

No. 646,437.

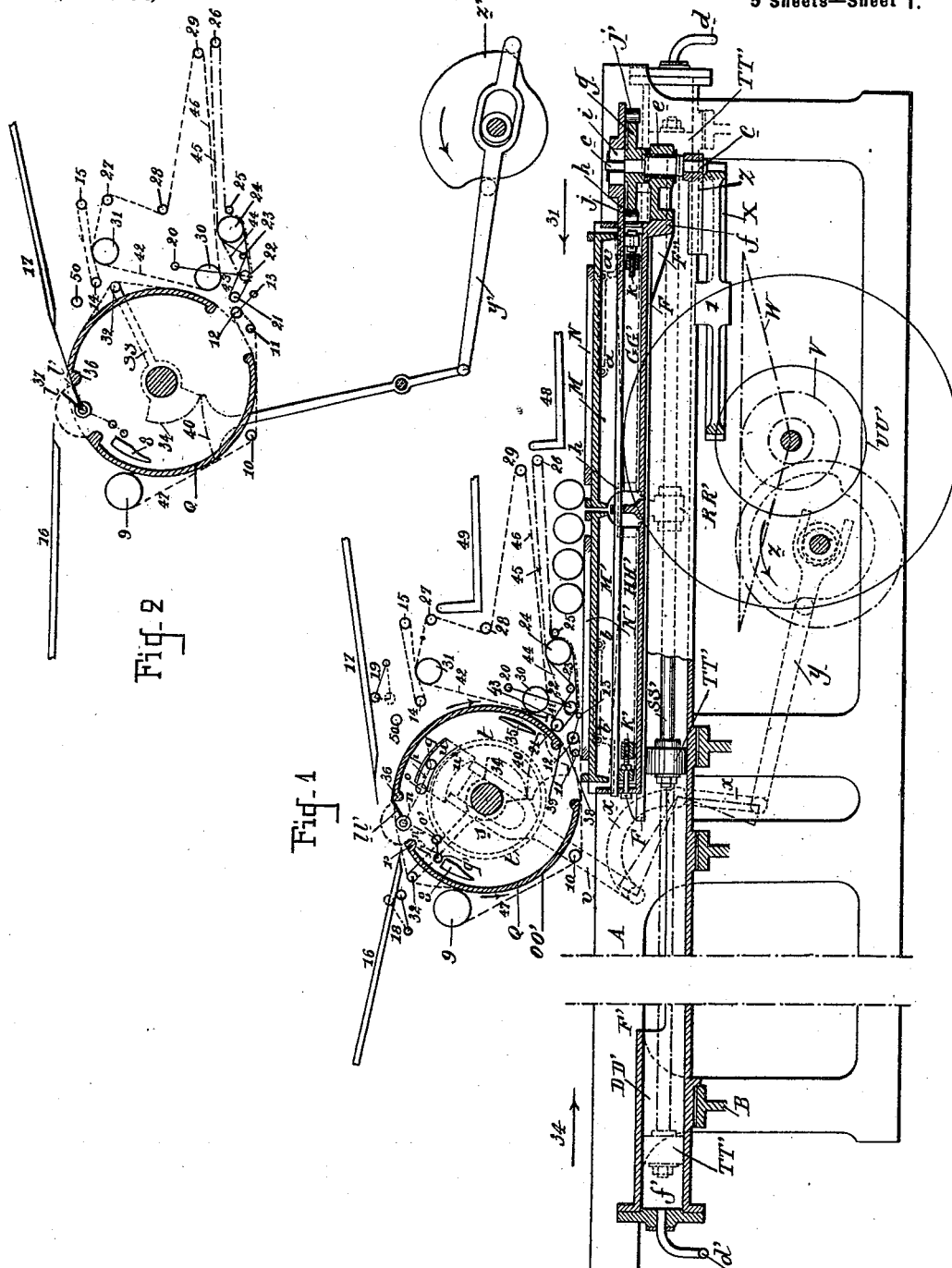
Patented Apr. 3, 1900.

**E. LAMBERT.
PRINTING MACHINE.**

(Application filed Dec. 29, 1897.)

5 Sheets—Sheet 1.

(No Model.)



Witnesses:

E. M. Rolton

Otto Munk

Inventor:
Edouard Lambert

By *Renard & Co.*

his Attorneys.

No. 646,437.

Patented Apr. 3, 1900.

E. LAMBERT.
PRINTING MACHINE.

(Application filed Dec. 29, 1897.)

(No Model.)

5 Sheets—Sheet 2.

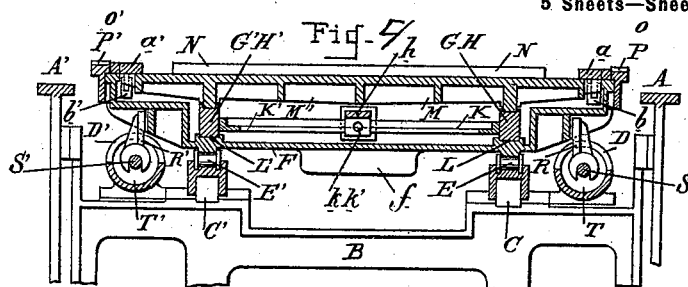
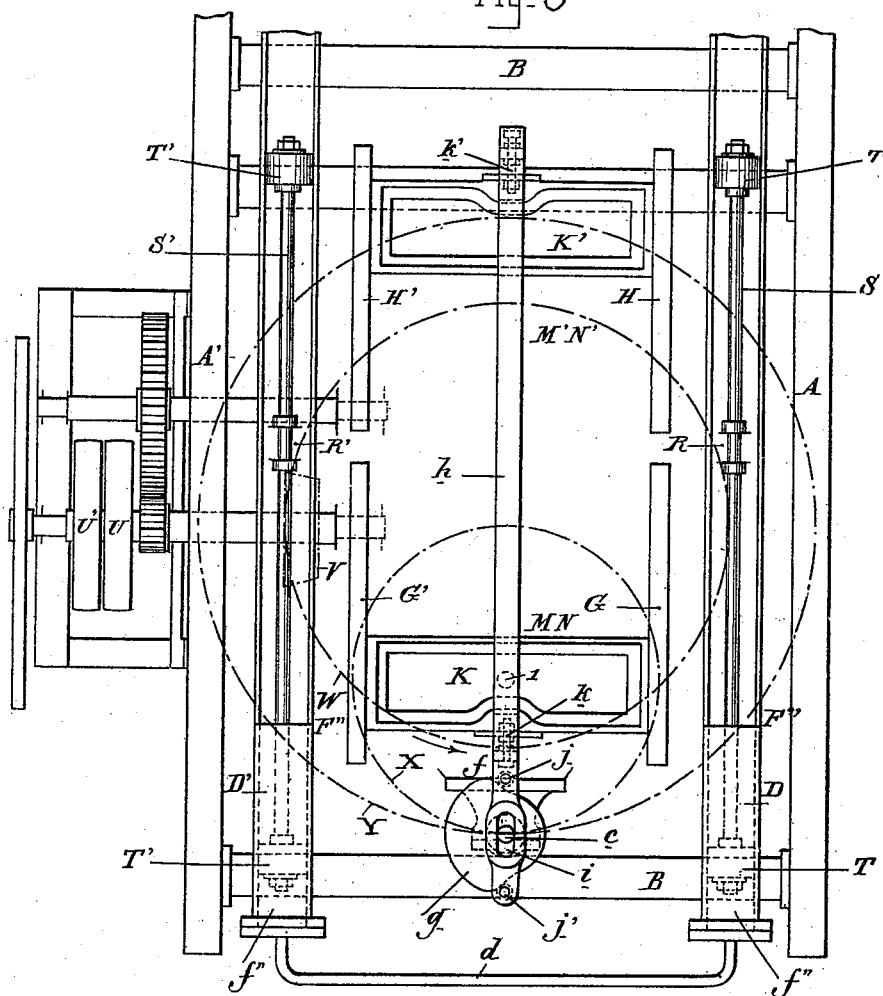


Fig. 3



Attest.
Wm. F. Hall,
James M. Spear.

Inventor:
Edouard Lambert,
by Richards & Co. Attys.

No. 646,437.

Patented Apr. 3, 1900.

E. LAMBERT.
PRINTING MACHINE.

(Application filed Dec. 29, 1897.)

(No Model.)

5 Sheets—Sheet 3.

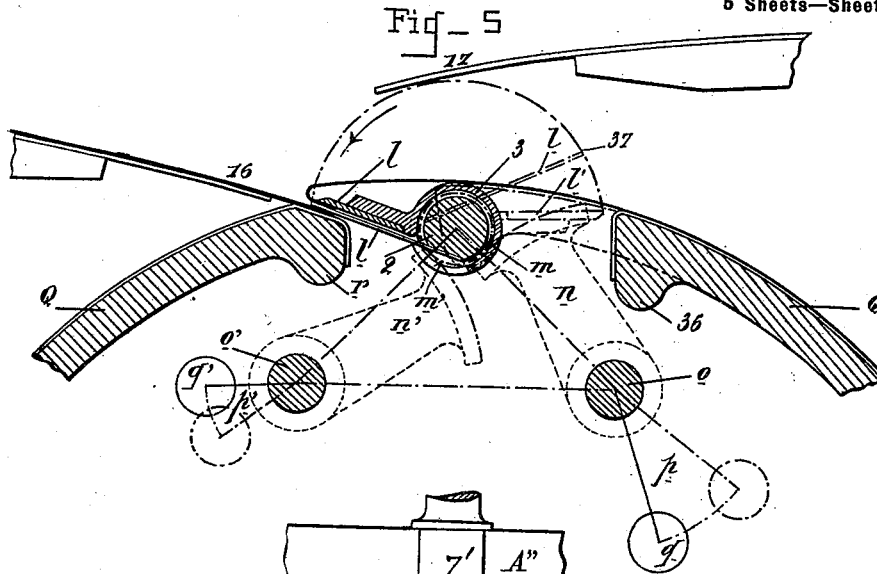
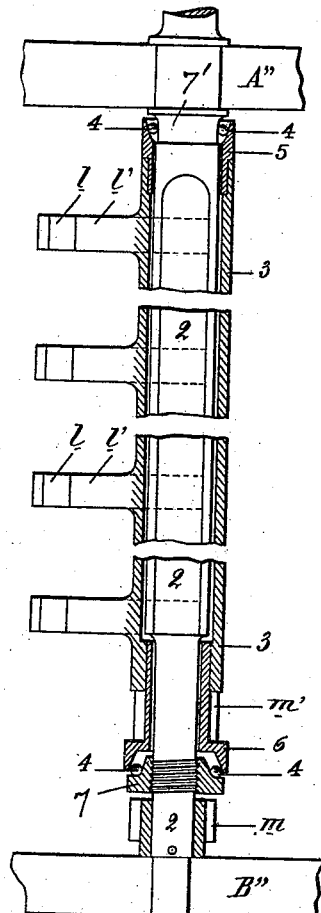


Fig. 6



Witnesses:

E. M. Rolton

[Signature]

Inventor:

Edouard Lambert

By

[Signature]

his Attorneys.

No. 646,437.

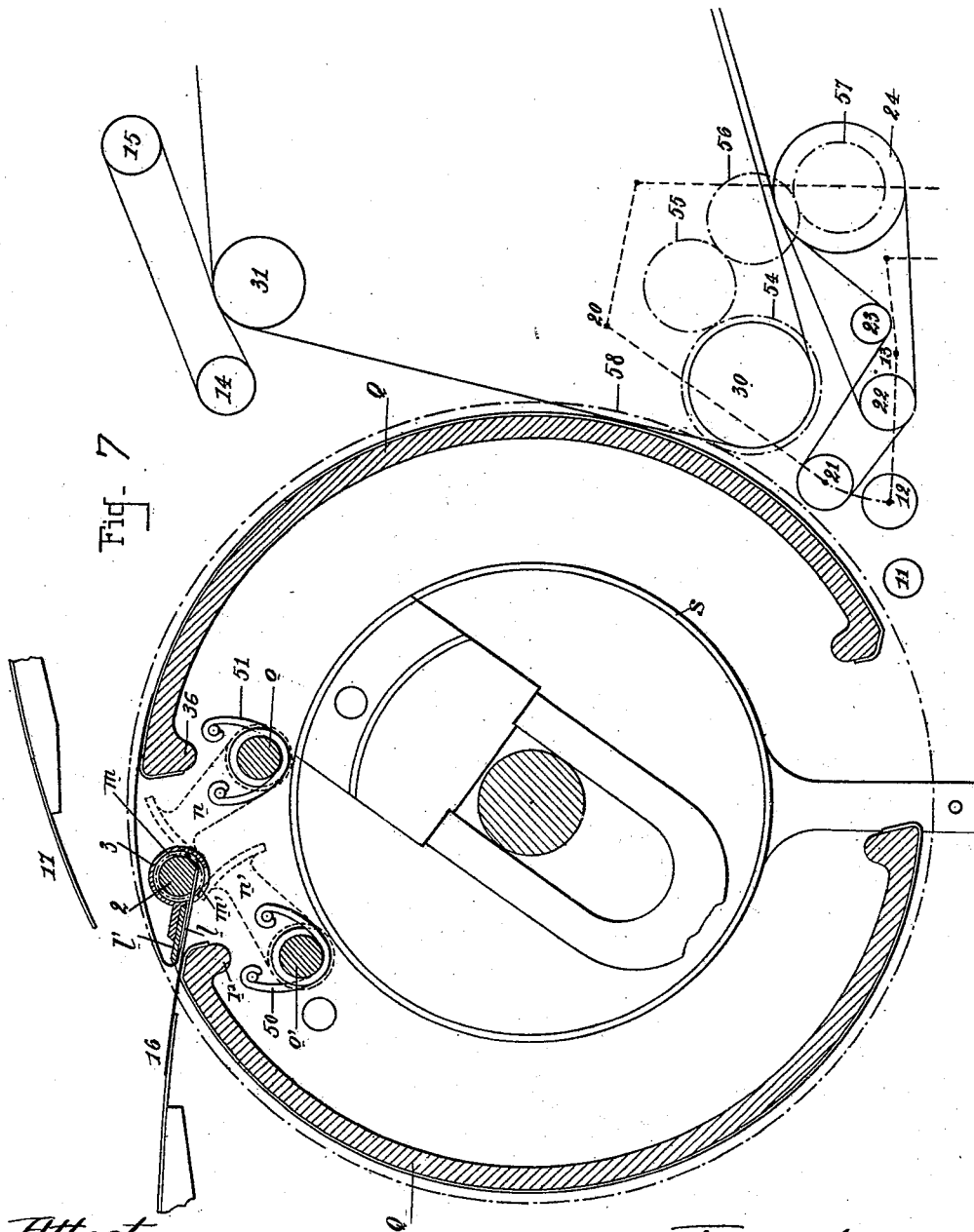
Patented Apr. 3, 1900.

E. LAMBERT.
PRINTING MACHINE.

(Application filed Dec. 29, 1897.)

(No Model.)

5 Sheets—Sheet 4.



Attest
Wm. F. Hall,
James M. Spear

Inventor
Edouard Lambert,
by Richards & Co.
Attys.

No. 646,437.

Patented Apr. 3, 1900.

E. LAMBERT.
PRINTING MACHINE.

(Application filed Dec. 29, 1897.)

(No Model.)

5 Sheets—Sheet 5.

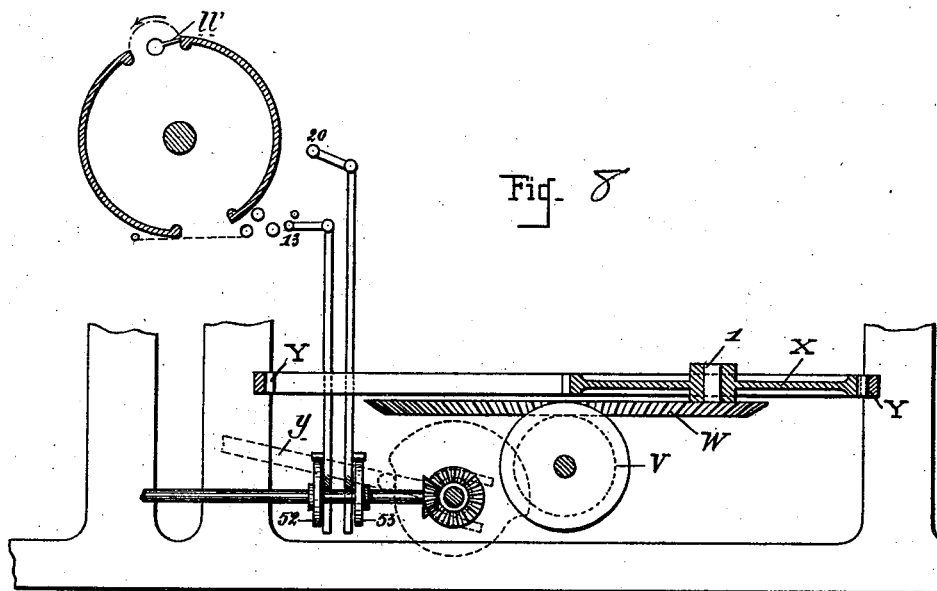


Fig. 8

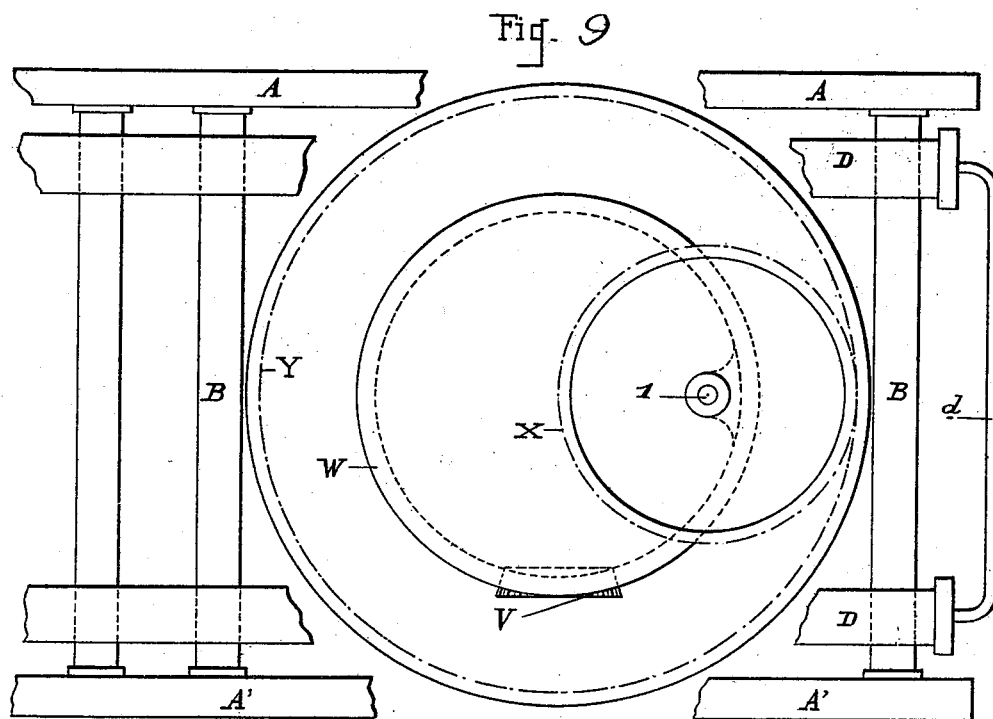


Fig. 9

Attest
Wm. F. Hall
James McPherson

Inventor
Edward Lambert
by Richard L. Hays

UNITED STATES PATENT OFFICE.

EDOUARD LAMBERT, OF PARIS, FRANCE.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,437, dated April 3, 1900.

Application filed December 29, 1897. Serial No. 664,350. (No model.)

To all whom it may concern:

Be it known that I, EDOUARD LAMBERT, a citizen of the Republic of France, and a resident of Paris, France, have invented certain new and useful Improvements in Perfecting Printing-Machines, of which the following is a specification, this invention having been patented in France under date of February 13, 1895, No. 245,099; in Belgium July 18, 1895, No. 116,580, and in England July 20, 1895, No. 13,890.

This invention relates to a construction of perfecting printing-machine having a single cylinder and a reciprocating table carrying two forms, the table being provided with one or more pistons working in one or more air-cylinders, so as to deaden the shock when it reaches the extremities of its stroke.

The table, according to the present invention, is moved to and fro by what is usually known as the "hypocycloidal" motion, in which a toothed wheel revolves within an internally-toothed rack of double the diameter, a crank-pin on the smaller wheel being thus caused to move to and fro in a straight line. These wheels being arranged horizontally and the crank-pin being connected to the table, the required reciprocation of the table is effected. To each side of the table is fixed a rod carrying at both its ends a piston working in an air-cylinder, which it fits closely only as it approaches the end of its stroke, compressing the air in the cylinder, which acts as a buffer. (Instead of two cylinders one cylinder can be used, placed in the middle of the machine.) Each of the two forms is on a bed resting on two (or more) inclined bars, which, besides moving to and fro with the table, have additional to-and-fro movements imparted to them by cams in such a manner that during each stroke of the table one of the forms is raised while the other is lowered, and thus the cylinder, which is caused to revolve in stationary bearings, by gearing with the table effects impressions on each form alternately. The forms are inked in the usual way, the inking-rollers ascending and descending with the forms.

The cylinder is provided with double grippers, and on each side of it there are tapes,

the gripper and tape mechanism being worked by suitable cams and so arranged that a sheet taken by the grippers from the feed-table is first carried around with the cylinder and printed on the one side. The grippers holding its front edge then turn over in the gap of the cylinder, and its rear end is directed by tapes in such a manner as to reverse the sheet, while the cylinder turns in the opposite direction and carries the sheet around, printing its other side, after which the cylinder turns in the first direction and the tapes carry the sheet onto the delivery-table. In order that the tapes may suitably guide the sheet in its successive movements, some of the rollers around which they pass are made to oscillate, and elastic tapes are employed to allow for their oscillations.

Figure I of the accompanying drawings is a longitudinal section, the table being at the right extreme of its stroke. Fig. II is a section of the cylinder, the table being at the left extreme of its stroke. Fig. III is a part plan, and Fig. IV is a transverse section, of a printing-machine according to my invention. Fig. V is a transverse section, to an enlarged scale, of part of the cylinder and its adjuncts. Fig. VI is a sectional plan of the grippers and spindle. Fig. VII is an enlarged sectional view of the cylinder. Fig. VIII is an enlarged detail view of the stationary rack and cooperating gearing, and Fig. IX is a plan view of the same.

The machine has two side frames A A', tied together by cross-frames B, carrying the rails C C' for the rollers E E', on which is mounted the carriage F. The buffer-cylinders D D', which are closed at the ends, communicate by small pipes d d'. The carriage F has grooves L L', in which can slide two pairs of inclined bars G G' and H H', the one form-table M carrying the form N resting on the pair G G' and the other form-table M' carrying the form N' resting on the pair H H'. Both tables are linked to the carriage F, each by a pair of rods a a' and b b', so that while either table can be raised or lowered by the longitudinal movement of its inclined supporting-bars its position relatively to the carriage F is unaltered, except in a vertical di-

rection. Between the carriage F and the inclined bars G G' and H H' and between these bars and the tables M M' rollers can be placed.

By a belt on the fast and loose pulleys U U' 5 is driven the bevel-pinion V, gearing with the horizontal bevel-wheel W on a stud I, on which is mounted the toothed wheel X, gearing with the internally-toothed stationary rack Y, which is twice the diameter of X. On X is 10 fixed a piece Z, from which projects a pin c into a bearing e, fixed at f to the carriage F, which is thus by the hypocycloidal gear caused to move to and fro in a straight line. On the pin c is fixed the cam g, above which 15 is arranged a rod h, having a slotted hole i for the pin c. The rod h carries two rollers j j', which always bear on the periphery of the cam g, giving a to-and-fro motion to the rod h and to the inclined bars G G' and H H', which 20 are fixed to cross-frames K K', attached by adjusting-screws k k' to the rod h. In this machine the bearings of the cylinder must have an unaltered position. The screws k k' must be adjusted to give the proper pressure 25 between the forms and the cylinder. There is one screw for each form. Thus while the tables M M' reciprocate they are caused to ascend and descend at the end of each stroke, while the printing-cylinder Q is driven by 30 racks P P' on the carriage F gearing with wheels O O' on the ends of the cylinder.

The cylinder Q has two sets of grippers l l' on the same axis, capable of turning thereon either simultaneously or separately. In the 35 two ends A' B' of the cylinder is fitted the spindle 2, carrying the one set of grippers l, and on 2 is fitted to turn the tubular axis 3, which carries the other set of grippers l' and is slotted to allow certain relative movement 40 of the grippers l, which project through the slots. The tubular axis 3 turns on balls 4, arranged in coned recesses 5 and 6 between it and the coned boss of an adjusting-screw 7 and a fixed part 7' of spindle 2, Fig. VI. On 45 the spindle 2 is fixed a pinion m, gearing with a segment n on a rock-spindle o, having an arm p, carrying a roller q, and similarly on the tubular axis 3 is a pinion m', gearing with a segment n' on a spindle o', having an arm 50 p', carrying a roller q'. Each of the spindles o o' is urged by a helical spring 50 51 to turn in such direction as to close the grippers on the edge r of the cylinder-slot.

On the end of the cylinder O when the rollers q q' present themselves is a circular cam s, cut out so that the roller q can run either 55 inside or outside the circular rib t, a movable part u of which can be moved outward or inward by a forked rod v, moved by lever x and 60 forked rod y from a cam z on a counter-shaft geared to the main shaft. Also a cam-piece 8, fixed to the framing, acts on the roller q'. When the cylinder is long, in the middle of spindle 2 is a bearing, and there are two tubular axes 3 with grippers l, one for each half 65 of the cylinder. So there must be two rollers

q and two cams 8, one for each tubular piece 3, at each end of the cylinder. Around the cylinder are the tape-roller 9, moved by the cylinder, and the tape-spindles 10, 11, and 12. 70 The tapes from 9 to 12 are elastic. The roller 12 moves from position 12, Fig. I, to position 12, Fig. II, raised by two arms fixed on spindle 13. This spindle is moved from a cam 52. The tapes from the roller 14 to the roller 15 75 carry the sheet to delivery-table 49. The tympan-table 16 and the feed-table 17 are raised and lowered by rollers on arms 18 and 19. On the rock-spindle 20 two arms carry the rollers 21 22 23, which move from position 21 22 23, 80 Fig. I, to position 21 22 23, Fig. II. A set of endless elastic tapes pass around the rollers 21, 23, 24, and 22 and another around the rollers 22, 24, 25, and 26. The spindle 13 and the spindle 20, moved by cam 53, are so connected 85 that as the roller 12 goes up the rollers 21 22 23 move away from the cylinder. A set of endless tapes pass around the rollers 27, 28, 29, 30, and 31. All these sets of tapes are moved, the spindles being geared with the 90 cylinder by gears 54 55 56 57 58.

32 is a roller which oscillates from the position 32, Fig. I, to position 32, Fig. II, moved 95 by two arms 33, oscillating on the shaft of the cylinder. These arms are moved by two pairs of segments 34 40 or by levers and by forked rod y' from cam z' on the same shaft as cam z. Elastic tapes pass around roller 32 and around the cylinder. The other parts of the machine are of ordinary construction, the 100 inking-rollers being mounted on the form-tables to ascend and descend with them.

The operation of the machine is as follows: Assuming the form-tables M and M' to be approaching the extreme of their stroke to the 105 left, the feed-table l', carrying the sheet to be printed, is down, Fig. II, and the cylinder is still turning like the hands of a clock. The grippers l' have turned to meet the edge 36 of the cylinder-slot, and the grippers l are in the 110 position l³⁷. The sheet is at the end of the stroke caught between the grippers l l', the grippers l having then closed down on l'. In the reverse movement the sheet is carried around and impressed on the form N', the 115 roller q of the grippers l rolling outside the circular rib s. When the sheet is free from the tape-rollers 9 10 12, its rear edge being then at 38, Fig. I, the roller q has reached the sliding piece u, which descends to the position 120 u', causing the grippers l to turn back toward the edge r of the cylinder-slot. The grippers l' return with l still holding the sheet. When the grippers l l' turn back, if the sheet is very little, its edge can be thrown out of 125 the tapes. 50 is a tube communicating by a pipe with the cylinders D D' and blowing compressed air on the sheet to hold it on the cylinder and drawing it onward, so as to release it from the part 39 of the cylinder, while the 130 rear edge of the sheet moves away from 38 to the position 41. Before the complete stroke

of the tables to the right a tympan-sheet has been placed on the table 16, and the grippers still holding the printed sheet come to bear on r , thus gripping the tympan-sheet. The cylinder then returns in the direction of arrow 42, and the rear edge of the sheet moves to tapes 43 44 (forming a V) and to tapes 45, which draw it along them and the tapes 46, while the front edge is still held by the grippers, and the sheet is then drawn back from the tapes 45 and 46 and passed between the cylinder and the form N, receiving the perfecting impression. If the sheet must receive only one impression, the cam-piece 35 can be put in a good position to act on the roller q . Then the grippers are opened when the sheet is on the tapes 45 and 46. The sheet instead of coming back goes to the delivery-table 48. Instead of a tympan-sheet a good sheet must be put on table 16. This sheet passes between the cylinder and the form N, receiving an impression, and goes back to the delivery-table 49. So each revolution of the machine gives two printed sheets having each only one impression. A little before the end of this stroke the roller q' meets the cam-piece 8, opening away the grippers l' and leaving the sheet free between the cylinder Q and the rollers 9, 10, and 12. Then the roller q , which was inside the rib t , meets the slide w' , which, rising, moves the roller q , raising the grippers l so as to leave the tympan-sheet as well as the printed sheet free and to take a fresh sheet from the table 17. The cylinder then returning in the direction of arrow 47 brings on the fresh sheet, while the printed and tympan sheets are carried between the cylinder and the rollers 12 and 30 and the rollers 32, Fig. II, 14, 15, and 31 27 by the tapes to the delivery-table 49. During the operations described one of the forms is raised for printing when the tables move in the one direction, the other form being then lowered, to be raised in its turn when the tables move in the opposite direction.

In order to prevent shock as the tables complete their stroke and to accumulate certain force to start them in the opposite direction, the carriage F has on each side forks R R', embracing piston-rods S S', each of which has at each end a piston T T', which work in the cylinders D D', which have their upper sides open from F' to F'', but elsewhere are closed. As the tables approach the ends of their stroke the air in the parts $f f'$ of the cylinders is compressed, opposing the movement of the tables, and then at the beginning of the return stroke the compressed air aids their movement.

It will be seen that the raising and lowering of the form-tables instead of raising and lowering the cylinder is a special characteristic of this invention, this being of special advantage in a perfecting-machine, in which the up-and-down movement of the cylinder

would have to take place when it is moving at its maximum speed, whereas the up-and-down movement of the form-tables in this case takes place when they are moving slowly about the extremes of their stroke. Another special feature is the oscillation of the tape-rollers 21, 22, and 23, which aids the return of the sheet when in the one position, and the oscillation of tape-rollers 12 and 32, which aids the delivery of the sheet when in the position Fig. II.

What is claimed is—

1. In a perfecting-machine having a single cylinder and a reciprocating table carrying two form-tables, the combination with mechanical devices for raising one of the form-tables and lowering the other at each end of the stroke of the table, of a hypocycloidal operating-gear having connections for reciprocating said table and rotating the cylinder, and having also connections for operating said devices for raising and lowering the form-tables, two sets of grippers carried by said cylinder and turning upon a common axis, operating connections to said grippers, elastic tapes and oscillating rollers carried adjacent to said cylinder for guiding the sheet, and air cylinders and pistons for preventing shock to the table and for starting the same, substantially as described.

2. In combination, the single cylinder, the reciprocating carriage geared thereto, the vertically-movable form-tables carried by said carriage, inclined bars supporting said form-tables, a hypocycloidal gear having connections to the table for operating the same, a cam on the crank of said gear, and connections from said cam to said inclined bars for reciprocating them to alternately raise and lower the form-tables, substantially as described.

3. In combination, the single cylinder, the reciprocating carriage, the vertically-movable form-tables carried thereby, the inclined bars supporting said form-tables, a hypocycloidal gear for operating the tables, connections from said gear to said bars for reciprocating the same to alternately raise and lower the form-tables, gripper mechanism carried by the cylinder comprising two spindles journaled one within the other, a set of grippers carried by each shaft, means for operating said grippers to cause them to engage the sheet to be printed and to turn it for the perfecting operation, and means for causing said grippers when desired to release the sheet without perfecting substantially as described.

4. In combination, the single cylinder, the reciprocating carriage, the form-tables carried thereby, means for operating said table and raising and lowering the form-tables, a pair of spindles journaled one within the other on said cylinder, balls interposed between said spindles, grippers carried by said spindles, means for operating said spindles to cause them to open and close to en-

gage the sheet to be printed and for turning
the grippers to turn the sheet for the perfect-
ing operation, means for causing said grip-
pers when desired to release the sheet with-
5 out perfecting, oscillating rollers located in
proximity to the cylinder, guiding-tapes pass-
ing over said rollers, and means for operat-
ing said rollers to cause the sheets to be either

perfected or delivered from the machine, sub-
stantially as described. 10

In witness whereof I have hereunto set my
hand in presence of two witnesses.

EDOUARD LAMBERT.

Witnesses:

EDWARD P. MACLEAN,

JULES FAYOLLET.