No. 757,248. PATENTED APR. 12, 1904.

H. M. BARBER.

SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

APPLICATION FILED JUNE 30, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

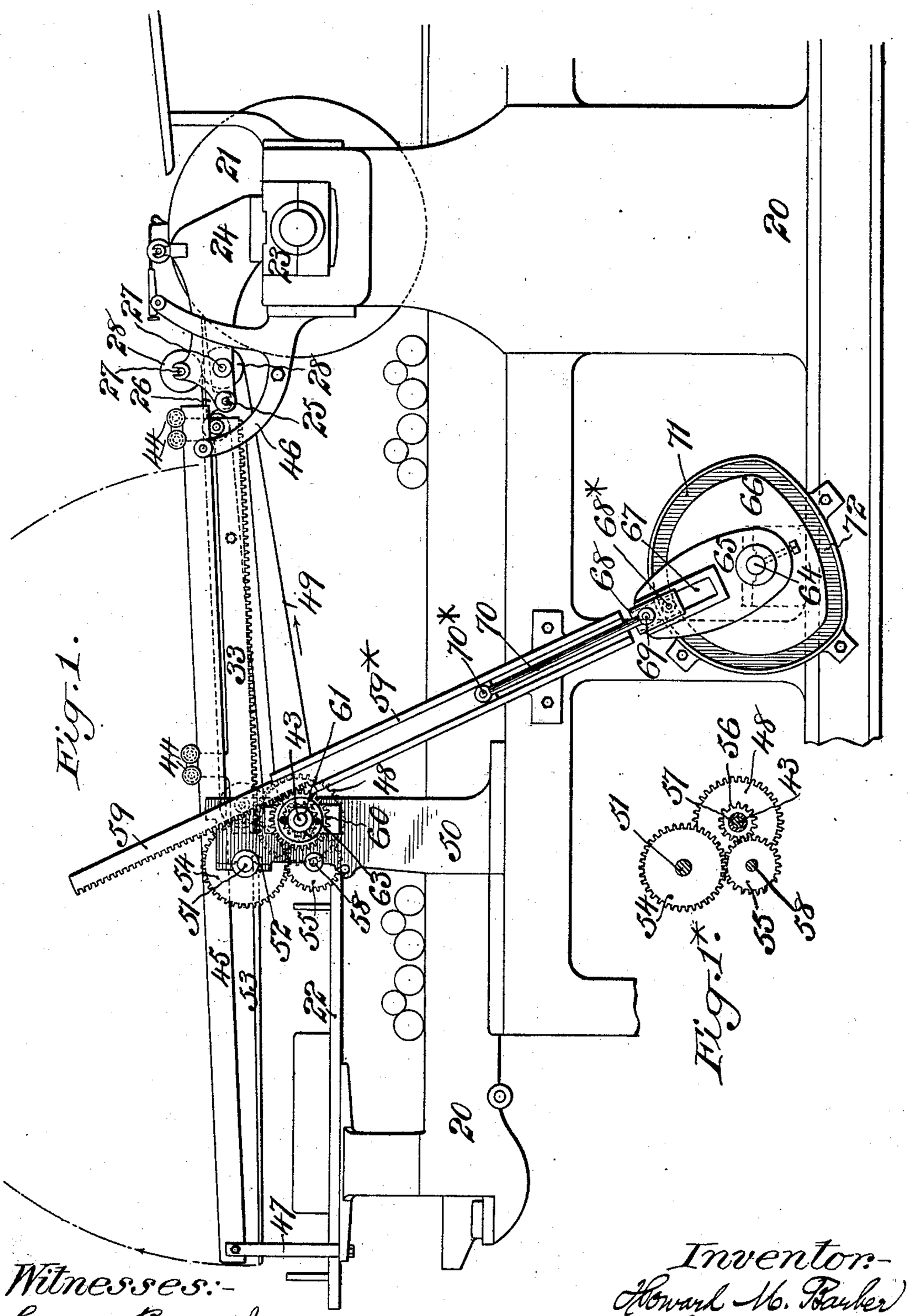

Fig. 1.

Fig. 1*.

Witnesses:-
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Henry Thieme.

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by attorneys
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NO MODEL. 5 SHEETS—SHEET 2.

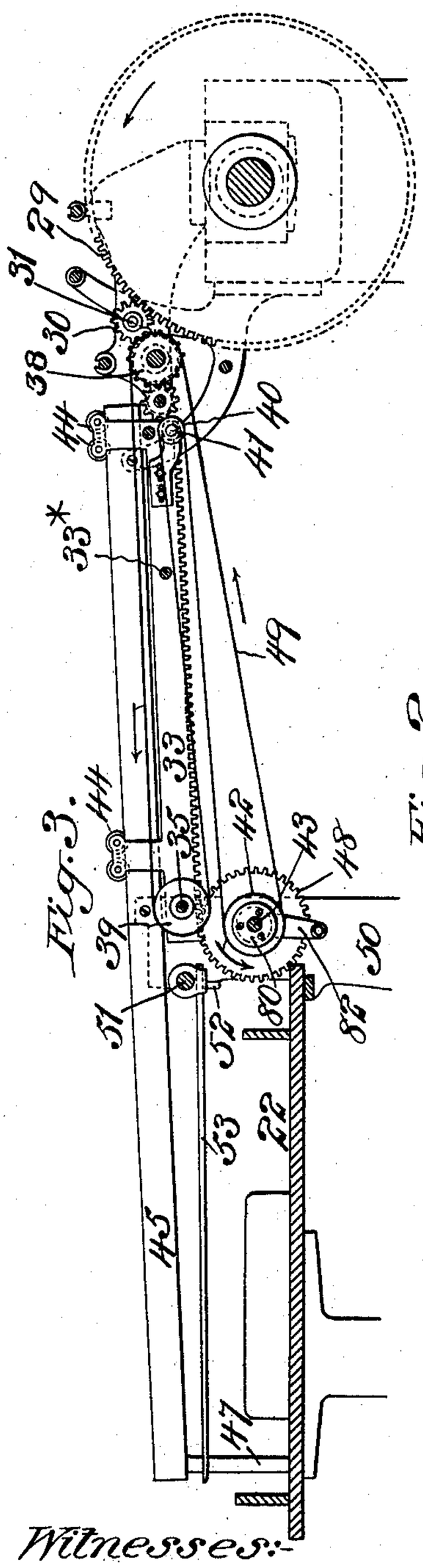

Fig. 3.

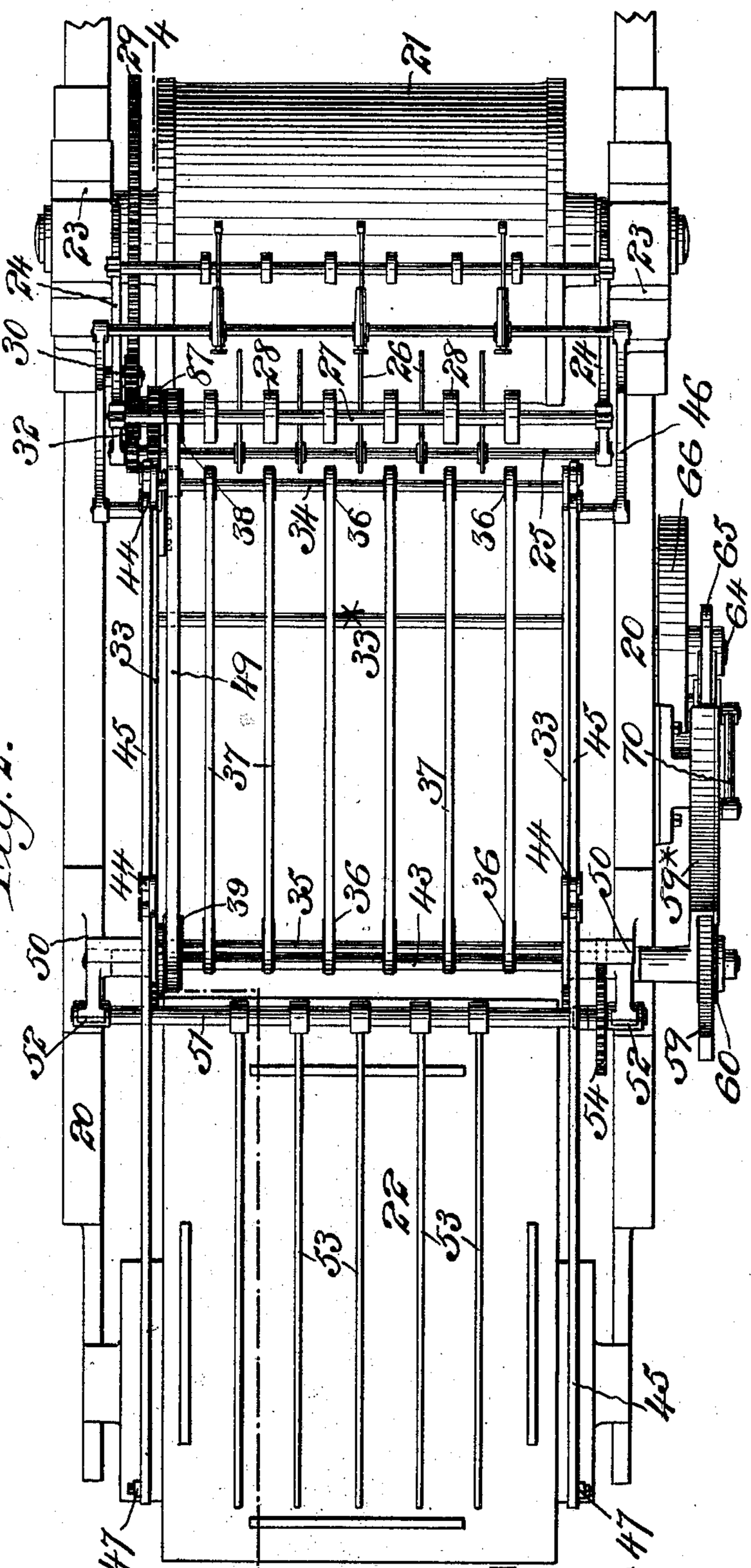

Fig. 2.

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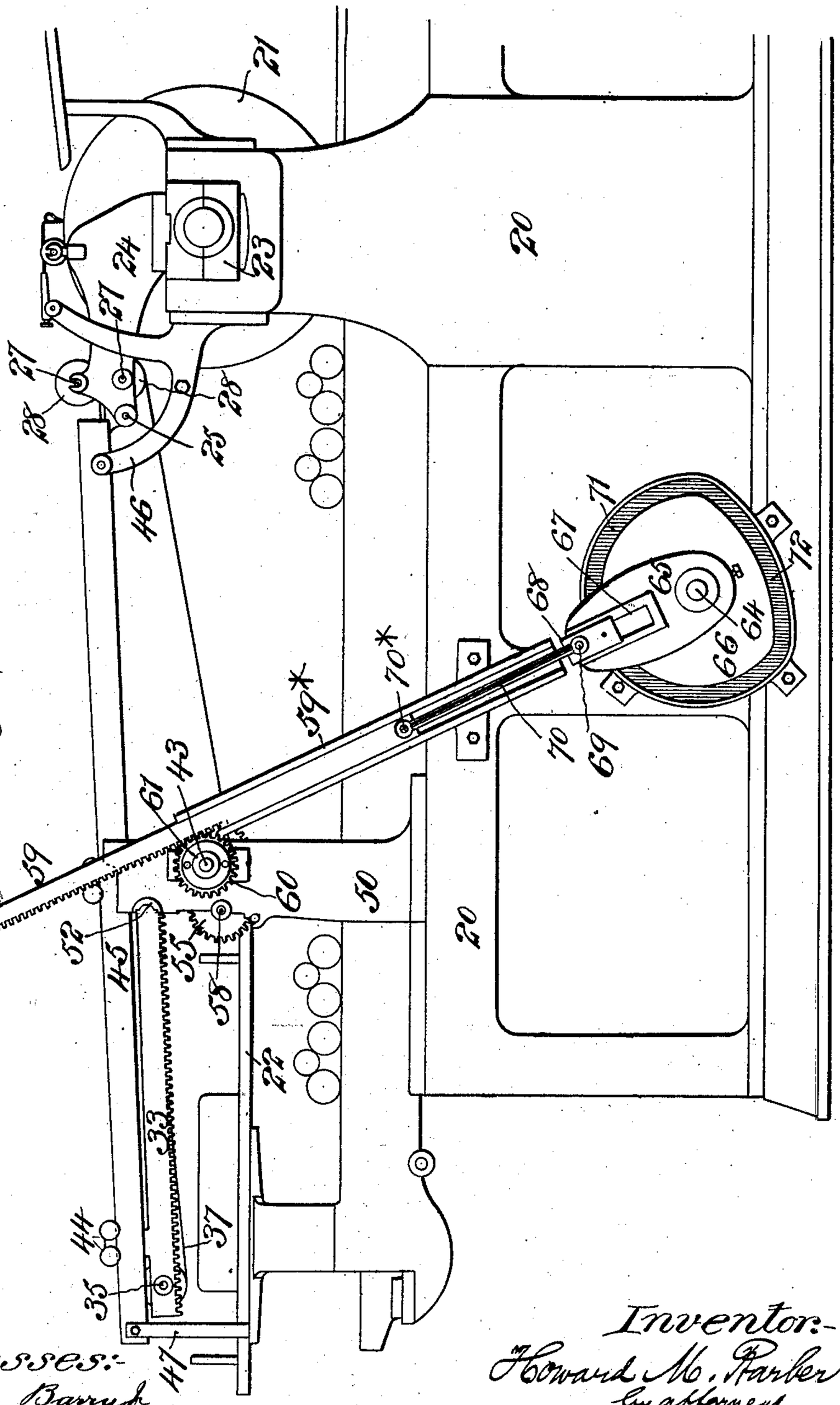
NO MODEL. 5 SHEETS—SHEET 3.



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NO MODEL. 5 SHEETS—SHEET 4.

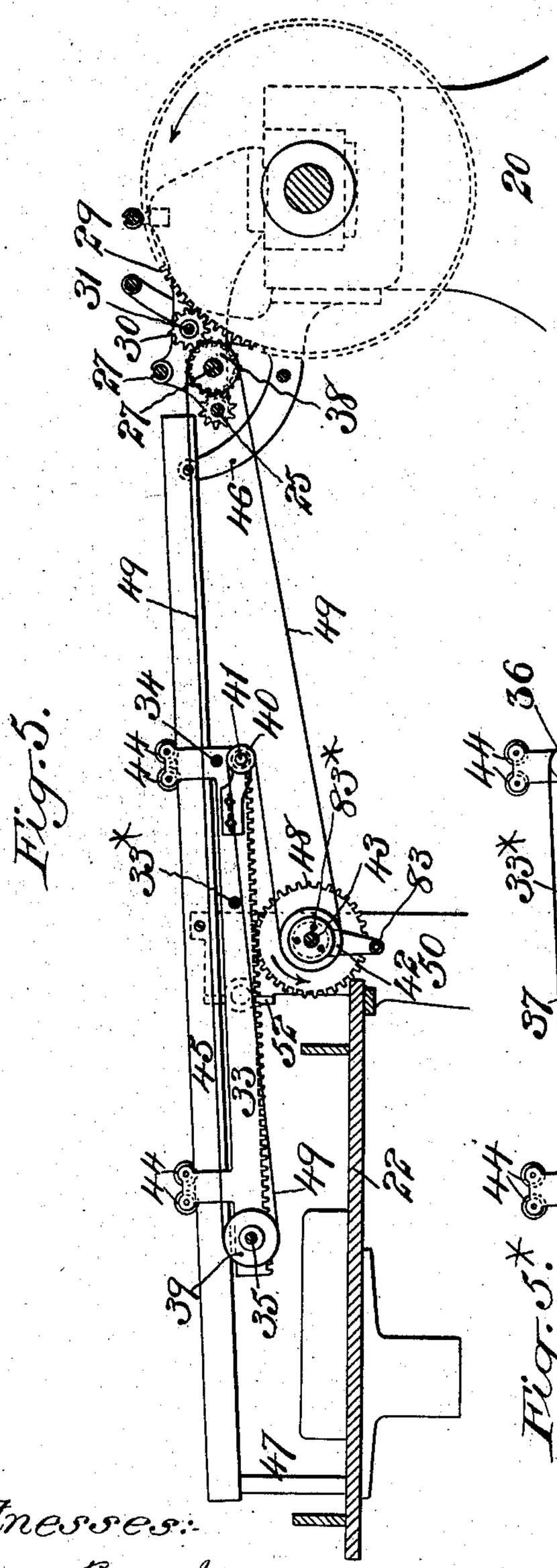

Fig. 5.

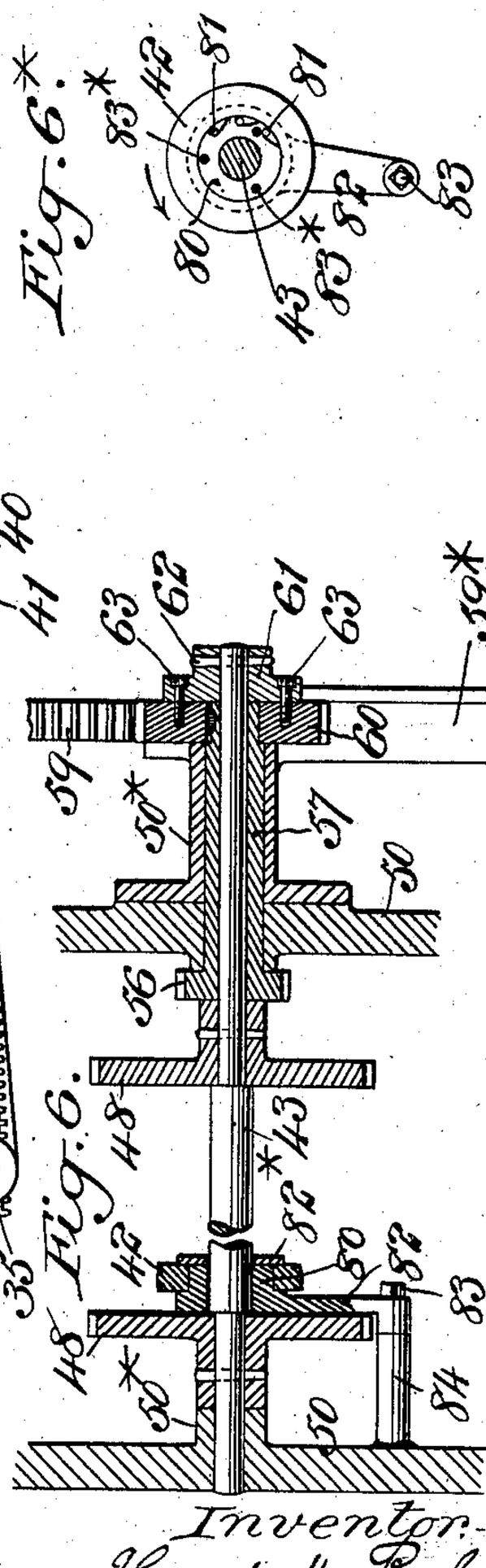

Fig. 5*.

Fig. 6.

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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 10.

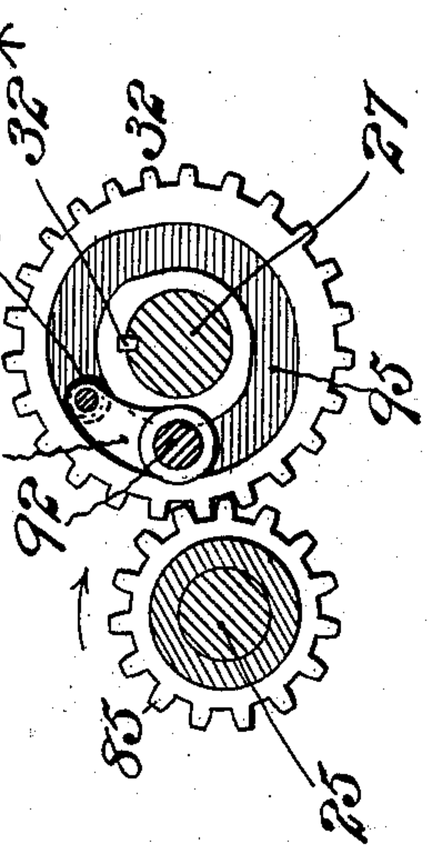


Fig. 11.

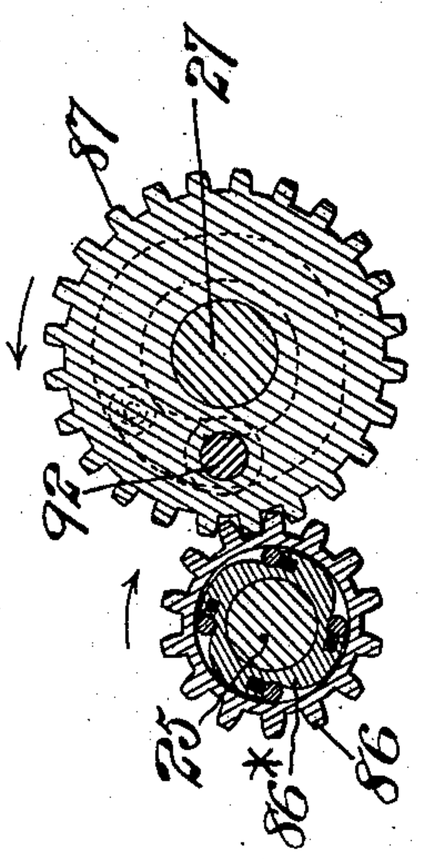


Fig. 12.

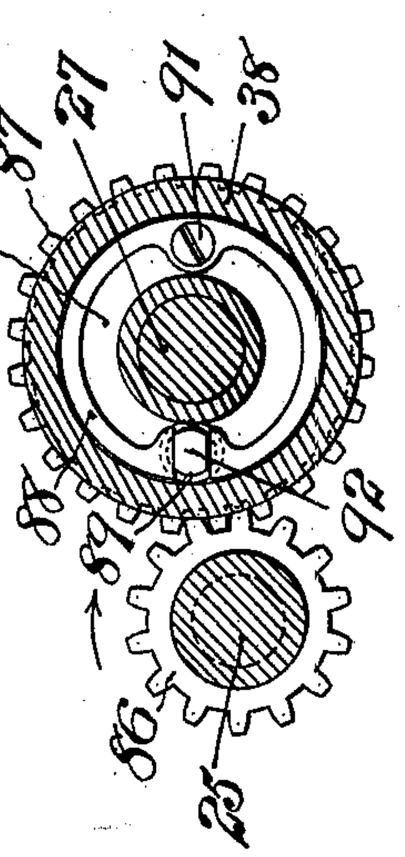


Fig. 7.

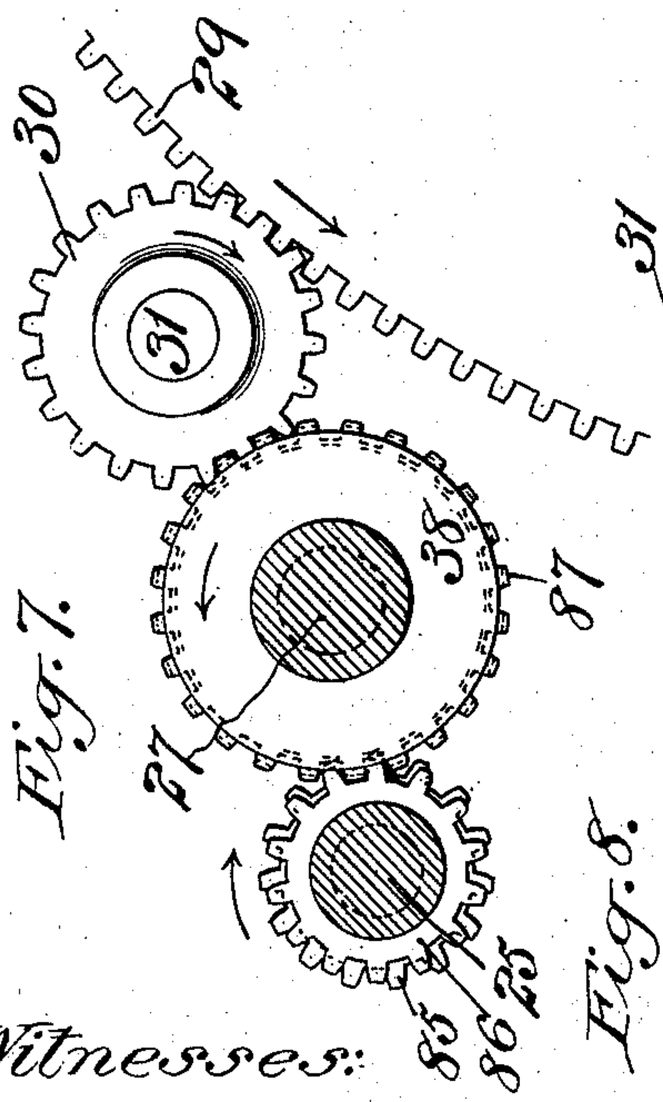


Fig. 8.

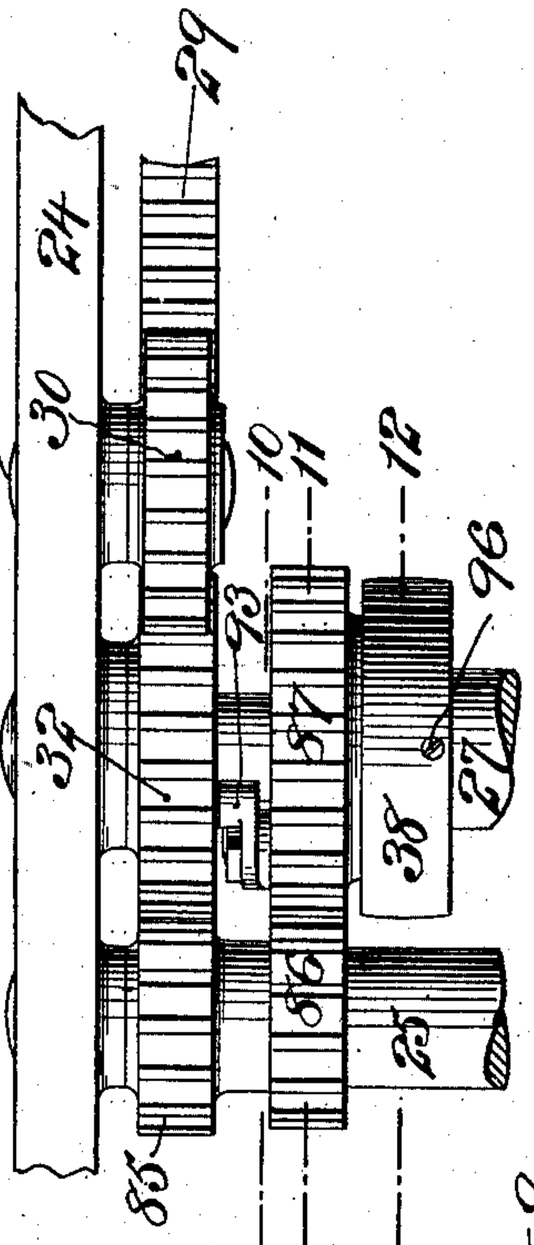
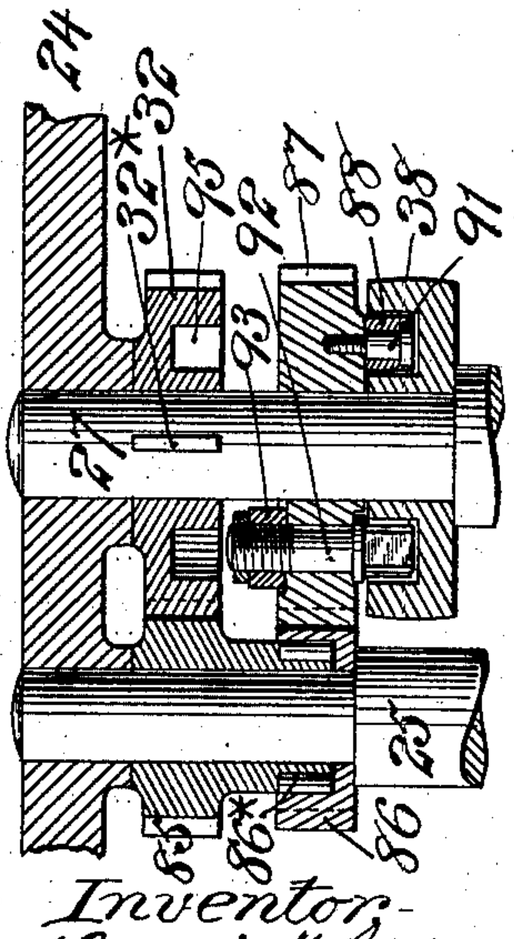


Fig. 9.



Witnesses:
George Barry Jr
Henry F. Thieme.

Inventor:
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Brown & Seward

No. 757,248. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

HOWARD M. BARBER, OF STONINGTON, CONNECTICUT, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SHEET-DELIVERY MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 757,248, dated April 12, 1904.

Application filed June 30, 1903. Serial No. 163,676. (No model.)

To all whom it may concern:

Be it known that I, HOWARD M. BARBER, a citizen of the United States, and a resident of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Sheet-Delivery Mechanism for Printing-Machines, of which the following is a specification.

The object of this invention is to provide, in a printing-machine, for the delivery of the printed sheet either side upward, as may be desired; and to this end the invention consists in certain novel devices and combinations hereinafter described and claimed, including an oscillating fly for the delivery of the sheets upon a suitable receptacle, as a receiving-table, with their freshly-printed sides downward and a sheet-carriage which has a reciprocating or to-and-fro motion between the impression-cylinder and such receptacle for the delivery of the sheets upon such receptacle with their printed sides upward.

Figure 1 is a side elevation of a two-revolution printing-machine having applied to it an oscillating fly and a reciprocating sheet-carriage for interchangeable use according to my invention and showing the fly-delivery in operation; Fig. 1*, a side view of gearing for operating the fly-delivery; Fig. 2, a plan corresponding with Fig. 1; Fig. 3, a longitudinal vertical sectional view taken about in the line 3 4 of Fig. 2, showing the fly operative; Fig. 4, a side elevation of the machine with the reciprocating carriage operative, the fly being then taken away; Fig. 5, a longitudinal sectional view taken in the line 3 4 of Fig. 2 and showing the carriage operative; Fig. 5*, a longitudinal sectional view of the reciprocating carriage and of its contained endless-tape carrier; Fig. 6, a longitudinal view of a shaft which serves to operate both the fly and the carriage, the gearing on said shaft being shown in section. Fig. 6* represents a transverse section of said shaft and a face view of a pulley and clutch thereon, which will be hereinafter described. Fig. 7 is a side view, partly in section, of the gearing for driving the tape-carrier; Fig. 8, a plan corresponding with Fig. 7; Fig. 9, a horizontal section of portions of said gearing. Figs. 10, 11, 12 represent vertical sections taken, respectively, in the lines 10, 11, 12 of Fig. 8.

20 designates the main framing of the machine; 21, the impression-cylinder; 22, the table for receiving the sheets from the delivery apparatus, said table being stationary at a suitable distance in front of the cylinder.

On the tops of the cylinder journal-boxes 23 are brackets 24, which support the rod or shaft 25, carrying the stripping-fingers 26, and in which are the bearings for the two shafts 27 of the usual delivery-pulleys 28. The lower one of the shafts 27 derives constant rotary motion in the usual way from the gear 29 on the cylinder through a gear 30, which turns on a stud 31, carried by one of the brackets 24, said gear 30 gearing both with said gear 29 and with a gear 32 on the said shaft 27 of the lower delivery-pulleys 28.

The reciprocating sheet-carriage consists, as shown in Figs. 2, 3, 4, 5, 5*, of parallel side bars 33 and a connecting cross-bar 33*, the said side bars being furnished with rollers 44, which run on stationary ways 45, supported partly on brackets 46, carried by the main framing 20, and partly on stands 47, erected on the front part of the receiving-table 22. The said ways 45 are represented as having a slight downward inclination from the cylinder toward the receiving-table. The said side bars 33 have on their lower edges toothed racks which engage for the purpose of imparting the reciprocating motion to the carriage with toothed gears 48 on a horizontal shaft 43, supported in fixed bearings 50* in stands 50 on the main framing. The said carriage contains the endless-tape carrier, which consists of two transverse shafts 34 35, provided with pulleys 36, on which run the tapes 37.

51 is the fly-shaft, arranged over the rear part of the receiving-table 22 in bearings 52 on the stands 50 and having the fingers 53 attached in the usual or any suitable way. The said shaft 51 is driven from a sleeve 57 (see Figs. 1* and 6) on the shaft 43, hereinbefore

mentioned as driving the carriage, and for that purpose it is geared with said shaft by a gear 54 and pinions 55 56, the said pinion 56 being on the sleeve 57 and meshing with the pinion 55, which runs loosely on a fixed stud 58 on one of the stands 50 and meshes with the gear 54. The said sleeve 57 derives the necessary movements in opposite directions alternately for operating either the carriage or the fly, as may be required, from a reciprocating toothed rack-bar 59, which slides in a stationary guide 59*, secured on the framing 20 and which meshes with a pinion 60 (see Figs. 1, 4, and 6) on the sleeve 57. As shown in Fig. 6, the gears 48 for driving the carriage are permanently fastened to the shaft 43, the pinion 56 for driving the fly is permanently fastened on the sleeve 57, and the pinion 60 is keyed firmly on the sleeve, which, together with said pinion, are attached to the shaft 43 in such manner as to be capable of being fastened thereto for driving the carriage or liberated therefrom when the fly and not the carriage is to be used, as will be hereinafter fully explained. The device (represented in Fig. 6) for thus securing the pinion and sleeve to the shaft consists in a collar 61, pinned permanently to the shaft by a pin 62 and secured to the pinion 60 by screws 63, which are removable to liberate the shaft when the fly and not the carriage is to be used, the fly being driven by the sleeve 57 and pinion 56 without any operation of the shaft.

For the purpose of giving the rack-bar 59 such a reciprocating movement as will start the carriage or fly without shock I employ an intermittently-operating crank 65 68 69 on the shaft 64, which corresponds with the cam-shaft commonly employed for operating the fly in a fly-delivery and which makes one revolution for every two of the two-revolution impression-cylinder, the operation of said crank and the intermissions of its operation being controlled by a stationary cam 66, which is fastened upon the framing 20. The arm 65 of the said crank, which is fast on the shaft, is formed, as shown in Figs. 1 and 4, with a slot 67 radial to its shaft, and to this slot is fitted a slide 68, which carries the crank-wrist 69, which is connected with the rack-bar by the rod 70. The said slide carries also a roller 68*, which runs in the groove 71 72 of the cam 66. The upper portion 71 of this groove is in the form of the arc of approximately two hundred and forty degrees of a circle concentric with the shaft 64. The lower portion 72 of said groove is approximately of the form of an arc the radius of which is equal to the length of the connecting-rod 70 and which is struck from the lowest point at which the connection 70* with the rack-bar is desired to reach. As the crank revolves while the roller 66* runs in the part 71 of the cam-groove which is concentric with the shaft the wrist has its full throw, and it produces the full stroke of the rack-bar upward and downward, and so produces the forward movement of the carriage or the fly, whichever is in use, toward the receiving-table and its return movement toward the cylinder; but while the roller is in the part 72 of the cam-groove the crank is inoperative—that is, the rack-bar having no movement the fly or the carriage, whichever is in use, remains for a time at rest after its return movement—and as the roller turns the rounded corners between the parts 71 and 72 of the cam-groove cause the crank-wrist to pass into and out of its operative position so gradually as to stop or start the carriage or fly without shock.

To drive the endless-tape carrier 34 35 36 37 within but independently of the reciprocating carriage, there is provided an endless belt 49, (see Figs. 2, 3, and 5,) which derives motion from a pulley 38 on the shaft 27 of the lower delivery-pulleys 28, the said belt running over a pulley 39 on the front-tape pulley-shaft 35 for thereby driving the tapes and running thence over an idler-pulley 40, turning on a fixed stud 41 on the rear part of the carriage, thence around an idler-pulley 42, (see Figs. 5, 6, and 6*,) which is represented as carried by the shaft 43, though it might turn on a specially-provided fixed pivot, and thence back to its driving-pulley 38. It will be seen in Figs. 2, 3, and 5 that the said belt makes four loops, one around the pulley 38, an upper one around the pulley 39, a lower one around the pulley 42, and an intermediate one around the pulley 40. The said pulley 42 is free to turn on the said shaft in the direction of the arrow shown near it in Figs. 5 and 6*, but prevented from turning in the other direction by any suitable detent. The detent represented consists of a hub 80, which is fitted to the shaft 43 and upon the exterior of which the said pulley 42 is fitted and in the periphery of which there are, as shown in Fig. 6*, a number of ratchet-like notches containing antifriction-balls 81. The said hub 80 is held stationary by an arm 82, which projects from it and which is fastened by a screw 83 to a stud 84, secured in the adjacent stand 50. A collar 82*, which is shown in Fig. 6 secured to the hub 80 by screws 83* for holding the pulley 42 in its place, is omitted in Fig. 6* to expose the ratchet-clutch to view. The purpose of the above-described detent will be rendered intelligible by the description which will be presently given of the operation of the reciprocating carriage.

It is to be understood that the endless-tape carrier is operative within the carriage both when the fly is used and when the reciprocating carriage is used for delivery; but its operation differs in the two cases. In the case of the fly-delivery when the carriage remains stationary in its position near the cylinder the tapes run continuously, their only duty being that of receiving the sheets from the delivery-

wheels 28 and taking them to the proper position over the fly while the latter is thrown back under or between them. In the case of the carriage-delivery when the carriage has its to-and-fro motion between the cylinder and receiving-table and a rest at its position near the cylinder the tapes run forward within but independently of the carriage, while the latter remains at rest. Then while the carriage runs forward to its position over the table the tapes remain stationary within it, and then while the carriage returns toward the cylinder the tapes again run forward within it, and so carry the sheet out from it, leaving the latter free to drop upon the table. These two different operations of the tape-carrier are produced by gearing and clutch mechanism, which is only partly shown in Figs. 1, 2, 3, and 5, but more fully, on a larger scale, in Figs. 7, 8, 9, 10, 11, 12, and which includes the gears 30 and 32 and the pulley 38, hereinbefore described. This gearing and clutch mechanism will now be described. The gear 32 is keyed fast to the shaft 27 by a key 32*, Fig. 9, and meshes with a gear 85, which runs loosely on a fixed axle, which, in this instance, is the stripper-shaft 25. On the hub of this gear 85 there runs a gear 86, between which and the said gear 85 there is a clutch 86*, which couples said gears so that 85 carries 86 only in the direction of the arrows shown opposite them in Figs. 10, 11, 12. The gear 86 meshes with a gear 87, which is loose on the shaft 27. The gears 32 87 are of corresponding size; but the gears 85 86 have different numbers of teeth. In the example shown the gear 86 has one tooth less than 85. The said gear 87 carries on its outer face a clutch 88 (see Figs. 9 and 12) in the form of an elastic ring which has an opening 89 at one point of its periphery and which is received in an annular groove 90 in the inner face of the belt-pulley 38. This clutch-ring, which is attached to the gear 87 by a screw 91, has normally an external diameter slightly smaller than the outer wall of the groove 90, as shown in Fig. 12, that it may be sufficiently loose therein to make it inoperative; but for the purpose of expanding it to couple the pulley to the gear 87 there is inserted through the said gear a pin 92, which has a flattened head which enters, as shown in Fig. 12, into the opening 89 of the clutch-ring. By the turning of this pin 92 on its axis its head operating within said opening 89 so expands the ring that it fits tightly enough in the groove 90 of the pulley for the gear 87 to drive the latter at the proper times, as hereinafter explained. For the purpose of so turning the pin 92 it has securely affixed to it an arm 93, which carries a truck-roller 94, which enters the groove of a cam 95 (see Figs. 9 and 10) on the outer face of the gear 32, which is keyed to the shaft 27.

When the fly-delivery is used and the carriage remains stationary in front of the cylinder, the cross-bar 33* of the carriage serves as the back-rest for the fly. For this delivery the shaft 43 is liberated from the sleeve 57, Fig. 6, by taking out the screws 63, and the pulley 38 is fastened to the shaft 27 by any suitable means—as, for example, by a set-screw 96, (shown in Fig. 8)—and the gears 85 86 87 then run loosely without effect, the difference between the gears 85 86 being compensated for by the clutch 86*. The upper and lower loops of the driving-belt 49 then occupy the positions shown in Fig. 3, being of nearly equal length, and the middle loop is very little shorter. The belt then simply runs continuously on the pulleys 38 39 40 42 in the direction of the arrows shown near it in Fig. 3, and the tapes run forward continuously in the carriage toward the receiving-table. All that has to be done to change to the carriage-delivery is to take out the fly from its bearings 52 to fasten the sleeve 57, Fig. 6, to the shaft 43 by the screws 63 and to loosen the pulley 38 from its shaft 27. The said pulley 38 then receives its motion for driving the belt in the direction just described from the gear 32 through the gears 85 86 87 and clutch 88. This motion then only takes place while the carriage is at rest in front of the cylinder for receiving the sheet, the clutch 88 then being in operation, as hereinbefore described. Just before the carriage begins its forward movement the clutch 88 liberates the pulley 38, which then ceases to drive the belt, and although as the carriage runs forward, as it is represented as doing in Fig. 5, the portion of the belt between the pulleys 42 and 41 runs toward pulley 39 over pulley 38, which is now free to revolve on shaft 27 with a tendency to slacken and stop travel of tapes, but not to drive them in opposite direction by said pulley 39, because the friction of the carrier in the carriage is more than the friction of pulleys 44 and 38 on their said bearings, which are shafts 27 and 43. Hence as the tapes do not run in the carriage, but only travel with it, the sheet simply lies upon them until the carriage completes its outward movement. During the time that the carriage is returning toward the cylinder the clutch 88 still leaves the pulley 38 disengaged, and although this movement of the carriage might develop a tendency to move the belt in the opposite direction to that before described such movement is prevented by the detent shown in Fig. 6* and the pull of the pulley 40 on the intermediate loop of the belt formed between the pulleys 42 and 39 draws the belt tightly to and over the pulley 39 and causes it to turn the said pulley, and so move the tapes forward within the carriage as the latter runs back toward the cylinder. By these movements of the carriage and tapes the sheet is run out from the carriage and left free to drop to the delivery-table.

It will be understood that in the use of the

carriage-delivery those movements of the endless carrier in the carriage which take place while the carrier is at rest near the cylinder for the reception of the sheets are only necessary during the alternate revolutions of the impression-cylinder. It is for that reason that I provide a clutch of suitable kind—such as 88, for example—for engaging the belt-driving pulley 38 with its driving-gear 87 and means—such, for example, as those illustrated in Figs. 8, 9, 10, 11, 12—for producing and maintaining such engagement during a suitable portion of every other revolution and the disengagement during the intervening revolutions. To effect this, the cam 95 is so formed and proportioned that by its action on the pin 92 it operates during a suitable portion of each of its revolutions to expand and tighten the clutch 88 and during another portion of each of its revolutions to permit the contraction and loosening thereof, and the differential gears 85 86 are so proportioned that the gear 87, which carries the clutch-spreading pin 92, will lose a half-revolution relatively to the gear 32, which carries the pulley-clutch 88, for each revolution of the impression-cylinder or a whole revolution during each complete cycle of the press. The several gears above described are of course all so proportioned to each other and to the gear 29 on the cylinder as to give the proper number of revolutions to the pulley.

What I claim as my invention is—

1. In a printing-machine, the combination of an impression-cylinder, a receptacle for printed sheets, a reciprocating sheet-carriage and stationary ways therefor between said cylinder and receptacle, a fly arranged between said cylinder and receptacle, an endless carrier common to both said sheet-carriage and said fly for receiving sheets from the cylinder, and means for operating said carriage, carrier and fly whereby sheets may be delivered printed side up by the carriage or printed side down by the fly.

2. In a printing-machine, the combination of an impression-cylinder, a receptacle for printed sheets, a reciprocating sheet-carriage and stationary ways therefor between said cylinder and receptacle, a fly arranged between said cylinder and receptacle, an endless carrier in said sheet-carriage for receiving sheets from the cylinder, and means for operating said carriage, carrier and fly whereby sheets may be delivered printed side up by the carriage or printed side down by the fly.

3. In a printing-machine, the combination of an impression-cylinder, a receptacle for printed sheets, a reciprocating sheet-carriage and ways therefor between said cylinder and receptacle, a fly arranged between said cylinder and receptacle, a shaft and gears thereon one for driving the carriage and another for operating the fly, and means for fastening one of said gears to said shaft and unfastening it therefrom to render the carriage operative or inoperative.

4. In a printing-machine, the combination of an impression-cylinder, a receptacle for printed sheets, a reciprocating sheet-carriage and ways therefor between said cylinder and receptacle, a fly arranged between said cylinder and receptacle, a shaft and a sleeve capable of turning thereon, means for producing rotary motion of said sleeve in opposite directions alternately, a gear fast on said sleeve for operating the fly, gearing fast on said shaft for operating the carriage, and means for fastening said sleeve to said shaft and unfastening it therefrom according as the carriage or the fly is to be operative.

5. In a printing-machine, the combination of an impression-cylinder, a receptacle for printed sheets, a sheet-carriage having a to-and-fro movement between said cylinder and receptacle, an endless carrier in said carriage for the reception of sheets from the cylinder, a pulley in gear with and deriving rotary motion from the cylinder, a pulley on one of the shafts of the endless carrier, an idler-pulley on the carriage, an idler-pulley and a pivot therefor in fixed position, and a driving-belt for said tapes running on the four pulleys.

6. The combination with the impression-cylinder, the reciprocating sheet-carriage and the endless carrier in said carriage, of a pulley in gear with and deriving motion from the cylinder, a pulley on one of the shafts of the endless carrier, an idler-pulley on the carriage, an idler-pulley and a pivot therefor in a fixed position, a detent for the latter pulley to restrict its rotation to one direction, and a belt running on the several pulleys for driving the carrier within but independently of the carriage.

7. In a printing-machine, the combination with a shaft for operating the sheet-delivery, a gear on said shaft and a rack engaging with said gear for giving it a rotary motion in opposite directions alternately, of a rotary shaft, a crank on said shaft, a connection between said crank and rack, and means for rendering said crank inoperative during a portion of its revolution for holding the sheet-delivery device stationary at the end of its backward movement.

8. In a printing-machine, the combination with a shaft for operating the sheet-delivery, a gear on said shaft and a rack engaging with said gear for giving it a rotary motion in opposite directions alternately, of a crank-shaft, a crank-arm on said shaft, a crank-wrist fitted to move within said arm toward and from its shaft, a connection between the crank-wrist and rack, and a stationary cam with which said wrist engages for controlling its movements to produce the forward and backward

movements of the sheet-delivery device and to hold said device stationary for a time at the end of its backward movement.

9. In a printing-machine, the combination with a shaft for operating the sheet-delivery, a gear on said shaft and a rack engaging with said gear for giving it a rotary motion in opposite directions alternately, of a crank-shaft, a crank-arm on said shaft, a crank-wrist fitted to move within said arm toward and from its shaft, a connection between the crank-wrist and rack, and a stationary cam with which said wrist engages for controlling its movements to produce the forward and backward movements of the sheet-delivery device, the gradual stoppage of said device at the end of its backward movement and the gradual starting of said device on its forward movement.

10. In a printing-machine, the combination with the impression-cylinder and an endless delivery-carrier, of a pulley on said carrier and a pulley between said carrier and the cylinder, gearing between the latter pulley and the cylinder, a belt running on said pulleys for driving said carrier, and means for engaging said gearing with the cylinder and disengaging it therefrom during alternate revolutions of the cylinder.

11. In a printing-machine, the combination with the impression-cylinder and a sheet-receptacle for printed sheets, of a reciprocating sheet-carriage and an endless carrier therein between said cylinder and receptacle, means for giving said carriage a to-and-fro motion between the cylinder and said receptacle and a rest while at that end of its movement when it is nearest the cylinder, a pulley and belt for driving said carrier in the carriage, gearing between said pulley and the cylinder for driving said pulley and belt, and clutch mechanism for engaging said gearing with the cylinder while the carriage is so at rest, and disengaging it at other times.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 26th day of June, 1903.

HOWARD M. BARBER.

Witnesses:
A. R. STILLMAN,
FREDK. L. HALL.