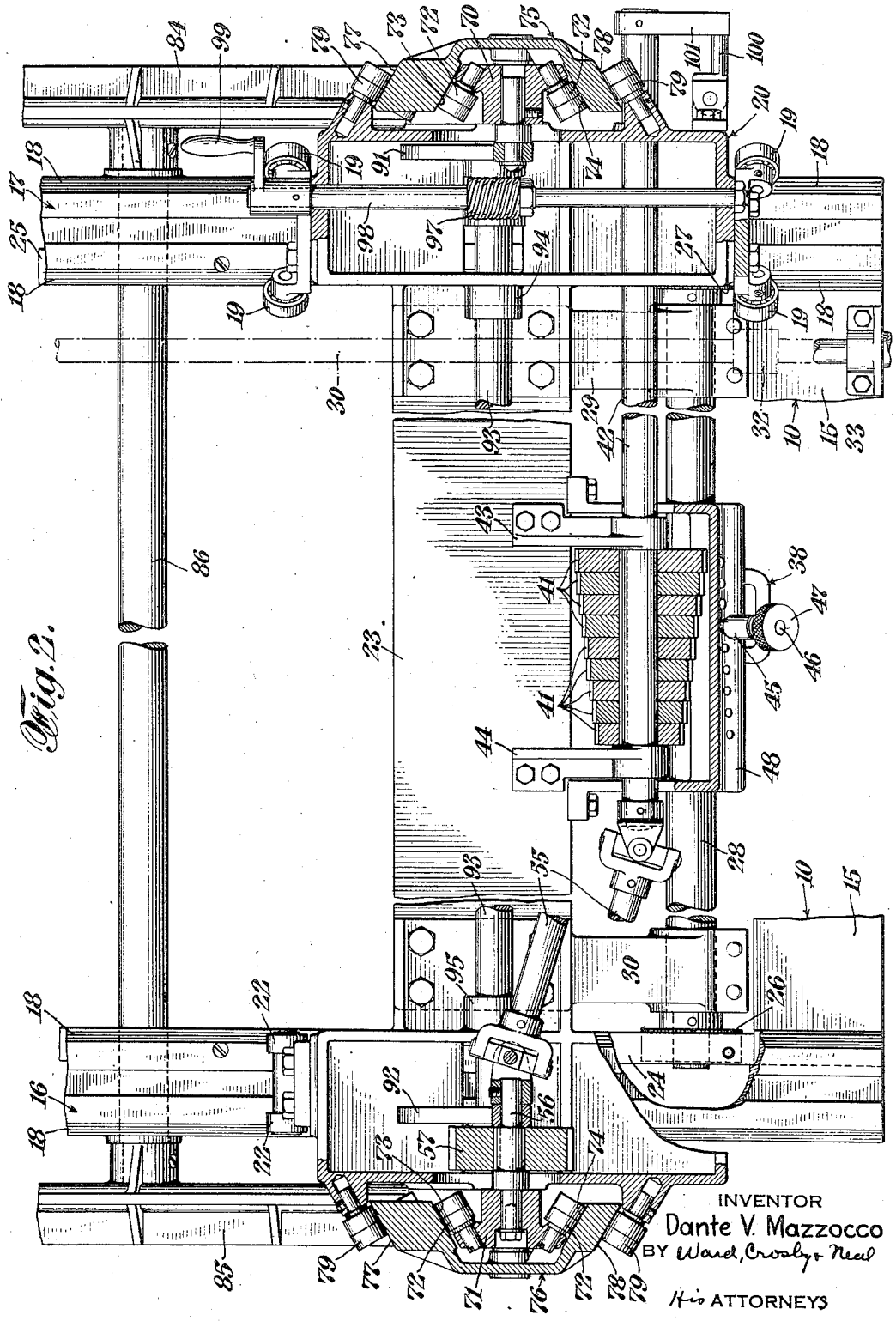


Fig. 2.

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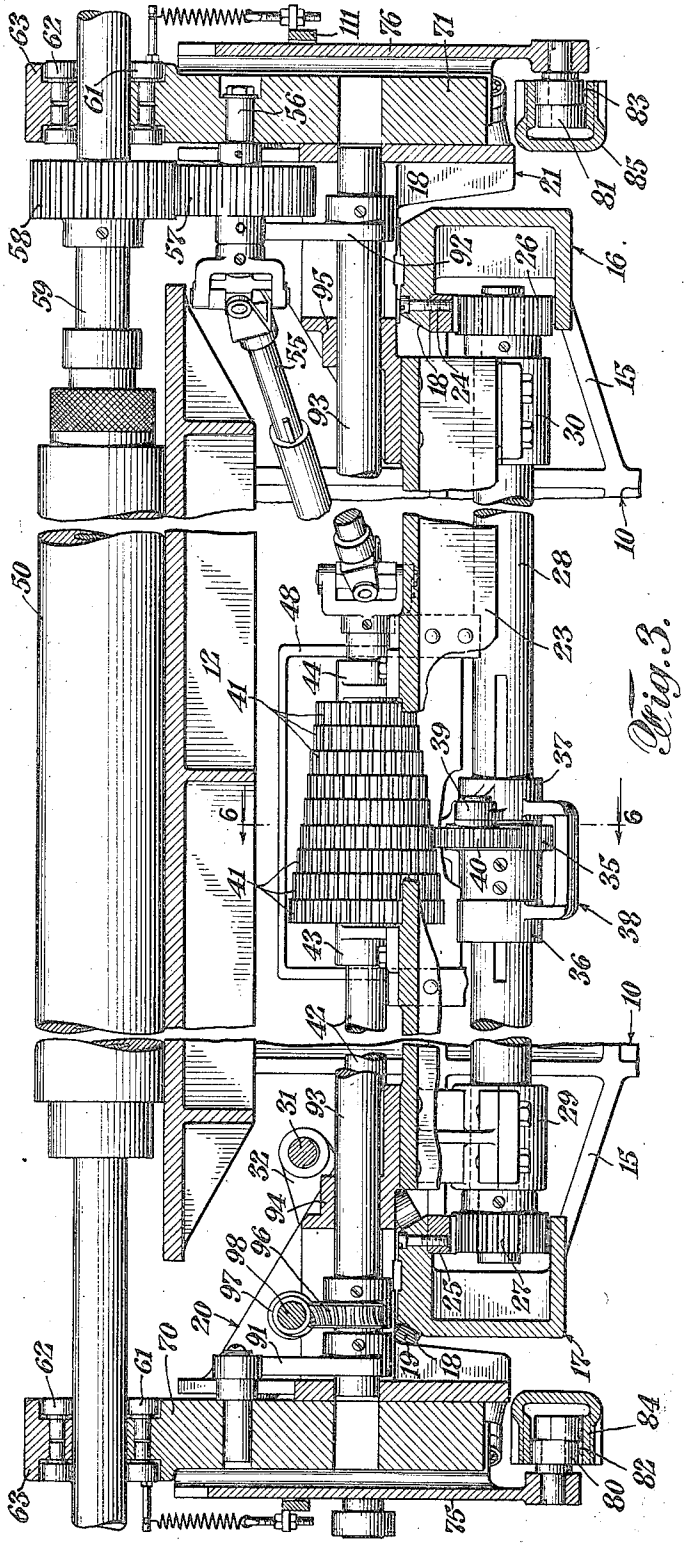


Fig. 3.

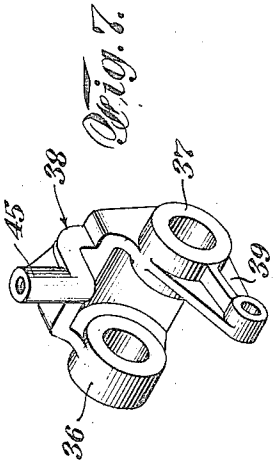


Fig. 7.

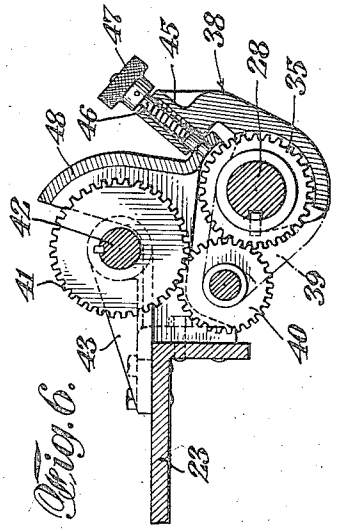


Fig. 6.

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MACHINE FOR TRANSFERRING DESIGNS

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Fig. 4.

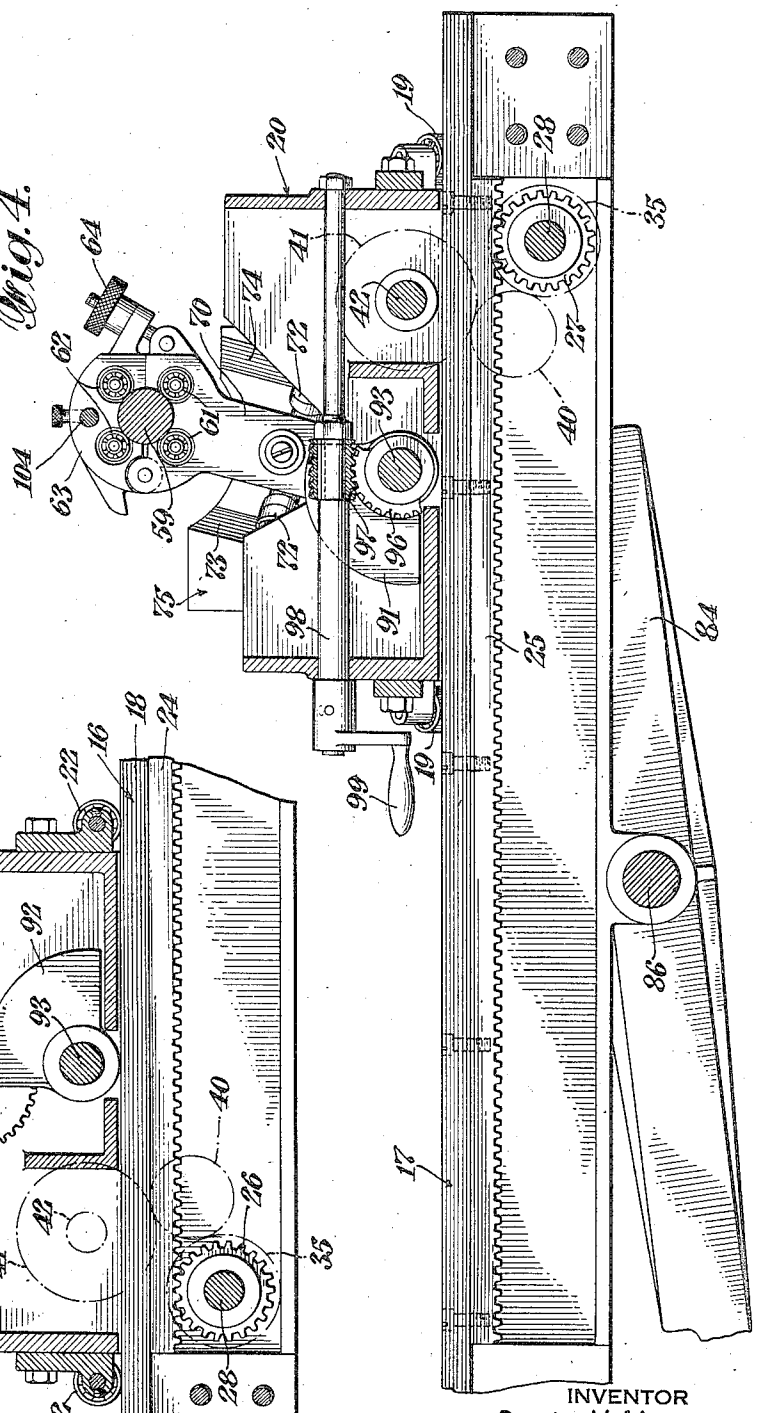
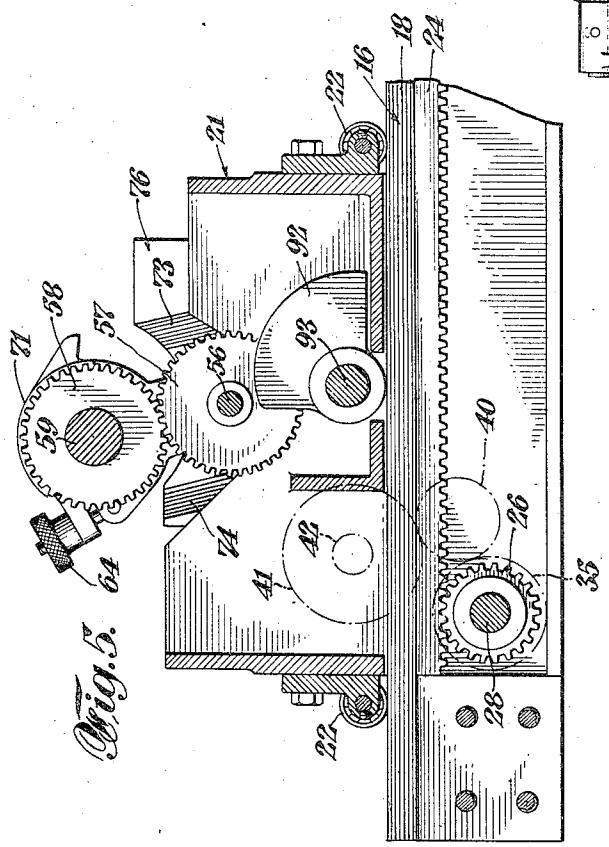


Fig. 5.



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Fig. 10.

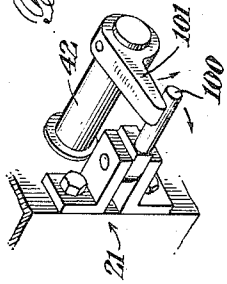


Fig. 8.

Fig. 13.

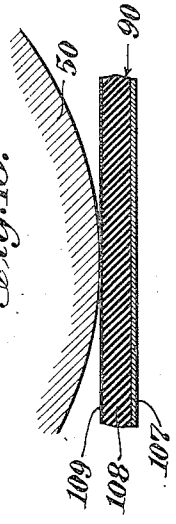
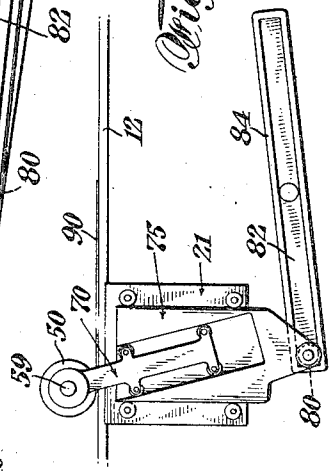


Fig. 11.



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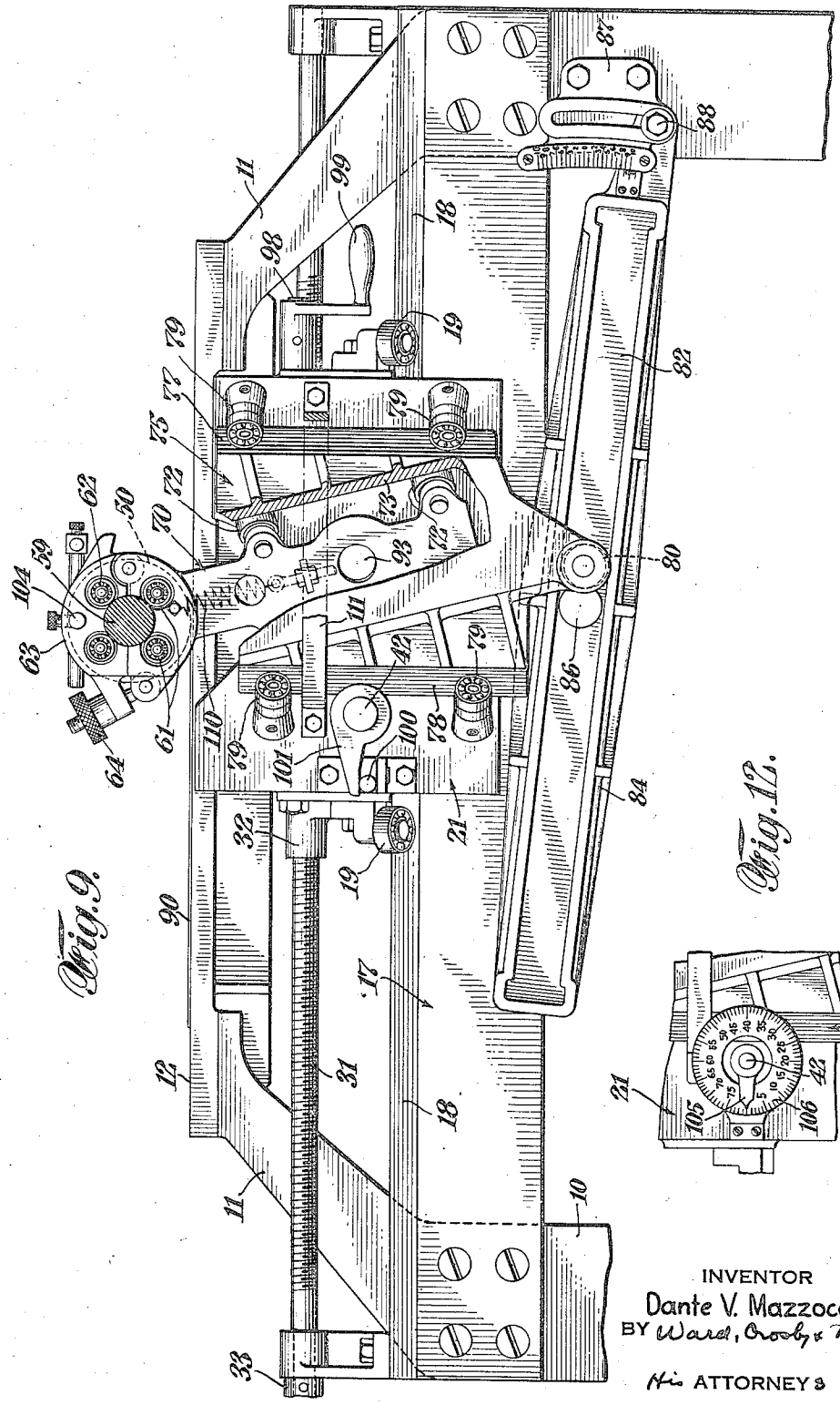


Fig. 9.

Fig. 12.

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Patented Feb. 18, 1936 2,031,222

UNITED STATES PATENT OFFICE

2,031,222

MACHINE FOR TRANSFERRING DESIGNS

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Application August 19, 1933, Serial No. 685,899

16 Claims. (Cl. 101—33)

This invention relates to a machine for transferring a design from a plane surface to a cylindrical surface, or vice versa, in cases where it is essential that the design transferred from one surface should exactly cover the entire area of the other surface or a fixed area thereof.

The machine is especially intended for use in transferring from a flat printing surface an acid resist to the surface of a roller so that the roller can be subsequently etched to provide a printing surface formed upon it for continuous web printing. It is necessary, in this case, that the design transferred should exactly cover the surface of the roller so that the two ends of the design will combine and not mismatch or leave a blank space therebetween. In accordance with this invention, provision is made for causing the roller to travel bodily a distance equal to the length of the design during one rotation of the roller.

Among the objects of this invention are the provisions of improved mechanism for controlling the roller on to which a design is to be transferred to travel in the direction of the length of the design a distance equal to the length of the design as the roller is given one rotation.

Other objects of the invention consist in the provision of a rugged construction providing means for causing the roller to travel over the plate from which the design is to be transferred in such a way that the axis of the roller will always remain parallel to a given line, so that its speed of travel across the design will always bear the desired relation to the peripheral velocity of the roller.

Other objects include means for adjusting the translatory speed of the roller with respect to its constant peripheral speed so that the relation of the speeds will be such as to cause the roller to travel over the design to be transferred as it makes one complete rotation.

Other objects of the invention consists in improved means for conditioning the mechanism for transferring designs from flat plates of different lengths on to different sized rollers.

Still another object of the invention consists in the improved means for adjusting the mechanism for causing the roller to travel the length of the design in exactly the time required for a rotation of the roller.

Another object of the invention consists in the use of an improved plate in connection with a transfer roller which is controlled so as to vary its translatory speed with its peripheral speed.

Other objects of the invention will appear from the following description taken in connection with the drawings in which but one embodiment has been shown for purposes of illustration, and in which

Fig. 1 is a top plan view of a roller transfer machine embodying the principles of my invention;

Fig. 2 is also a top plan view of the machine showing parts in horizontal section for purposes of illustration;

Fig. 3 is a vertical transverse section taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a vertical longitudinal section taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is a vertical longitudinal section taken substantially on the line 5—5 of Fig. 1;

Fig. 6 is a section on the line 6—6 of Fig. 3 through the gear box;

Fig. 7 shows the gear shifting casting shown in Figs. 3 and 6;

Fig. 8 is a side view with parts broken away, as indicated by the line 8—8 in Fig. 1, showing the transfer roller in its forward or starting position;

Fig. 9 is a view similar to Fig. 8 showing the transfer roller in its rearward or advanced position;

Fig. 10 is a detail showing a single rotation stop;

Fig. 11 is a diagrammatic view illustrating the mechanism for controlling the travel of the roller;

Fig. 12 shows a rotation indicator for the transfer roller shaft; and

Fig. 13 shows my improved design bearing plate.

The frame of the machine preferably comprises four legs 10 provided with inclined upper ends 11, the upper ends of the front pair of legs being inclined to the rear and the upper ends of the rear pair of legs being inclined to the front for supporting a table 12 which may be of any suitable material and secured to the upper inclined ends of the legs, in any suitable manner. The table 12 may be suitably reinforced, as also may the legs 10, by suitably located webs and flanges. The pairs of legs are preferably rigidly spaced by means of spacer bars 14 which may be secured thereto in any manner. The legs may also be provided with extensions 15 either integral therewith or secured thereto, to which are secured carriage rails 16 and 17 by any suitable means.

The upper surfaces of the rails 16 and 17 are provided with tracks upon which carriage supporting rollers travel. These tracks may be of the same shape and each one may include inclined or beveled side portions 18 with which co-

operate rollers 19 arranged in pairs at each end of the carriage member 20. These rollers support the carriage member for movement in a horizontal direction and hold this member properly aligned to travel in the direction of the carriage rails. The other carriage member 21, at the left of Fig. 2, may be provided with pairs of rollers 22 which roll on the top face of the rail 16 as lateral movement of the carriage member 21 is prevented by the rollers 19 and track 17 through a connecting plate 23 secured to the members 20 and 21, as indicated in Figs. 2 and 3.

Each of the rails 16 and 17 is preferably hollow or U-shaped, as shown in Fig. 3, and within which are secured racks 24 and 25 with which cooperate gears 26 and 27 carried by a shaft 28 supported on the cross member 23 in bearings 29 and 30. This construction is provided for the purpose of causing the carriage to travel in a straight line direction, as is well understood.

The main carriage 20, 21, and 23 is preferably driven by a threaded rod 31 suitably supported on the stationary frame and rotatable in a nut 32 suitably supported on the main carriage. The rod may be rotated by a crank 33.

For the purpose of communicating rotational movement to the transfer roller 50, the shaft 28 carries a gear 35. The gear is splined to the shaft for movement axially on the shaft for gear changing purposes. The hub of this gear is mounted between collars 36 and 37 on a casting 38 which is slidably and pivotally supported on the shaft 28, and by means of which the gear 35 may be shifted on the shaft 28. The casting also carries an arm 39 constituting a bearing for idler gear 40 which continuously meshes with the gear 35, and which may be moved to mesh with any one of the various gears 41 keyed to a shaft 42 supported by brackets 43 and 44 on the cross plate 23 connecting the carriage members 20 and 21, and which together with the carriage members constitute the main carriage. For the purpose of facilitating shifting the idle gear 40 into mesh with any of the gears 41, the casting 38 is provided with a hollow cylindrical upwardly extending portion 45 for receiving a spring-pressed locking pin 46 which may be operated by means of a head 47, by means of which also the casting may be shifted after the locking pin 46 has been withdrawn from a cooperating hole in a bracket 48 suitably secured to the cross member 23 of the carriage. As shown in Fig. 2, the bracket 48 is provided with a series of holes for locking the casting 38 and gears 35 and 40 in any position of adjustment. This gear mechanism, comprising gears 35, 40, and 41, is so designed that it will cause the transfer rollers of different sizes to normally travel at the same peripheral speed as the speed of the main carriage.

The shaft 42 through a universal extensible connection 55 drives a shaft 56 journaled in the carriage member 21 at the same speed. This shaft carries a gear 57 meshing with a gear 58 on the transfer roller supporting shaft 59 which may be provided, for purposes later described, with a crank 60, as shown in Fig. 1. Upon movement of the main carriage, comprising the carriage members 20 and 21, and the cross member 23, along the tracks 16 and 17, the shaft 59 is rotated at a speed determined by the position of the gear shift casting 38, Fig. 3. By means of the mechanism so far described, the horizontal distance traveled by the shaft 59 and transfer roller 50 is the same for a given distance traveled by the main carriage with the gear 40 in a given position. The gear may be shifted and meshed with another gear 41 to change the rotational and translatory speeds of the shaft 59 and transfer roller on constant speeds of the travel of the main carriage.

The shaft 59 is supported in suitable bearings carried by complementary carriage members 70 and 71, such members being preferably constructed as shown in Figs. 8 and 9, and which may comprise pairs of roller bearings 61, Fig. 4, carried by the carriage frame member, and another pair of roller bearings 62 carried by the member 63 which is pivoted to the carriage frame member and which may be locked in position by a locking nut 64 on a pivoted bolt which is of well known construction. By this means the shaft and roller may be readily removed.

The supplemental carriages 70 and 71, are provided with rollers 72 which are mounted on inclined studs and cooperate with convergent faces 73 and 74 which are inclined to the vertical, and which are formed on controlling slides 75 and 76 provided with outer convergent faces 77 and 78 which move over rollers 79 on the carriage members 20 and 21. By moving the members 75 and 76 downwardly, as shown in Fig. 9, the member 70 is moved toward the left, and by raising the controlling members 75 and 76 the complementary carriages 70 and 71 are moved toward the right. By means of this mechanism the transfer roller may be moved to the left or right, as viewed in Fig. 9, by means of which the transfer roller may be caused to travel horizontally over the table either slower or faster than the travel of the main carriage comprising members 20, 21 and 23.

For the purpose of controlling the rate of travel of the roller, with respect to the main carriage, automatically during the operation of the carriage the slides 75 and 76 are provided with rollers 80 and 81 which operate in slots 82 and 83 in members 84 and 85 keyed to a shaft 86 for uniform movement of the members. These members may be rocked, as indicated in these figures, and for purposes of facilitating adjustment scale marks may be provided on the member 84 which cooperate with scale marks on a slotted bracket 87 secured to one of the legs 10 of the frame member. The member 87 is slotted to receive a locking bolt 88 carried by the member 84 for the purpose of locking the member 84 in adjusted position.

By adjusting the members 84 and 85, the slots 82 and 83 in said members may be orientated in such a position as to cause the slides 75 and 76 to either move upwardly or downwardly as the main carriage is moved from the left to the right in Fig. 9. If the adjustment is made to cause the slides 75 and 76 to move downwardly during the travel of the roller from the left to the right, Fig. 9, then the horizontal distance traveled by the roller is less than the distance traveled by the main carriage 20, 21, and 23. When the parts are adjusted so as to cause the slides 75 and 76 to move upwardly, as the main carriage is moved from the left to the right, Fig. 9, then the horizontal distance traveled by the roller shaft is longer than the distance traveled by the main carriage.

The plate from which the design is transferred to the roller is indicated at 90. Any suitable means may be used for holding this plate in proper position on the table 12.

The roller supporting shaft 59 may be raised from the table by means of cams 91 and 92 which

bear on the roller carried by the controlling slide 75 and the roller carried by the shaft 56, Fig. 3. These cams are secured to a shaft 93 mounted in bearings 94 and 95 in the carriage members 20 and 21. The shaft may be operated by worm gear 96 driven by a worm 97 on a shaft 98 mounted in the carriage frame member 20 which may be operated by a handle 99 shown in Fig. 4.

The movement of the crank 60 and roller carrying shaft 59 may be limited to one complete rotation by means of a stop pin 100, Fig. 10, which is pivotally supported on angle pieces on the carriage member 21, in order that it may be thrown into and out of operative position. Cooperating with this pin is an arm 101 on the shaft 42, before referred to. The shaft 42 makes one rotation for each rotation of the roller supporting shaft 59. When it is desired to limit the rotation of the roller to one complete rotation, the crank is turned until the arm 101 engages the pin 100. The pin 100 is then swung to the side and the shaft 42 is rotated and before it completes the rotation the pin 100 is swung back into operating position, after which the shaft is further rotated until the arm 101 engages the pin 100.

During the operation of the machine, the plate 90 from which the transfer is to be made is aligned and secured on the table 12 with the forward edge of the design on the plate approximately in line with a mark on the gauge 102, Fig. 1, which is laterally adjustable in an opening in a member 103 which latter member is longitudinally adjustable in a member 104 which is carried by the supplemental carriage frame 70 and in which said member is also adjustable. Set screws are provided for locking the various members in adjusted position. The next step in the operation is to move the roller to the front end of the machine until the arm 101 engages the pin 100, after which the parts 102, 103, and 104 are adjusted as required to bring the mark on the member 102 over the front end of the design on the plate 90. The next step in the operation is to withdraw the stopping pin 100. The main carriage is then moved to rotate the transfer roller and carry the roller across the plate 90. The next step is to move the stop 100 back into operative position, and then to continue the rotation until the arm 101 is stopped by the pin 100. The mark on the member 102 may either be directly above the rear edge of the design or in front thereof or to the rear thereof. If the mark on the member 102 is directly above the rear boundary line of the design then the machine is in proper adjustment for transferring the design from the plate 90 to the roller 50.

If the mark on the member 102 is in front of the rear line of the design it shows that the design is longer than the circumference of the cylinder and that, therefore, the roller must be controlled to travel a greater distance across the table during a single rotation of the roller. This control is effected by rocking the levers 84 and 85 counterclockwise, as viewed in Figs. 8 and 9, toward the position indicated in Fig. 11. This is accomplished by unlocking the lock bolt 83, Fig. 9, and by rocking the lever 84 counterclockwise, and the amount by which this lever has to be rocked may be approximated fairly closely after many operations have been performed by the machine. The lever is then locked in position and another trial is made. If the mark on the member 102 at the second trial will be located to the rear line of the design on the plate 90 at the end of the rotation of the roller 50, it shows that the levers 84 and 85 were moved too far in a counterclockwise direction. In this instance, the levers will be adjusted clockwise, locked in position, and another trial made. These operations are continued until the line on the member 102 coincides with the rear line of the design at the end of rotation of the roller. During these operations the roller is held in raised position by the mechanism before referred to, so as to be out of contact with the plate 90. After the adjustment has been completed the roller is lowered into contact with the plate when the roller it as its extreme forward limited movement. The roller is then again given one rotation by means of the crank 60 which causes the design to be transferred toward the plate 90 to the roller 50 to completely cover the roller and to match the ends of the design and to meet without overlapping.

If desired, the rotation indication means shown in Fig. 12 may be substituted for the stop mechanism shown in Fig. 10. This indicator may comprise a relatively movable pointer and disk 105 and 106, provided with scale marks suitably referenced.

The plate 90 is preferably constructed as shown in Fig. 13 in which it is shown as comprising a metal backing such as zinc 107, a layer of rubber 108 firmly cemented to said back and an upper coating or thin film 109 of cellulose or other ink repellant material. The upper layer or film 109 is firmly secured or cemented at every point of its rear surface to the surface of the rubber layer 108. This film is made of substantially incompressible material but is made to yield readily so as not to interfere with the operation of the rubber layer. The construction provides a cushioned inextensible but readily yieldable design bearing surface. The pressure of the roller on the layer 109 does not spread the design, as in the case in which the design is carried by the surface of a rubber plate, and as the layer 109 is secured to the rubber there is substantially no horizontal shifting of the design with respect to the table as the roller is caused to travel horizontally either slower or faster than its peripheral speed.

If desired, the transfer roller 50 may be held against the plate 90 by springs, or the like, 110 stretched between the supplemental carriages 70 and 71 and brackets 111 on the main carriage members 20 and 21. These springs may be adjusted as indicated to any desired tension and as required by different sized rollers 50.

The crank handle 60 on the shaft 59 could be used as the operating means by omitting the main carriage operating means 31, 32, and 33. The crank is used in the organization disclosed for taking up the lost motion in the gear mechanism before the roller is moved across the table.

While the invention has been described with reference to the single embodiment illustrated, it is to be understood that terms imported from the specification into the claims are to be considered descriptive and not limiting, and that it is the intention to cover all equivalent forms of this invention.

What I claim is:

1. An apparatus for transferring a design from a plane surface to a cylindrical surface, the combination with a cylindrical surface, of a traveling frame for said cylindrical surface, a gear rotatably connected with said cylindrical surface, a gear traveling with said traveling frame

and operatively connected to said first mentioned gear, fixed racks with which said second mentioned gear cooperates, and means providing for translatory movement of said cylindrical surface with respect to said traveling frame.

2. In a machine for transferring a design from a flat plate to a roller, the combination of a plate support, a roller, a carriage supporting said roller, means for rotating said roller and driving said carriage, and means for varying the translatory speed of said roller with respect to said carriage during a constant peripheral velocity of said roller and a constant horizontal speed of said carriage.

3. In a machine for transferring from a flat plate to a roller, the combination of a roller, a carriage supporting said roller, means for rotating said roller and moving said carriage at constant relative speeds, and means for varying the translatory speed of said roller with respect to the speed of said carriage.

4. In a machine for transferring a design from a flat plate to a roller, the combination of a roller, a carriage supporting said roller, and means for moving said roller horizontally with respect to said carriage during constant rotational speed of said roller and constant speed of said carriage.

5. In a machine for transferring a design from a flat plate to a roller, the combination of a roller, a carriage support therefor, a flat plate support, and means for moving said roller horizontally across said plate support at a different speed from that of said carriage.

6. In a machine for transferring a design from a flat plate to a roller, the combination of a roller, a carriage support therefor, a flat plate support, means for moving said roller horizontally across said plate support at a different speed from that of said carriage, and adjustable means for controlling said roller to travel at less or greater speed than said carriage.

7. In a machine for transferring a design from a flat plate to a roller, the combination of a flat plate support, operating means for rotating said roller and for moving said roller and plate support relatively to each other, and means for varying the velocity of relative movement between said roller and plate support during rotation of said roller at constant speed.

8. The combination of a table for supporting a flat plate bearing a design, a roller to which said design is to be transferred, a main carriage, tracks on said table for supporting and guiding said carriage, means for shifting said carriage, a rack secured to said table, a gear journaled on said carriage and operated by said rack, a driving connection between said gear and roller, and horizontally shiftable bearings for said roller carried by said carriage for causing said shaft to travel slower or faster than said carriage as desired.

9. The combination of a table for supporting a flat design bearing plate, a carriage slidably mounted on said table, roller supporting bearing members carried by said carriage, and a connection between said members and carriage for moving said members relatively to said carriage in the direction of movement of said carriage as said carriage is moved.

10. The combination of a table for supporting a flat design bearing plate, a roller, a carriage movably supported on said table for carrying said roller in rolling contact over said plate, bearings for said roller provided with inclined guide means, and vertically movable slides on said carriage provided with inclined guide means for advancing or retarding the movement of said bearings with respect to said carriage.

11. The combination of a table for supporting a flat design bearing plate, a roller, a carriage movably supported on said table for carrying said roller in rolling contact over said plate, bearings for said roller provided with inclined guide means, vertically movable slides on said carriage provided with inclined guide means for advancing or retarding the movement of said bearings with respect to said carriage, and track elements located adjacent said vertically movable slides for moving said slides vertically as said carriage is moved.

12. The combination of a table for supporting a flat design bearing plate, a roller, a carriage movably supported on said table for carrying said roller in rolling contact over said plate, bearings for said roller provided with inclined guide means, vertically movable slides on said carriage provided with inclined guide means for advancing or retarding the movement of said bearings with respect to said carriage track elements located adjacent said vertically movable slides for moving said slides vertically as said carriage is moved, and means for orientating said track elements with respect to the horizontal.

13. The combination of a table including a plate support, a roller, a roller supporting carriage slidable on said table, means for sliding said carriage and for rotating said roller at a peripheral speed equal to the speed of said carriage, and gear shift means for controlling the rotational speed of rollers of different sizes to provide for the same peripheral speeds for different sized rollers for the same speed of said carriage.

14. The combination of a flat plate table support, a roller supporting carriage movably supported on said table, means for rotating a roller of any one of a plurality of different diameters supported on said carriage at a peripheral speed equal to the speed of said carriage, and means for moving said roller with respect to said carriage in the direction of movement of said carriage.

15. The combination of a movable carriage, a roller supported on said carriage, means for moving said carriage and for rotating rollers of different sizes at a peripheral speed equal to the speed of said carriage, and automatic means for moving said roller with respect to said carriage in the direction of movement of said carriage.

16. The combination with means operable at a constant speed for rotating a roller in rolling contact with a flat plate at constant angular velocity, means for varying the angular velocity of rollers of different sizes during operations of said operable means at constant speeds, operating means to provide for a constant peripheral velocity for different sized rollers, and means for varying the translatory speed of any of such rollers upon constant speed of said operating means.

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