

No. 637,590.

Patented Nov. 21, 1899.

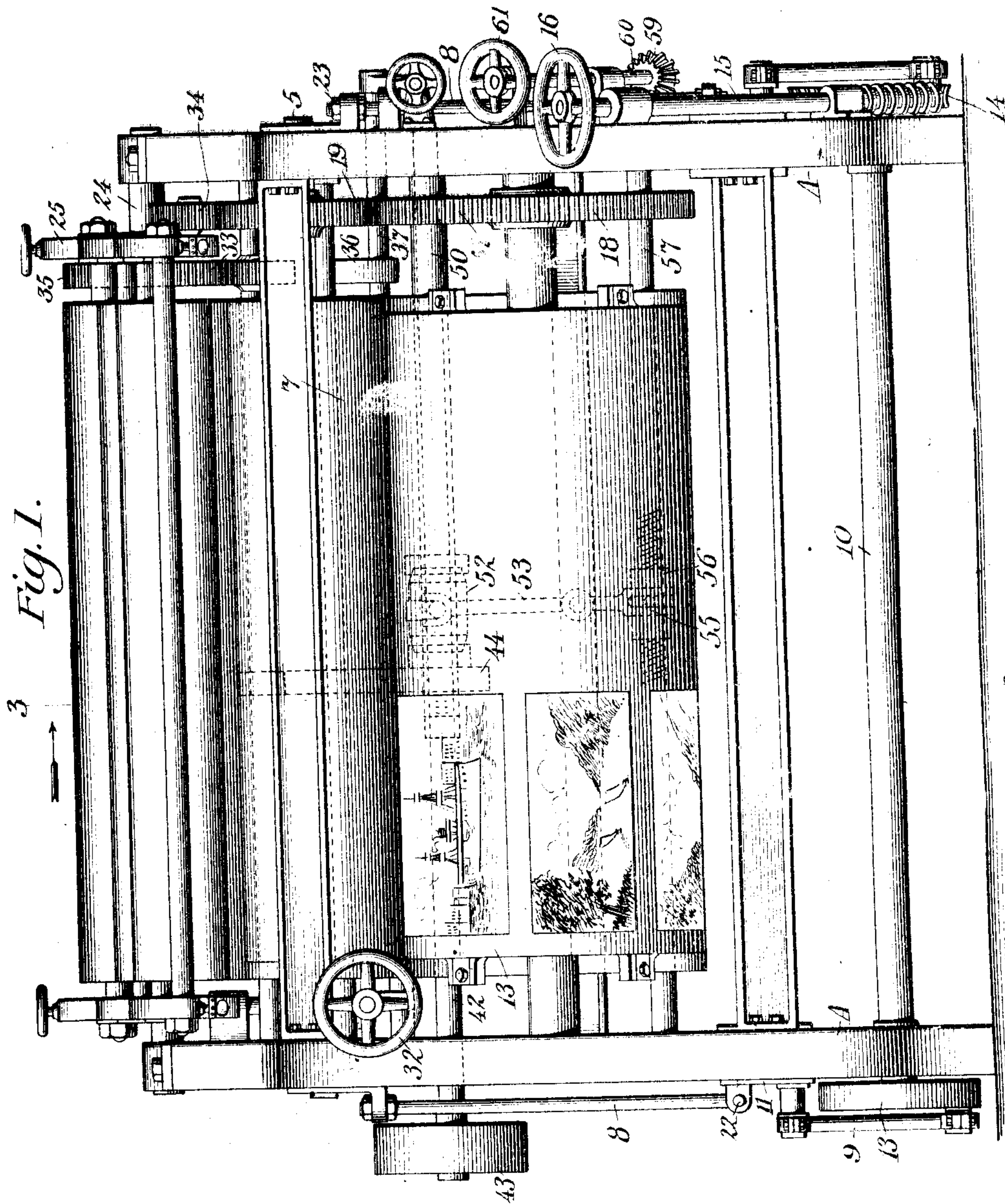
E. HETT.

TURNING OVER AND ROLLING UP MACHINE.

(Application filed Nov. 1, 1899.)

3 Sheets—Sheet 1.

(No Model.)



Witnesses.
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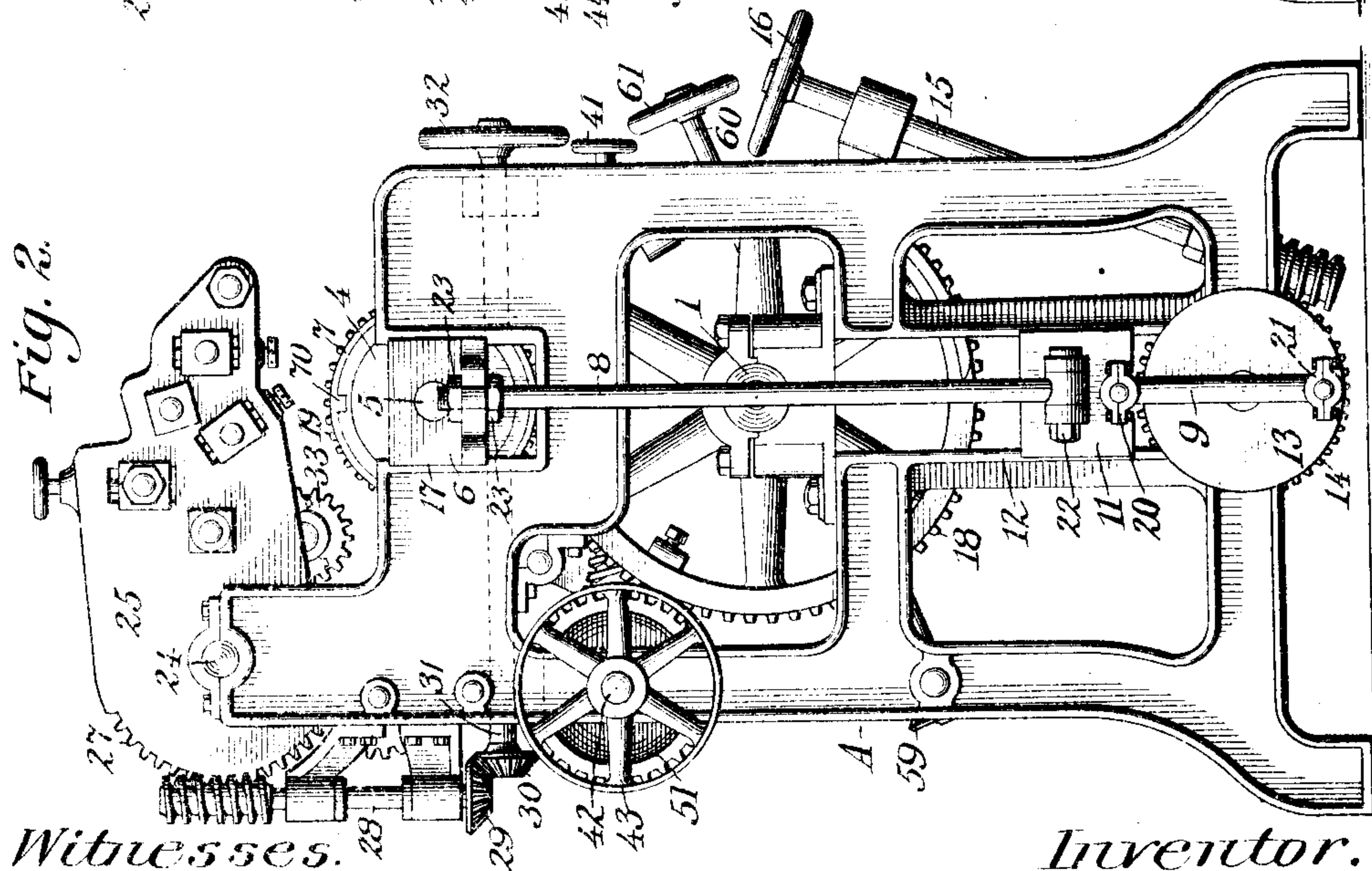
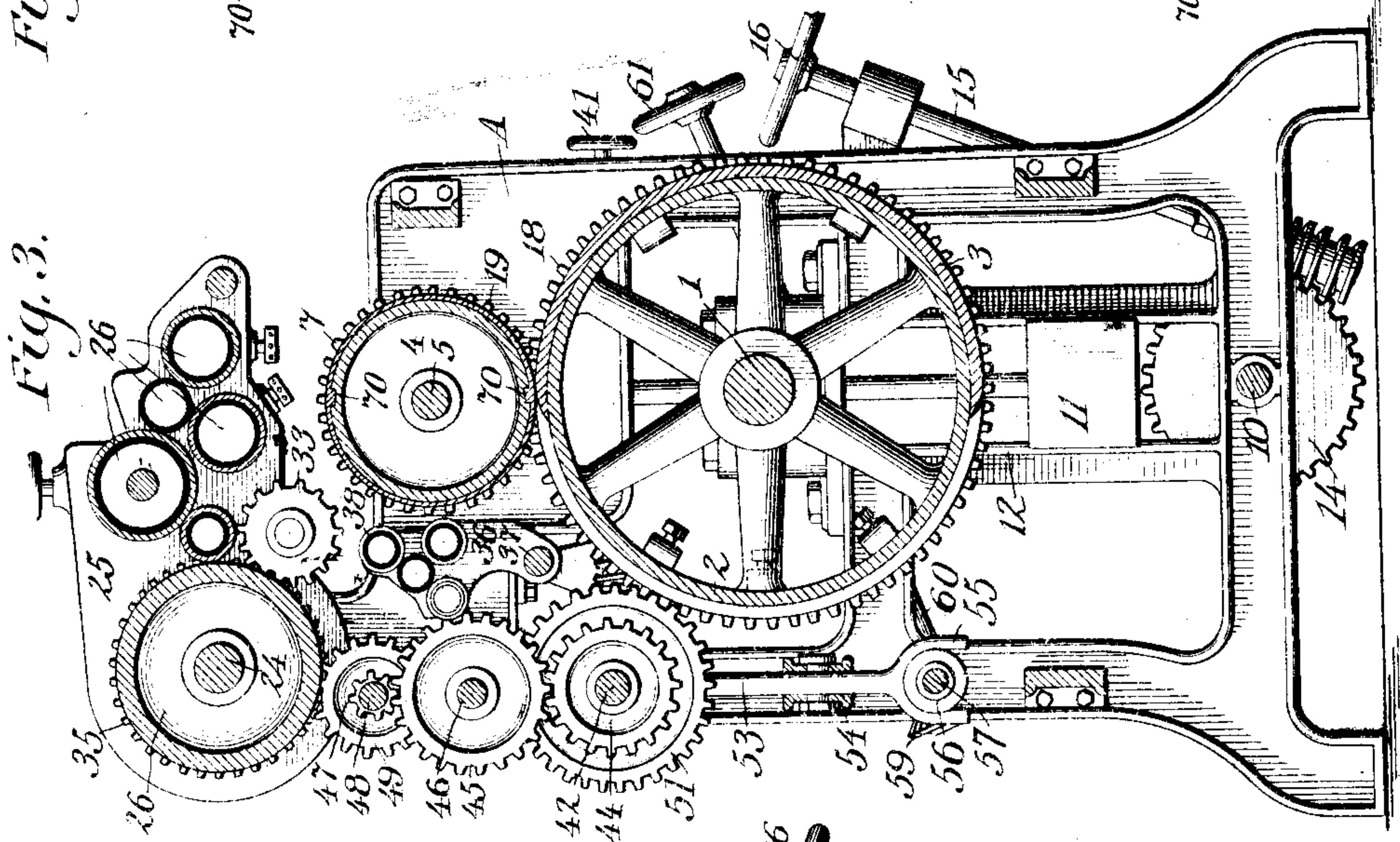
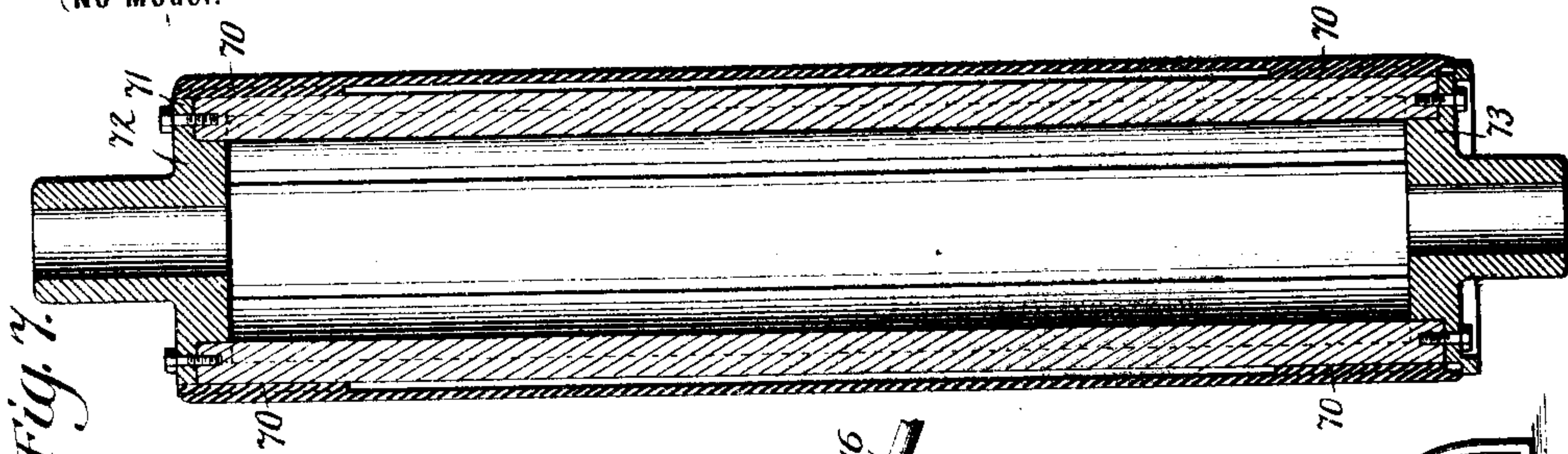
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TURNING OVER AND ROLLING UP MACHINE.

(Application filed Nov. 1, 1899.)

3 Sheets—Sheet 2.

(No Model.)



Witnesses.
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No. 637,590.

Patented Nov. 21, 1899.

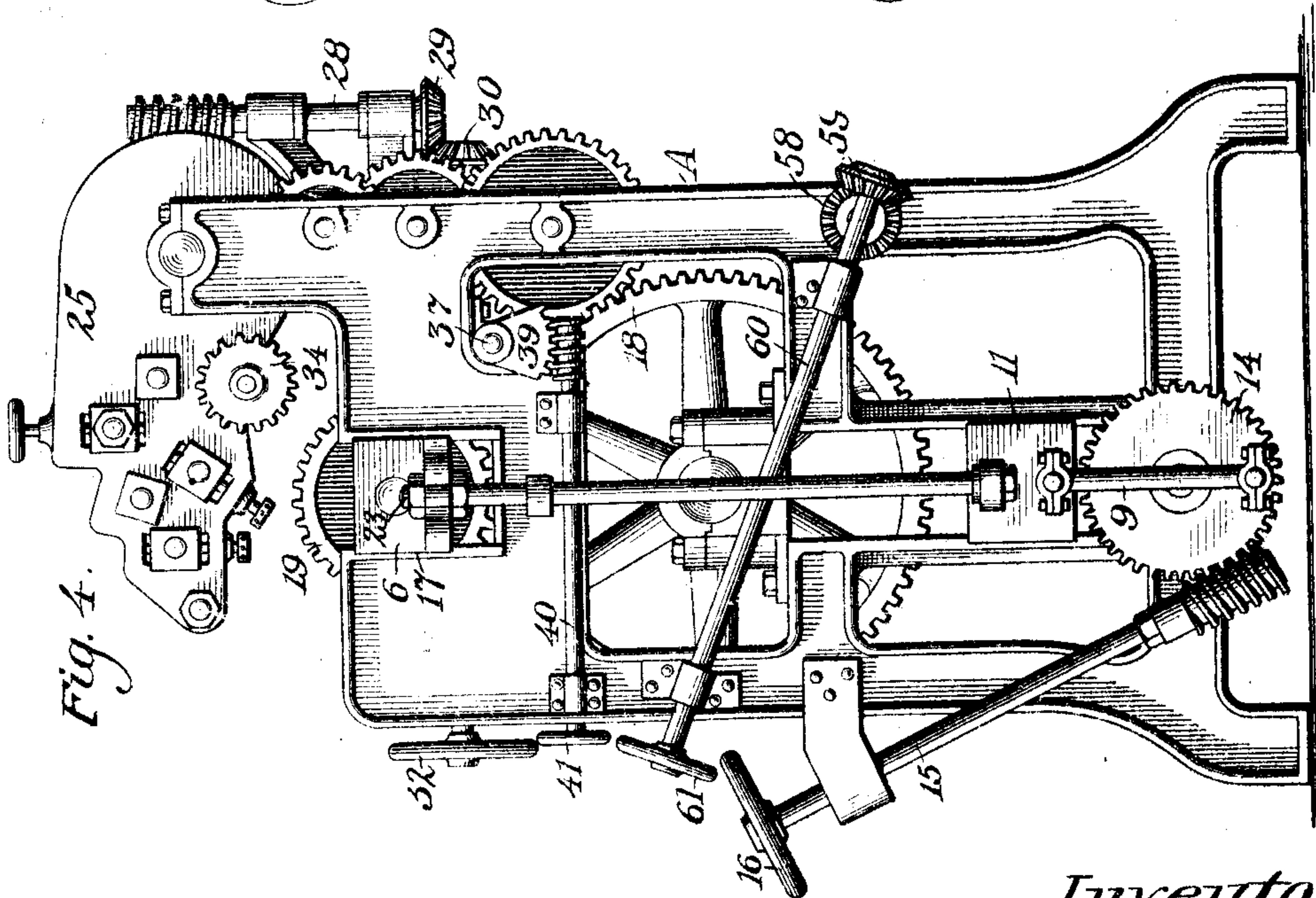
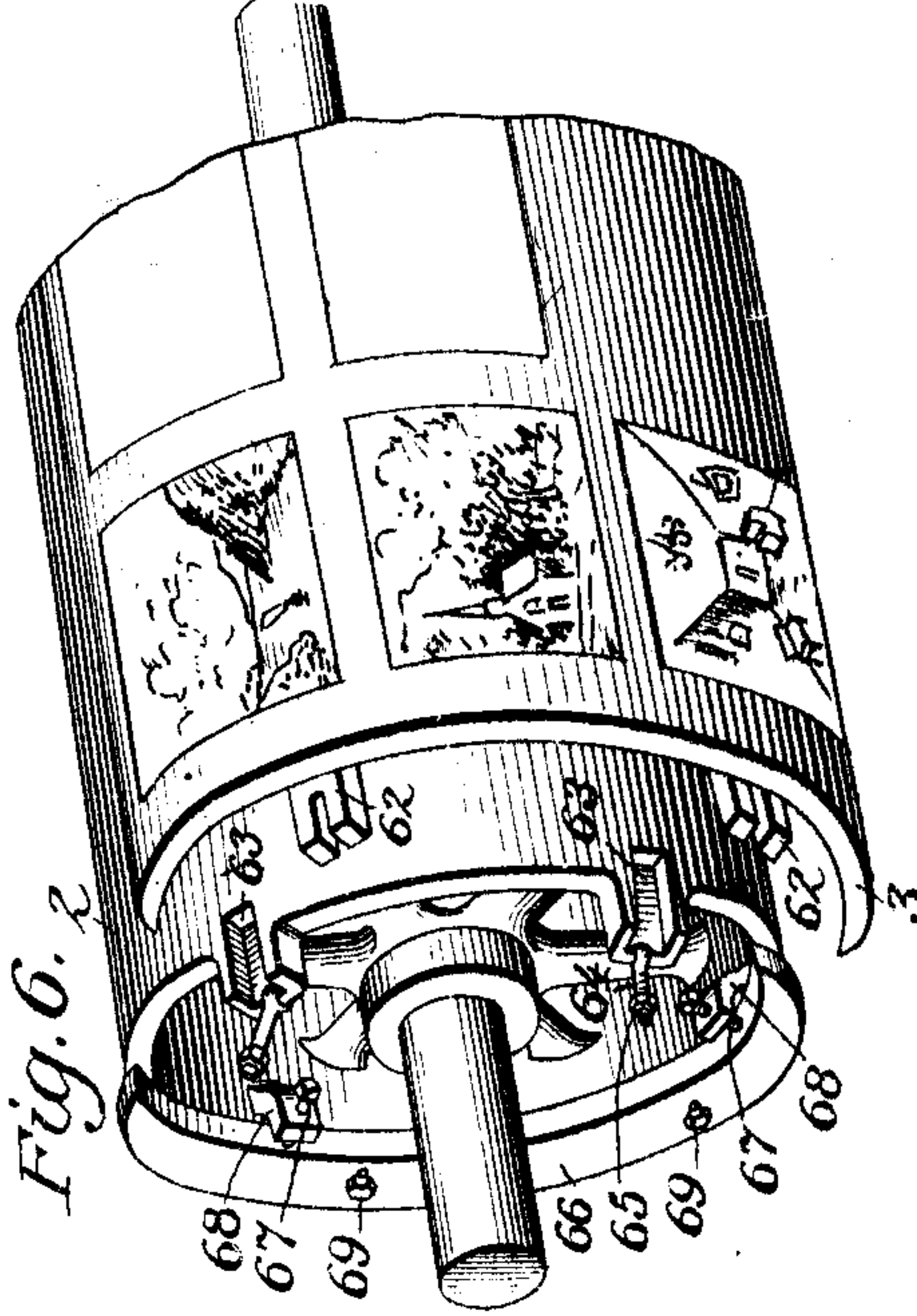
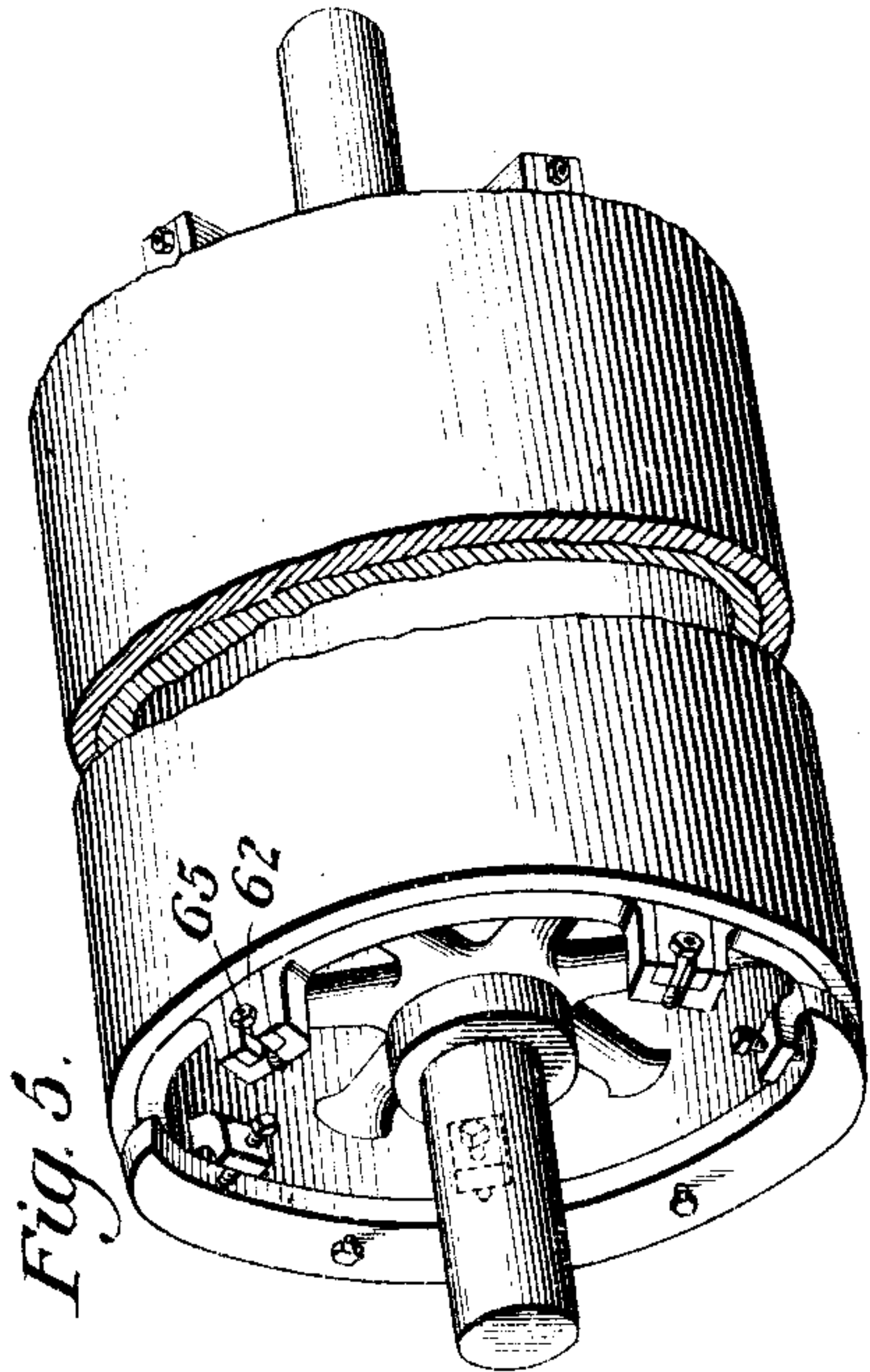
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TURNING OVER AND ROLLING UP MACHINE.

(Application filed Nov. 1, 1899.)

(No Model.)

3 Sheets—Sheet 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

TURNING-OVER AND ROLLING-UP MACHINE.

SPECIFICATION forming part of Letters Patent No. 637,590, dated November 21, 1899.

Application filed November 1, 1899. Serial No. 735,510. (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 and State of New York, have invented certain new and useful Improvements in Turning-Over and Rolling-Up Machines, of which the following is a specification.

This invention relates to a machine designed to turn over transfers from a setting-up plate upon a planographic or other printing surface and to roll up or develop the printing-surface so as to make it suitable for use in printing.

It also relates to certain features and combinations of features adapted for employment in such machine and for employment in other machines using a printing-surface, whether such printing-surface is used for the purpose of developing it so as to be suitable for printing or whether it is actually used in the process of printing or otherwise.

The invention consists principally of a curved or rounded setting-up plate whereby transfers may be turned over upon a printing-surface and especially upon a curved or rounded and preferably a cylindrical printing-surface by rolling contact. So far as I am aware my invention is the first to contemplate and make practical the use of such a setting-up plate. By its use many advantages arise, especially in the preparation of curved and cylindrical printing-surfaces. Speed, economy, and accuracy are combined by its use.

The invention further consists in the various accessories of such curved setting-up plate and in the various combinations of elements hereinafter set forth, whereby a complete turning-over and rolling-up machine is provided, simple and convenient in its construction and operation.

The invention further consists of the various features and combination of features hereinafter set forth, and more particularly specified in the claims.

In the embodiment of the various features and combinations of features of the invention shown in the drawings I have illustrated them all combined in a machine designed to turn over transfers from a setting-up plate upon a printing-surface and then develop or roll up

such printing-surface, so as to make it suitable for use in printing. By the term "setting-up plate" as herein used I mean any surface upon which may be mounted transfer-sheets bearing a design to be imparted by contact to a printing-surface. This setting-up plate may be normally flat and bent upon its support, but is preferably rigid—i. e., inflexible—so as to maintain substantially its shape at all times. Its exterior surface, upon which the transfer-sheets are usually mounted, is preferably, though not necessarily, non-expandible and non-contractible. In its best form the setting-up plate consists of a metallic base having fixed thereon a layer or layers of paper or cardboard, upon which the transfer-sheets may be stuck up or made to adhere. If desired, the surface of the setting-up plate may be formed of rubber or other yielding material, or a yielding material may underlie layer or layers of paper, cardboard, &c., or may be interposed between the setting-up plate and its support.

In the several figures of the drawings which form part of this specification and in which similar characters of reference designate corresponding parts, Figure 1 is a front elevation of a turning-over and rolling-up machine. Fig. 2 is a side elevation of the machine as viewed from the left in Fig. 1. Fig. 3 is a sectional elevation on the line 3 3 of Fig. 1. Fig. 4 is a side elevation of the machine as viewed from the right in Fig. 1. Figs. 5 and 6 are fragmental perspective views of the curved or rounded setting-up plate and its supporting-cylinder, the setting-up plate being detached from its cylinder in Fig. 6. Fig. 7 is a longitudinal section of the printing-surface seated on its form-support.

Referring now more particularly to the particular embodiment of the invention as shown in the drawings, A is the frame of the machine.

I is a shaft suitably supported in the frame and carrying a suitable support 2 for the curved or rounded setting-up plate 3, upon which the transfers are mounted. This setting-up plate is designed to be brought into rolling contact with a printing-surface, whereby the transfers may be turned over thereon. I prefer to make my printing-surface curved or rounded, so that when finally developed

and ready for use in printing it may be used in a rotary printing-press. In its best form my printing-surface is cylindrical, and for the purpose of supporting it in contact with the setting-up plate I provide a form-cylinder 4, fixed on a shaft 5, carried in boxes 6. The printing-cylinder is preferably made in the form of a continuous shell removable from the form-cylinder. 7 is such a printing cylinder or surface. The printing-surface has an accurate preestablished seat in the machine, so that successive printing-surfaces may be mounted therein in accurate predetermined position, both longitudinally and transversely. The seat for the printing-surface is on the form-cylinder 4. The ribs 70, formed on the inner side of a printing-surface, and the corresponding longitudinal grooves formed on the cylinder 4, in which the ribs fit, a marked rib in a marked groove, determine the transverse or circumferential location of the printing-surface in its seat. The longitudinal position of the printing-surface on its support may be determined in any convenient manner. I preferably employ for this purpose a collar 71, fixed on one end of the form-cylinder 4, against which the printing-surface accurately fits when in proper position. The form-cylinder 4 (shown in Fig. 7) is secured firmly to hubs 72 and 73, adapted to be secured on the shaft 5. The collar 71 is formed on the hub 72. Thus established guides for quickly and accurately seating the printing-surface are provided. Other forms of preestablished guides for the purpose may of course be employed.

For the purpose of efficiently turning over the transfers upon the printing-surface it is important that such surface and the setting-up plate be brought firmly into contact or that pressure be applied to such contact. For the purpose of exerting this pressure I employ arms 8, secured at their upper ends to the boxes 6, adapted to slide in the ways 17, and links 9, pivotally connected with the lower ends of the arms 8 and with a shaft 10. The rotation of the shaft 10 moves the printing-cylinder, and with it the printing-surface, to and from the setting-up plate and affords efficient means for imparting the desired pressure to their contact. In the preferred form of this pressure mechanism the lower ends of the arms 8 are secured to the slides 11, adapted to move in the ways 12, and the links 9 are pivoted at 20 to the slides 11 and at 21 to wheels 13 and 14, fast on the ends of the shaft 10. The wheel 14 has worm-teeth, and the worm-shaft 15, having a hand-wheel 16, drives the worm-wheel, and thus operates the shaft 10 and the pressure mechanism.

It will be seen that in order to secure the desired rolling contact of the curved printing-surface and the curved setting-up plate only one of them need, and at least one of them must, rotate. It will also be seen that such rolling contact can be secured in the simplest and most efficient way by having both the

printing-surface and the setting-up plate rotate together. This arrangement is shown in the drawings, the shafts 1 and 5 rotating in their boxes. In order to rotate the printing-surface and setting-up plate in precise unison and without possibility of either slipping on the other, I fix a gear-wheel 18 on the shaft 1 and a gear-wheel 19 on the shaft 5, these gear-wheels being brought into mesh when the printing-surface and setting-up plate are in contact. Moreover, in order to insure the required perfection in the accuracy of register of the setting-up plate and the printing-surface I mark a tooth and a recess of their intermeshing gears, so that the marked tooth of one shall always be entered into the marked recess of the other before these intermeshing gears begin their conjoint action. In this way the required register may be readily obtained without delicate and skilled manipulation.

For the purpose of removing a printing-cylinder from its form-cylinder I separate the form-cylinder from the setting-up plate preferably by lifting the form-cylinder up from its working position and so that the printing-cylinder may be slipped endwise from the form-cylinder. To effect this result, I prefer to employ the pressure mechanism already described, the upward movement of which the arms 8 are capable being sufficient to lift the boxes 6 above the slides 17 in the frame. One of the arms 8 is pivoted at 22 to the slide 11, as shown in Fig. 2, and both are secured to the slides 6 by means of the nuts 23. In removing a printing-cylinder the shaft 15 is turned till the boxes 6 are lifted, with the form-cylinder 4, above the ways 17. The printing-cylinder is then slipped from its supporting-cylinder. A transporting-shaft (not herein shown, but such as is shown in an application filed by me July 12, 1898, Serial No. 685,764) may then be brought into alinement with the shaft 5, the arm 8, which is pivoted at 22, being turned down on the pivot 22 out of the way, having first been detached from its box 6. The printing-cylinder is then slipped from its supporting-cylinder over the box 6 and onto the transporting-shaft, upon which it is carried away. A new printing-cylinder may be then fixed upon the cylinder 4 and the parts adjusted to their original position.

The machine shown in the drawings is designed not only to effect the turning over of the transfers, but also the development of the printing-surface after the transfers have been turned over. I will now describe the mechanism for this purpose.

24 is a shaft on which is fixed a frame 25, carrying the usual inking-rollers 26. This shaft is suitably supported to rotate in boxes on the frame A, whereby the frame 25 may be swung, with its inking-rollers, to and from the printing-surface 7. For actuating the frame 25 I generally provide the frame with worm-teeth 27 and employ a worm-shaft 28, meshing with the teeth 27, and having a bevel-

gear 29, meshing with a bevel-gear 30 on the shaft 31. This shaft 31 may be operated by the hand-wheel 32. When the printing-cylinder is ready to be rolled up or developed, it is lifted by the arms 8 up out of contact with the setting-up plate 3. For the purpose of rotating the printing-cylinder while it is being developed I mount a short shaft in one side of the frame 25 and fix thereon two gear-wheels 33 and 34, which are driven by the gear-wheel 35, fixed on the shaft 24 of the main inking-roller. When the printing-cylinder is brought into contact with the inking-rollers, the gear-wheels 19 and 35 intermesh, thus driving the inking-rollers and the printing-cylinder in unison. When the printing-cylinder is to be removed, the operation of the hand-wheel 32 swings the frame 25 back, so as to carry the inking-rollers out of the way, as already described. 36 is a swinging frame carried by the shaft 37, mounted in the frame A, and carrying the dampening or water rollers 38. The shaft 37 carries a segmental gear 39, operated by the worm-shaft 40, having the hand-wheel 41.

In the operation of turning over the transfers and developing the printing-surface I prefer to employ suitable gearing designed to be operated by a motor. This gearing is best arranged so that the printing-cylinder may be rotated from the same driving-shaft whether it is being rotated in contact with the setting-up plate in turning over the transfers or is being rotated in contact with the inking-rollers in developing the printing-surface. 42 is the main driving-shaft, having a drive-wheel 43, adapted to be connected with a suitable motor. This shaft carries a gear-wheel 44, generally mounted on the shaft near the middle and meshing with an idle gear-wheel 45 on the shaft 46, carried in the frame A. The gear 45 meshes with a small gear-wheel 47 on the shaft 48, which also carries a gear-wheel 49, meshing with the gear-wheel 35 on the shaft 24 of the main inking-roller. By this train of gearing it will be seen that the inking-rollers are actuated, and also, through the gear-wheels 33 and 34, the printing-cylinder 7, when it is in contact with the inking-rollers, as above explained. For the purpose of actuating the setting-up plate and the printing-cylinder when they are in contact I arrange on the shaft 42 a hollow shaft 50 about half as long as the shaft 42. This shaft 50 carries a gear-wheel 51, meshing with the gear-wheel 18 on the shaft 1, carrying the setting-up plate. A friction-clutch 52, mounted on the shaft 42 between the gear-wheel 44 and the inner end of the hollow shaft 50, serves to lock either gear-wheel 44 or the hollow shaft 50 on the drive-shaft 42. This clutch is operated by a lever 53, pivoted on the cross-brace 54, and having a bifurcated end 55, engaged by lugs on a nut 56, mounted on the threaded shaft 57. This shaft carries a beveled gear-wheel 58, operated by the beveled

gear-wheel 59 on the shaft 60, turned by the hand-wheel 61.

In order that the setting-up plate may be stuck up at the operator's table apart from the machine, I make it removable from its supporting-cylinder and provide for it an accurate preestablished seat on its supporting-cylinder. To this end I preferably provide the setting-up plate with slotted angle-pieces 62, adapted to be received in corresponding recesses 63 in the supporting-cylinder 2, whereby when the setting-up plate is in place on its cylinder it is always in identically the same place and cannot slip, and I lock it in place by means of the screw-bolts 64, pivoted to the supporting-cylinder. These bolts are adapted to enter the slots in the angle-pieces 62, and by means of their nuts 65, which are screwed down tight against the angle-pieces, securely hold the setting-up plate in place. The angle-pieces or lugs 62 and their recesses 63 also serve to insure that the removable setting-up plate shall always be mounted in exactly the same place on its support, thus cooperating in the attainment of the required register of the setting-up plate and the printing-surface. Of course the lugs 62 and recesses 63 or equivalent projections and recesses may be reversed as to their location on the setting-up plate and its support.

Inasmuch as the supporting-cylinder 2 may be made considerably larger than the printing-cylinder, the setting-up plate 3 may be of less circumferential extent than its supporting-cylinder, as shown in Figs. 5 and 6. This arrangement is convenient, as it enables the setting-up plate to be easily withdrawn radially from its supporting-cylinder without disturbing said cylinder. It is important, however, when the setting-up plate and the printing-cylinder are rolling one over the other, that they be supported evenly throughout the entire rotation of both, especially when the setting-up plate and its supporting-cylinder are designed and arranged to rotate continuously in operation, as in the machine shown in the drawings. To provide for this, I employ a shoe or shoes suitably fixed on the supporting-cylinder to bridge the space between the side edges of the setting-up plate. I prefer to employ two shoes, one at each end of such cylinder. The shoes are generally made adjustable and are curved to correspond with the curve of the setting-up plate, so that when the latter is in place and the shoes are once adjusted the printing-cylinder will roll from the setting-up plate upon the shoes and then on round and upon the setting-up plate, always evenly and smoothly and without jar. In the drawings, 66 designates these shoes, held firmly in place by the adjusting-screws 67, passing through the brackets 68 on the interior of the cylinder, and by the set-screws 69.

While I have herein shown and described a particular form of machine embodying the various features and combination of features

embraced within my invention, it is to be understood that my invention is not limited to this particular machine. Various changes in the form and arrangement of parts may be made without departing from the scope of my invention. Furthermore, believing that my invention is the first to contemplate the use of a rounded or curved setting-up plate which operates by rolling contact to turn over transfers upon a printing-surface of any description, whether curved or flat, I wish it clearly understood that any curved or rounded setting-up plate is within the scope of my invention. Such a setting-up plate may be utilized in connection with a curved lithographic or planographic surface, and also in connection with flat lithographic or planographic surfaces such as have been heretofore in use. Again, in effecting the rolling contact of the curved or rounded setting-up plate and the printing-surface it is only necessary that one of these contacting parts should roll. One may roll and the other be stationary, and if both are curved both may roll or one be stationary while the other rolls around it. The printing-surface may in its development into a printing-surface be deeply etched or otherwise developed into a relief or an intaglio printing-surface.

While it is of course important that the contact of the printing-surface with the curved setting-up plate 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. Again, while I make use of a marked tooth and a marked recess in the intermeshing gears as preestablished guides to bring the printing-surface and setting-up plate into accurate predetermined cooperating relation, it will be obvious that various other devices may be used for this purpose. In accomplishing the desired rolling contact of the setting-up plate and printing-surface the intermeshing gears may be entirely dispensed with and mere frictional contact of the setting-up plate and printing-surface or other expedients resorted to.

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

1. For a machine for making a printing-surface, a curved or rounded setting-up plate constructed to carry the design upon its exterior surface.

2. For a machine for making a printing-surface, a curved or rounded setting-up plate constructed to carry the design upon its exterior surface, said exterior surface being non-expansible and non-contractible.

3. For a machine for making a printing-surface, a rigid curved or rounded setting-up plate having its exterior surface non-expansible and non-contractible.

4. For a machine for making a printing-surface, a rotating support and a rigid curved or rounded setting up plate mounted thereon so

as to rotate therewith and having its exterior surface non-expansible and non-contractible.

5. In a machine for making a printing-surface the combination of a curved or rounded setting-up plate having a non-expansible and non-contractible exterior surface, a printing surface or plate and means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

6. For a machine for making a printing-surface, a rigid curved or rounded setting-up plate.

7. For a machine for making a printing-surface, a rotating curved or rounded setting-up plate constructed to carry the design upon its exterior surface.

8. For a machine for making a printing-surface, a rotating support and a removable and replaceable curved or rounded setting-up plate mounted thereon so as to rotate therewith, and constructed to carry the design upon its exterior surface.

9. For a machine for making a printing-surface, a rotating support having a seat for a setting-up plate accurately established both longitudinally and circumferentially and a curved or rounded setting up plate removably and replaceably mounted thereon so as to rotate with the support.

10. For a machine for making a printing-surface, a rotating support and a rigid curved or rounded setting-up plate mounted thereon so as to rotate therewith.

11. For a machine for making a printing-surface, a rotating support having a seat for a setting-up plate accurately preestablished both longitudinally and circumferentially, and a rigid curved or rounded setting-up plate removably and replaceably mounted thereon so as to rotate therewith.

12. For a machine for making a printing-surface, a supporting-cylinder and a removable curved or rounded setting-up plate adapted to be supported thereon, said setting-up plate being of less circumferential extent than the supporting-cylinder and one or more shoes curved to correspond with the curve of the setting-up plate and bridging the space between its edges on the said cylinder.

13. For a machine for making a printing-surface, a supporting-cylinder and a removable curved or rounded setting-up plate adapted to be supported thereon, said cylinder having recesses 63 and bolts 64, and said setting-up plate having slotted angle-pieces 62, and being of less circumferential extent than the supporting-cylinder, and one or more shoes curved to correspond with the curve of the setting-up plate and bridging the space between its edges on the said cylinder.

14. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a curved or rounded printing surface or plate and means for bringing them together in rolling contact, whereby a transfer may be turned over from the set-

ting-up plate upon the printing surface or plate.

15. In a machine for making a printing-surface, the combination of a curved or rounded
5 setting-up plate and a printing surface or plate and means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

10 16. In a machine for making a printing-surface, the combination of a rotating curved or rounded setting-up plate and a printing surface or plate and means for bringing them together in rolling contact, whereby a transfer
15 may be turned over from the setting-up plate upon the printing surface or plate.

17. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a rotating curved or rounded printing surface or plate and means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

25 18. In a machine for making a printing-sur-
face, the combination of a rotating curved
or rounded setting-up plate and a rotating
curved or rounded printing surface or plate
and means for bringing them together in roll-
30 ing contact, whereby a transfer may be turned
over from the setting-up plate upon the print-
ing surface or plate.

19. In a machine for making a printing-surface, the combination of a rotating curved or rounded setting-up plate and a printing surface or plate and means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

40 20. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a curved or rounded printing surface or plate means for bringing them together in rolling contact, and means
45 for applying pressure to said contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

21. In a machine for making a printing-sur-
50 face, the combination of a rotating curved or
rounded setting-up plate and a printing sur-
face or plate means for bringing them together
in rolling contact, and means for applying
pressure to said contact, whereby a transfer
55 may be turned over from the setting-up plate
upon the printing surface or plate.

60 22. In a machine for making a printing-surface, the combination of a rotating curved or rounded setting-up plate and a printing surface or plate means for bringing them together in rolling contact, and means for applying pressure to said contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

65 23. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a rotating curved or

rounded printing surface or plate means for bringing them together in rolling contact, and means for applying pressure to said contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate. 70

24. In a machine for making a printing-surface, the combination of a rotating curved 75 or rounded setting-up plate and a rotating curved or rounded printing surface or plate means for bringing them together in rolling contact, and means for applying pressure to said contact, whereby a transfer may be 80 turned over from the setting-up plate upon the printing surface or plate.

25. In a machine for making a printing-surface, the combination of a rotating curved or rounded setting-up plate and a rotating cylindrical printing surface or plate means for bringing them together in rolling contact, and means for applying pressure to said contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate.

26. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a printing surface or plate, means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate, and preestablished guides with reference to which the printing-surface and the setting-up plate can be arranged in an accurate predetermined co-operating relation both longitudinally and transversely.

27. In a machine for making a printing-surface, the combination of a curved or rounded setting-up-plate and a curved or rounded printing surface or plate, means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate, and pre-established guides with reference to which the printing-surface and the setting-up plate can be arranged in an accurate predetermined coöperating relation both longitudinally and transversely.

28. In a machine for making a printing-surface, the combination of a rotating curved or rounded setting-up plate and a rotating curved or rounded printing surface or plate means for bringing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing-surface or plate, and preestablished guides with reference to which the printing-surface and the setting-up plate can be arranged in an accurate predetermined coöperating relation both longitudinally and transversely.

29. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a curved or rounded printing surface or plate, means for bringing them together in rolling contact, and means for applying pressure to said contact, whereby a transfer may be turned over from the

setting-up plate upon the printing-surface, and preestablished guides with reference to which the printing-surface and the setting-up plate can be arranged in an accurate predetermined cooperating relation both longitudinally and transversely.

30. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a rotating cylindrical printing surface or plate means for bringing them together in rolling contact, and means for applying pressure to said contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate, and preestablished guides with reference to which the printing-surface and the setting-up plate can be arranged in an accurate predetermined cooperating relation both longitudinally and transversely.

31. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate, a form-cylinder carrying a removable printing-surface, means for bringing together said setting-up plate and said printing-surface into firm rolling contact, and means for separating the form-cylinder and the setting-up plate whereby the printing-surface may be removed from the machine.

32. In a machine for making a printing-surface, the combination of a supporting-cylinder carrying a removable curved or rounded setting-up plate, a form-cylinder carrying a removable printing-surface, means for bringing together said setting-up plate and said printing-surface into firm rolling contact, and means for separating the form-cylinder and the setting-up plate whereby the printing-surface may be removed from the machine and the setting-up plate may be removed from its supporting-cylinder.

33. In a machine for making a printing-surface, the combination of a form-cylinder, adapted to be moved into and out of working position and supported in bearing-boxes, a pair of lifting-arms connected with said bearing-boxes and adapted to lift the form-cylinder clear of the frame of the machine, and a rotatable shaft for operating the lifting-arms and connected therewith by links pivotally connected with the shaft and with the lifting-arms.

34. In a machine for making a printing-surface, the combination of a form-cylinder adapted to be moved into and out of working position and supported in bearing-boxes, a pair of lifting-arms connected with said bearing-boxes and adapted to lift the form-cylinder clear of the frame of the machine, and a rotatable shaft for operating the lifting-arms and connected therewith by links pivotally connected with the shaft and with the lifting-arms, and a hand-shaft having a worm for turning said shaft.

35. In a machine for making a printing-surface, the combination of a form-cylinder adapted to be moved into and out of working position and supported in bearing-boxes, a

pair of lifting-arms connected with said bearing-boxes, and adapted to lift the form-cylinder clear of the frame of the machine, slides supported in the frame of the machine and connected with the lifting-arms, and a rotatable shaft for operating the slides and connected therewith by links pivotally connected with the shaft and with the slides.

36. In a machine for making a printing-surface, the combination of a form-cylinder adapted to be moved into and out of working position and supported in bearing-boxes, a pair of lifting-arms connected with said bearing-boxes, slides supported in the frame of the machine, and connected with the lifting-arms, and a rotatable shaft for operating the slides and connected therewith by links pivotally connected with the shaft and with the slides, and a hand-shaft having a worm for turning said shaft.

37. In a machine for making a printing-surface, the combination of a form-cylinder adapted to be moved into and out of working position and supported in bearing-boxes, a pair of lifting-arms connected with said bearing-boxes, and a rotatable shaft for operating the lifting-arms and connected therewith by links pivotally connected with the shaft and with the lifting-arms, one of said lifting-arms having a joint whereby it may be turned down out of the way when the printing-surface is to be removed.

38. In a machine for making a printing-surface, the combination of a form-cylinder adapted to be moved into and out of working position and supported in bearing-boxes, a pair of lifting-arms connected with said bearing-boxes, slides supported in the frame of the machine and connected with the lifting-arms, and a rotatable shaft for operating the slides and connected therewith by links pivotally connected with the shaft and with the slides, one of said lifting-arms being pivoted to its slide whereby it may be turned down out of the way when a printing-surface is to be removed.

39. In a machine for making a printing-surface, the combination of a form-cylinder adapted to be moved into and out of working position and supported in bearing-boxes, a pair of lifting-arms connected with said bearing-boxes, slides supported in the frame of the machine and connected with the lifting-arms, and a rotatable shaft for operating the slides and connected therewith by links pivotally connected with the shaft and with the slides, and a hand-shaft having a worm for turning said shaft, one of said lifting-arms being pivoted to its slide whereby it may be turned down out of the way when a printing-surface is to be removed.

40. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate, a form-support having an accurate preestablished seat for the printing-surface, a removable and replaceable printing-surface mounted in said seat, preestab-

lished guides with reference to which the printing-surface and the setting-up plate may be arranged in accurate predetermined cooperating relation both longitudinally and transversely, means for bringing the setting-up plate and printing-surface together in rolling contact and means for separating the form-support and setting-up plate whereby the printing-surface may be removed from the machine.

41. In a machine for making a printing-surface, the combination of a supporting-cylinder having an accurate preestablished seat for a setting-up plate, a removable and replaceable curved or rounded setting-up plate mounted in said seat, a form-support having an accurate preestablished seat for a printing-surface, a removable and replaceable printing-surface mounted in said seat, preestablished guides with reference to which a printing-surface and a setting-up plate may be arranged in accurate predetermined cooperating relation both longitudinally and transversely, means for bringing the setting-up plate and printing-surface together in rolling contact, and means for separating said supporting-cylinder and said form-support whereby the printing-surface and setting-up plate may be removed from the machine.

42. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate, a form-support carrying a removable printing-surface, means for bringing together said setting-up plate and said printing-surface into firm rolling contact, water-rollers and inking-rollers adapted to be moved to and from the printing-surface and out of the way of the printing-surface, and means for separating the form-support and the setting-up plate whereby the printing-surface may be removed from the machine.

43. In a machine for making a printing-surface, the combination of a supporting-cylinder carrying a removable curved or rounded setting-up plate, a form-support carrying a removable printing-surface, means for bringing together said setting-up plate and said printing-surface into firm rolling contact, water-rollers and inking-rollers adapted to be moved to and from the printing-surface, and out of the way of the printing-surface, and means for separating the form-support and the setting-up plate whereby the printing-surface may be removed from the machine, and the setting-up plate may be removed from its supporting-cylinder.

44. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate, a form-support carrying a printing-surface, and means for bringing together said printing surface or plate and said setting-up plate into firm rolling contact, a swinging frame carrying inking-rollers, and means for shifting the printing-surface from contact with the setting-up plate into contact with the inking-rollers.

45. In a machine for making a printing-sur-

face, the combination of a curved or rounded setting-up plate, a form-support carrying a printing-surface means for bringing together said printing surface or plate and said setting-up plate into firm rolling contact, a swinging frame carrying inking-rollers, means for shifting the printing-surface from contact with the setting-up plate into contact with the inking-rollers, and gearing for driving the printing-surface both when in contact with the setting-up plate and when in contact with the inking-rollers.

46. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate, a form-support carrying a removable printing-surface, means for bringing together said printing surface or plate and said setting-up plate into firm rolling contact, a swinging frame carrying inking-rollers, means for shifting the printing-surface from contact with the setting-up plate into contact with the inking-rollers, and means for moving the inking-frame out of the way whereby the printing-surface may be removed from the machine.

47. In a machine for making a printing-surface, the combination of a removable curved or rounded setting-up plate a form-support carrying a printing-surface, means for bringing said printing-surface and said setting-up plate together into firm rolling contact, a swinging frame carrying inking-rollers, and means for shifting the printing-surface from contact with the setting-up plate into contact with the inking-rollers.

48. In a machine for making a printing-surface, the combination of a shaft carrying a supporting-cylinder, a setting-up plate on said supporting-cylinder, a gear-wheel fast on the shaft of said cylinder, a movable shaft carrying a form-cylinder, a printing surface or plate on said form-cylinder adapted to be brought into firm rolling contact with the setting-up plate, a printing surface or plate on said form, a gear-wheel on the shaft of said form-cylinder a frame carrying inking-rollers and a gear-wheel, the gear-wheel on the shaft of the printing-form adapted to mesh with the gear-wheel on the inking-frame and also with the gear-wheel on the shaft of said supporting-cylinder according to whether the printing-surface is in contact with the inking-rollers or is in contact with the setting-up plate, means for shifting the form-cylinder so that the printing-surface may be in contact with either the setting-up plate or the inking-rollers, a driving-shaft, and means for throwing it into gear with the gear-wheel of the form-cylinder in conjunction with either the setting-up plate or the inking-rollers, according as it is desired to operate the printing-surface in connection with either.

49. In a machine for making a printing-surface, the combination of a shaft carrying a supporting-cylinder, a removable setting-up plate on said supporting-cylinder, a gear-wheel fast on the shaft of said cylinder, a

movable shaft carrying a form-cylinder, a printing surface or plate on said form-cylinder adapted to be brought into firm rolling contact with the setting-up plate, a gear-wheel 5 on the shaft of said form-cylinder, a frame carrying inking-rollers and a gear-wheel, the gear-wheel on the shaft of the form-cylinder adapted to mesh with the gear-wheel on the inking-frame and also with the gear-wheel 10 on the shaft of said supporting-cylinder according to whether the printing-surface is in contact with the inking-rollers or is in contact with the setting-up plate, means for shifting the form-cylinder so that the printing-surface may be in contact with either the setting-up plate or the inking-rollers, a driving-shaft, and means for throwing it into gear with the gear-wheel of the form-cylinder in conjunction with either the setting-up plate 20 or the inking-rollers according as it is desired to operate the printing-surface in connection with either.

50. In a machine for making a printing-surface, the combination of a shaft carrying a 25 supporting-cylinder, a removable setting-up plate on said supporting-cylinder, a gear-wheel fast on the shaft of said cylinder, a movable shaft carrying a form-cylinder, a removable printing surface or plate on said form-cylinder adapted to be brought into firm rolling 30 contact with the setting-up plate, a gear-wheel on the shaft of said form-cylinder, a swinging frame carrying inking-rollers and a gear-wheel, means for moving the swinging frame and the inking-rollers out of the way, the gear-wheel on the shaft of the form-cylinder adapted to mesh with the gear-wheel on the inking-frame and also with the gear-wheel on the shaft of said supporting-cylinder according 40 to whether the printing-surface is in contact with the inking-rollers or is in contact with the setting-up plate, means for shifting the form-cylinder so that the printing-surface may be in contact with either the setting-up plate or the inking-rollers, a driving-shaft, 45 and means for throwing it into gear with the gear-wheel of the form-cylinder in conjunction with either the setting-up plate or the inking-rollers according as it is desired to operate the printing-surface in connection with 50 either.

51. In a machine for making a printing-surface, the combination of a shaft carrying a supporting-cylinder, a removable setting-up 55 plate on said supporting-cylinder, a gear-wheel fast on the shaft of said cylinder, a movable shaft carrying a form-cylinder, a removable printing surface or plate on said form-cylinder adapted to be brought into firm rolling 60 contact with the setting-up plate, a removable printing surface or plate on said form, a gear-wheel on the shaft of said form-cylinder, a swinging frame carrying inking-rollers and a gear-wheel, means for moving the swinging 65 frame and the inking-rollers out of the way, the gear on the shaft of the form-cylinder adapted to mesh with the gear-wheel on the

inking-frame and also with the gear-wheel on the shaft of said supporting-cylinder according to whether the printing-surface is in contact with the inking-rollers or is in contact 70 with the setting-up plate, means for shifting the form-cylinder so that the printing-surface may be in contact with either the setting-up plate or the inking-rollers, a driving-shaft, 75 and means for throwing it into gear with the gear-wheel of the form-cylinder in conjunction with either the setting-up plate or the inking-rollers, according as it is desired to operate the printing-surface in connection 80 with either, water-rollers and means for moving them out of the way.

52. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a printing surface or 85 plate and means for bringing them together in rolling contact whereby a transfer may be turned over from the setting-up plate upon the printing-surface.

53. In a machine for making a printing-surface, the combination of a curved or rounded 90 setting-up plate, a printing surface or plate and means for bringing them together in rolling contact and means for applying pressure to said contact, whereby a transfer may be 95 turned over from the setting-up plate upon the printing-surface.

54. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate and a printing surface or 100 plate and means for bringing them together in rolling contact whereby a transfer may be turned over from the setting-up plate upon the printing-surface, and intermeshing gear-teeth for said setting-up plate and said printing-surface. 105

55. In a machine for making a printing-surface, the combination of a curved or rounded setting-up plate, a printing surface or plate 110 and means for bringing them together in rolling contact and means for applying pressure to said contact, whereby a transfer may be turned over from the setting-up plate upon the printing-surface, and preestablished 115 guides with reference to which a printing-surface and a setting-up plate may be brought together in accurate predetermined cooperating relation both longitudinally and transversely.

56. For a machine for making a printing-surface, the curved or rounded support and 120 a curved or rounded setting-up plate removably mounted thereon, said support and said setting-up plate being provided with corresponding interlocking projections and recesses whereby, when secured together, their 125 relative position with respect to each other will always be identical for the purpose of attaining accurate register in the operation of transferring.

57. In a machine for making a printing-surface, the combination of a curved or rounded 130 setting-up plate and a curved or rounded printing surface or plate and means for bring-

ing them together in rolling contact, whereby a transfer may be turned over from the setting-up plate upon the printing surface or plate and preestablished guides with reference to which a printing-surface and a setting-up plate may be brought together in accurate predetermined cooperating relation both longitudinally and transversely.

58. In a machine for making a printing-surface, the combination of a suitable support having an accurate preestablished seat thereon for a setting-up plate, a curved or rounded setting-up plate removably and replaceably mounted therein, a support having an accurate preestablished seat for a printing surface or plate, a removable and replaceable print-

ing surface or plate mounted therein, means for bringing a setting-up plate and printing-surface together in rolling contact, and preestablished guides with reference to which a printing-surface and a setting-up plate may be brought together in accurate predetermined cooperating relation both longitudinally and transversely.

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

EDWARD HETT.

Witnesses:

JEAN KENNEDY,
SIDNEY MANN.