

(No Model.)

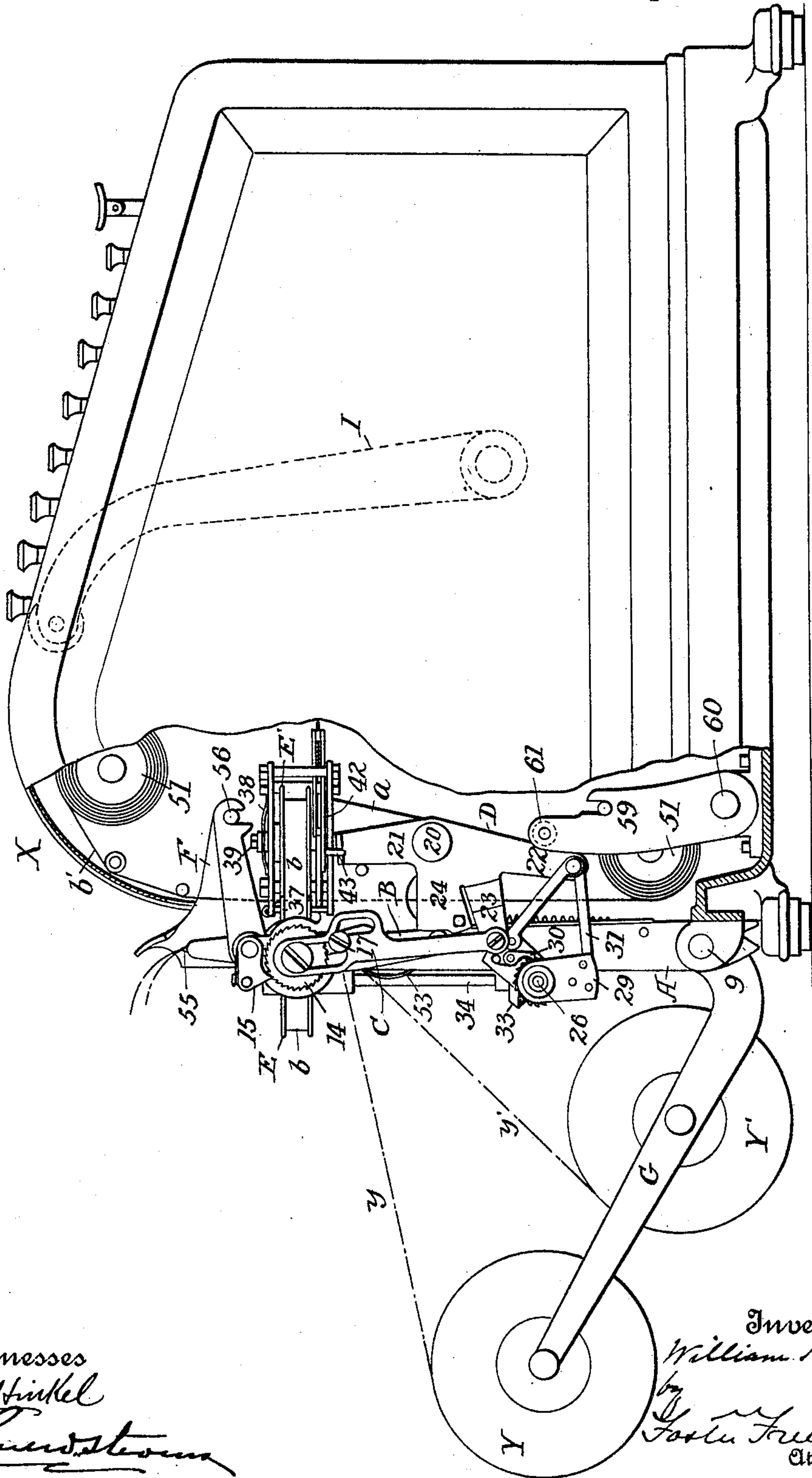
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W. H. PIKE, Jr.
DEVICE FOR DUPLICATE PRINTING.

No. 590,772.

Patented Sept. 28, 1897.

Fig. 1.



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(No Model.)

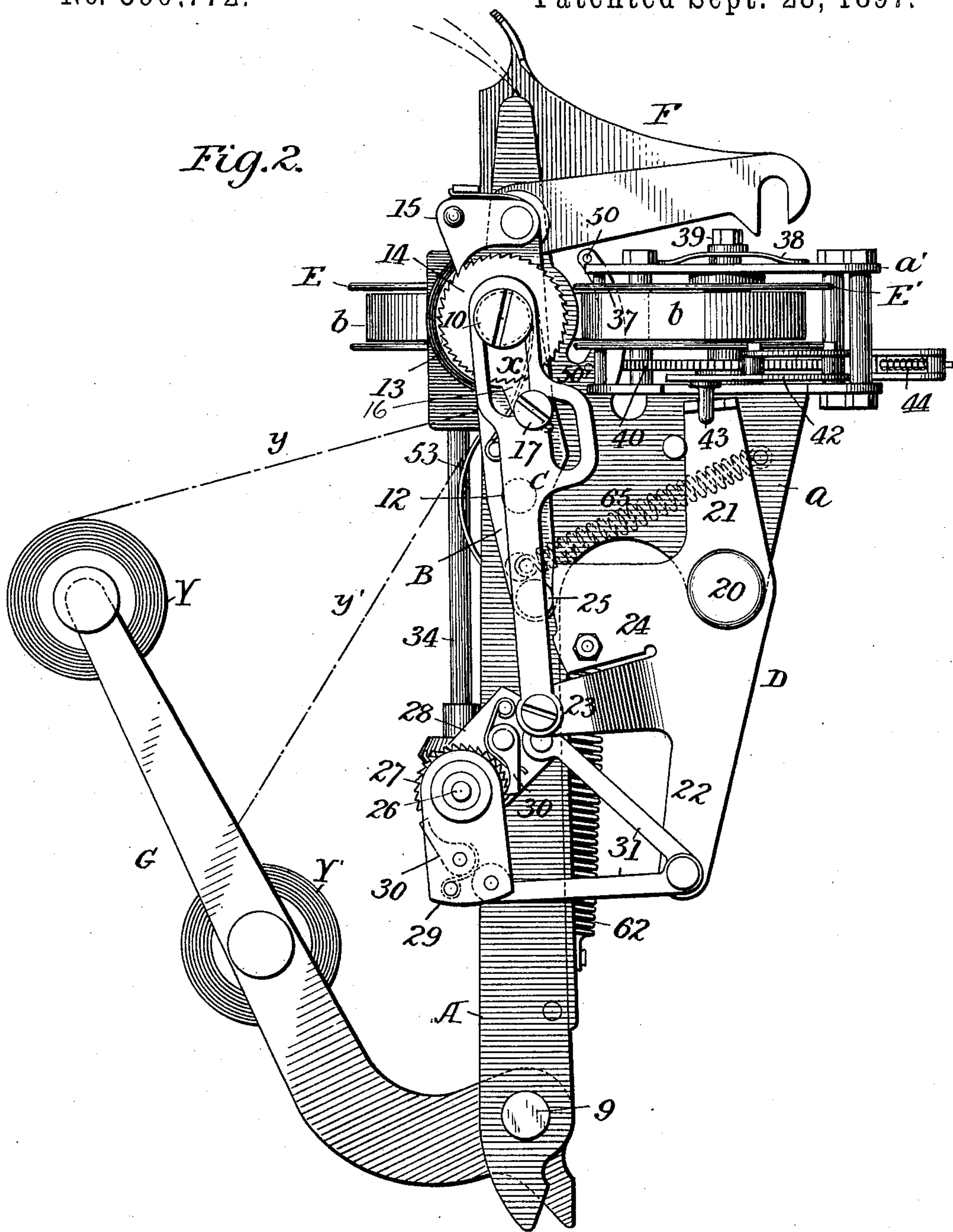
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Fig. 2.



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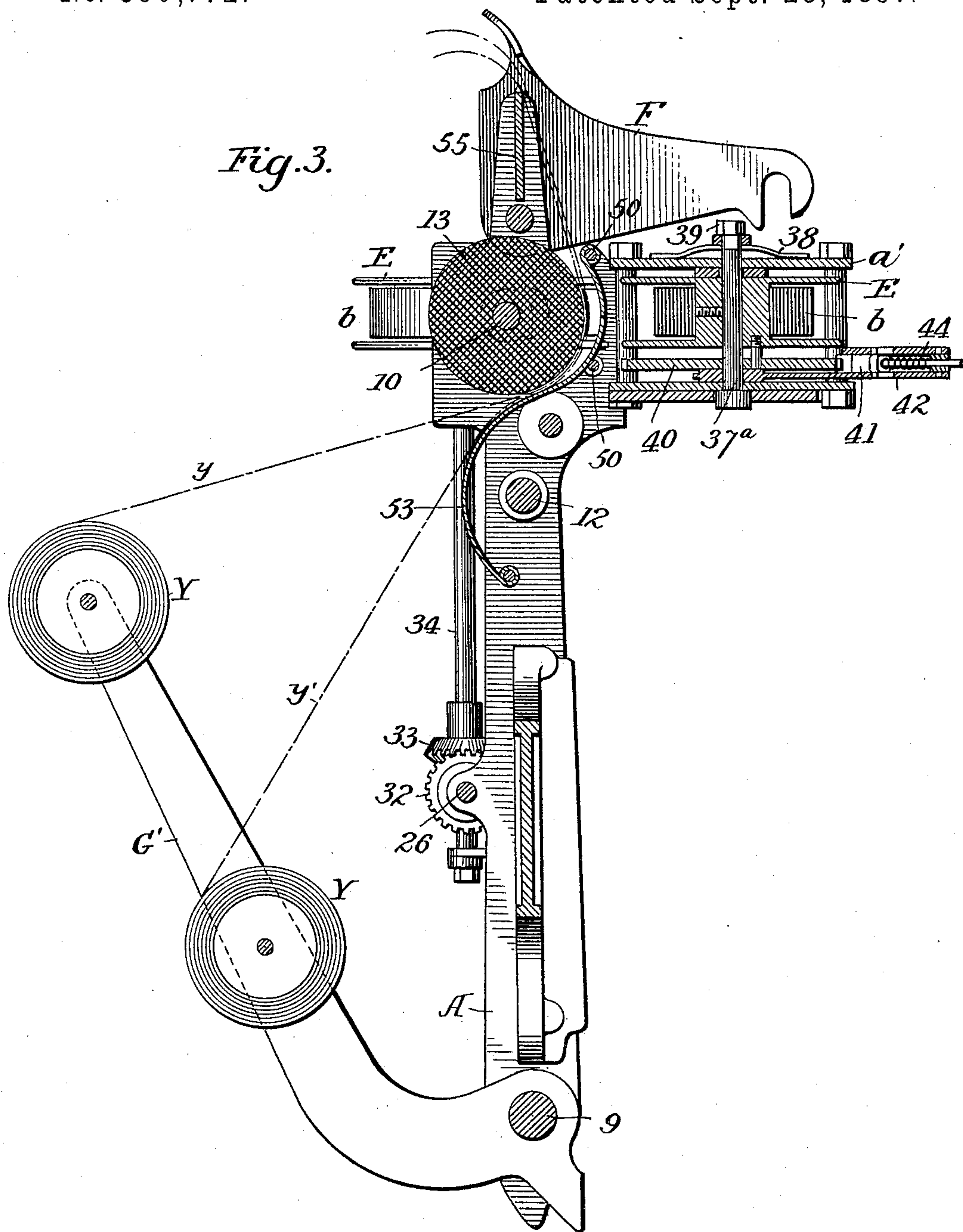
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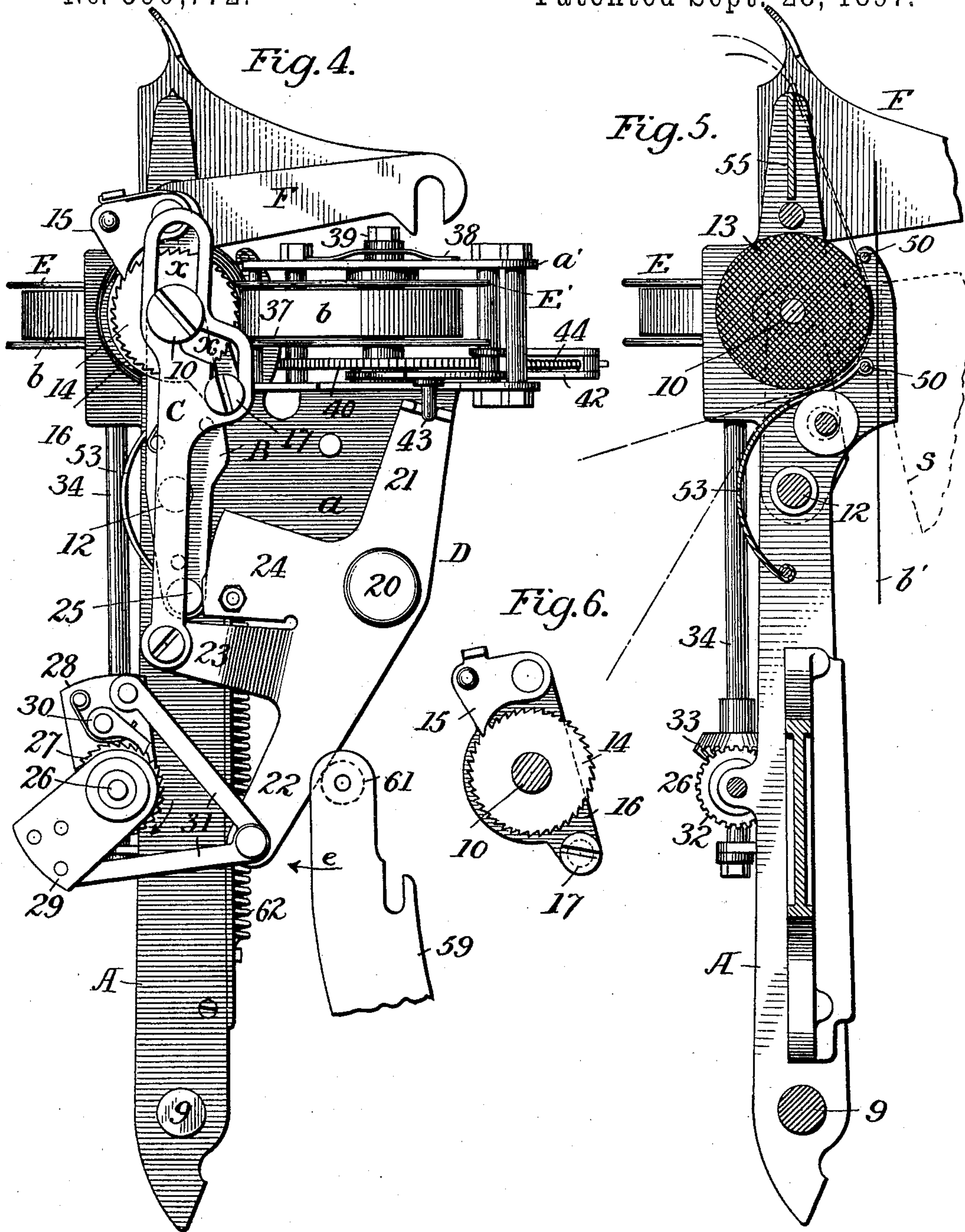
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6 Sheets—Sheet 4.

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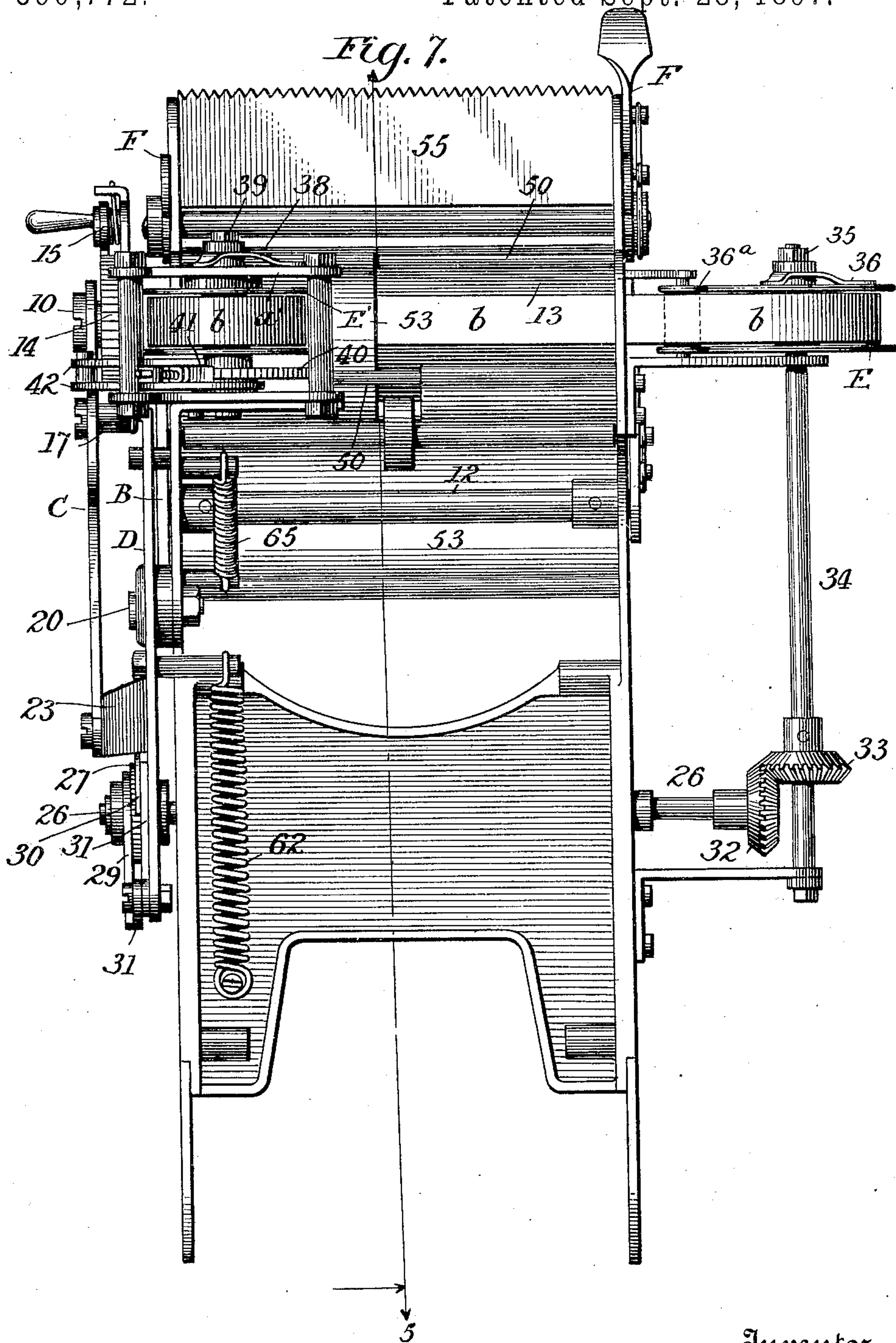
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(No Model.)

6 Sheets—Sheet 6.

W. H. PIKE, Jr.
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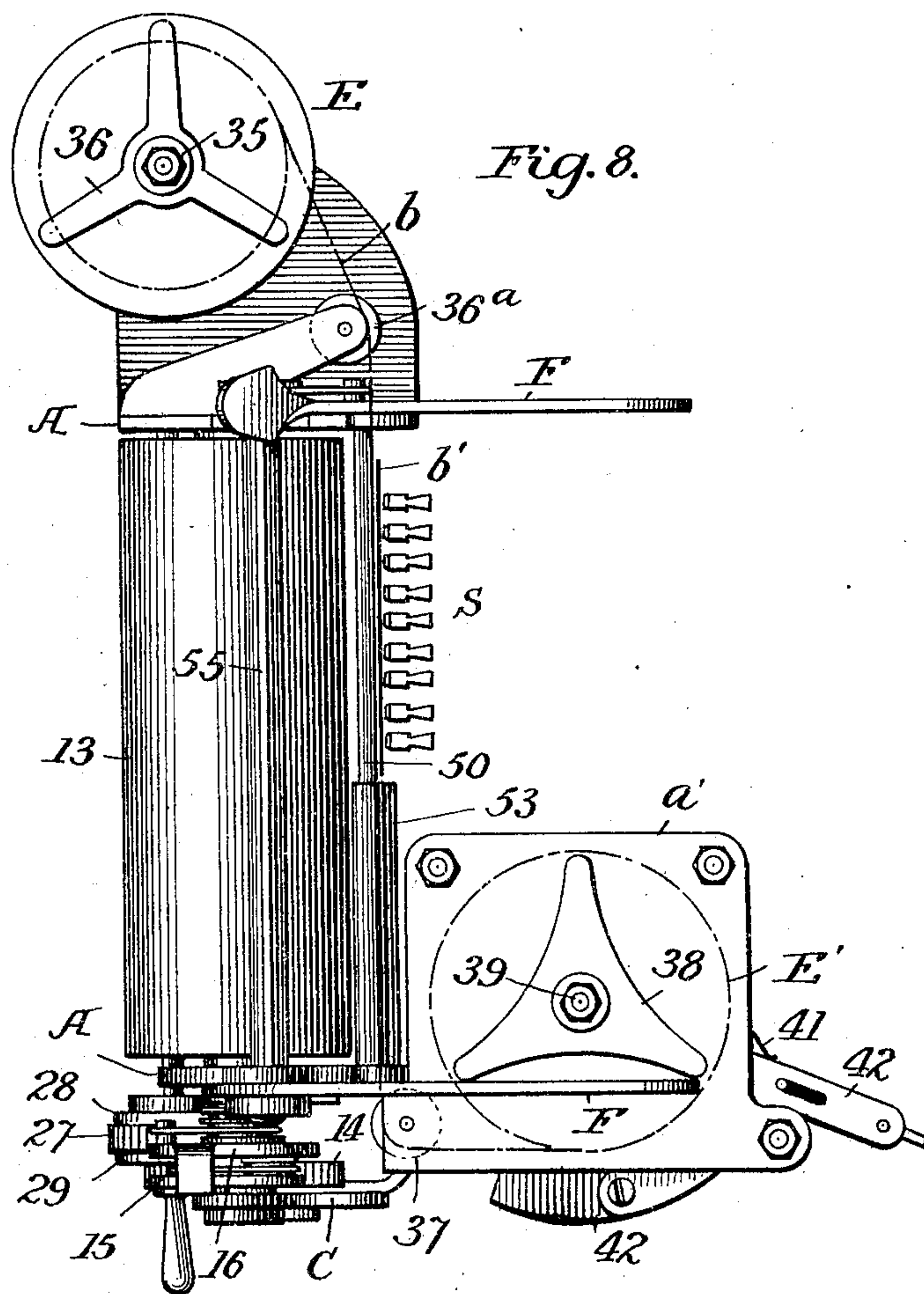
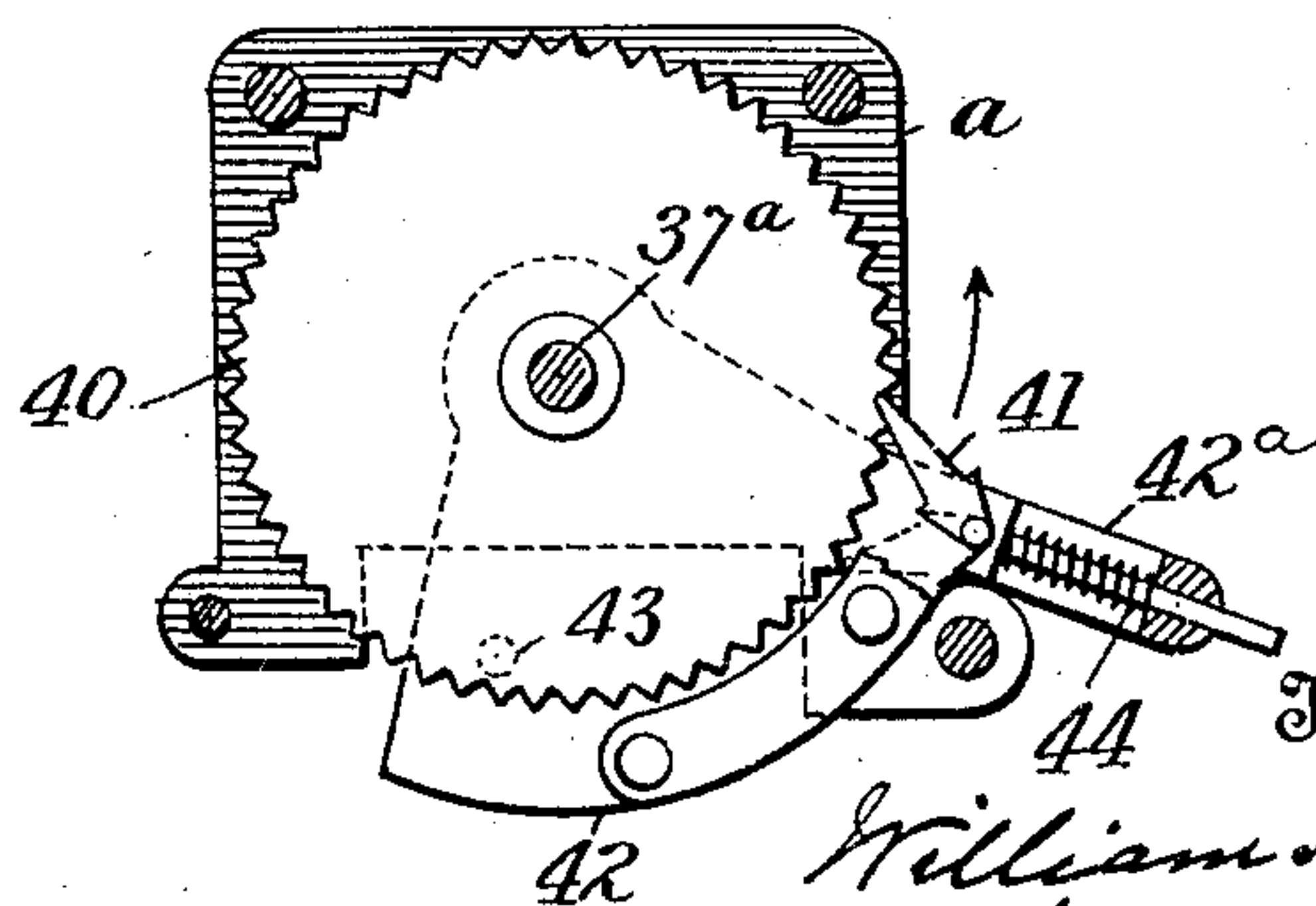


Fig. 9



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UNITED STATES PATENT OFFICE.

WILLIAM HENRY PIKE, JR., OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE
AMERICAN ARITHMOMETER COMPANY, OF SAME PLACE.

DEVICE FOR DUPLICATE PRINTING.

SPECIFICATION forming part of Letters Patent No. 590,772, dated September 28, 1897.

Application filed March 23, 1897. Serial No. 628,873. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY PIKE, Jr., a citizen of the United States, residing at St. Louis, in the State of Missouri, have
5 invented certain new and useful Improvements in Devices for Duplicate Printing, of which the following is a specification.

My invention relates to that class of printing-machines in which movable type are carried to and from a platen and a strip of paper is fed between the platen and the type intermittently; and my invention has for its object to duplicate the printing in connection with continuous strips or sheets of paper
10 where the ordinary separate loose carbon-sheets cannot be employed, and to this end I combine in any suitable kind of machine—as, for instance, a type-writer or a calculating-machine—two independent type-ribbons,
20 one fed transversely, the other either transversely or vertically, together with means for feeding the ribbons and for feeding superposed strips of paper, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, in part section, of a calculating or adding machine embodying my improvements. Fig. 2 is an enlarged side elevation of the printing-frame and parts carried thereby. Fig. 3 is a vertical transverse section of the parts shown in Fig. 2. Fig. 4 is a side elevation of the parts shown in Fig. 2, but in a different position. Fig. 5 is a transverse sectional elevation on the line
30 5 5, Fig. 7. Fig. 6 is a detached view of part of the platen-turning device. Fig. 7 is an inside elevation of the printing-frame and parts carried thereby. Fig. 8 is a plan view; Fig. 9, a detached view, in part section, showing one of the devices for feeding the ribbon-spool at one side of the machine.

The frame X of the machine may be of any suitable construction, as may also the other parts of the apparatus hereinafter to be described, the construction depending upon
45 the character of the apparatus to which the improvement is adapted, as a type-writing machine or a calculator—such, for instance, as shown in Letters Patent granted to W. S. Burroughs, No. 504,963. The construction of

parts shown is one adapted to be used with a Burroughs calculator.

The main parts of the improved device are carried by a printing-frame A, swinging about a shaft 9, supported by the frame X. To
55 the frame A is pivoted at 12 another frame B, carrying a shaft 10, on which is secured the platen-roller 13, and at the end of the shaft 10 is a ratchet-wheel 14, with which engages a pawl 15, carried by an arm 16, swinging on the roller-shaft 10 and provided with a stud 17, which extends into the slot *x* of a sliding cam-plate C. To a bracket *a* on the frame A is pivoted at 20 a lever D, having three arms 21 22 23 and a cam projection 24.
60 The cam-plate C is connected to the arm 23, and the edge of the cam projection 24 bears on a stud 25 of the platen-frame B.

At the lower part of the frame A are bearings for a transverse shaft 26, carrying a
70 ratchet-wheel 27, and on this shaft swing two arms 28 29, each of which carries a pawl 30, engaging the ratchet-wheel in such manner that when both arms swing forward on the shaft 26 one of the pawls will engage and
75 turn the ratchet-wheel and shaft, and when they swing backward the other pawl will engage and turn the ratchet-wheel and shaft, the latter rotating thus intermittently always in the same direction. Each of the arms 28
80 29 is connected by a connecting-rod 31 with the lower end of the arm 22 of the lever D.

At the opposite end of the shaft 26 is a bevel-wheel 32, gearing with a bevel-wheel 33 upon a vertical shaft 34, turning in bearings at the opposite side of the frame A. At the upper end
85 of the shaft is a type-ribbon spool E, connected only frictionally with the shaft. Thus at the top of the shaft is a nut 35, which presses upon a spring tension-plate 36 to cause it to bear
90 frictionally upon the upper flange of a type-ribbon spool E. The ribbon *b* from the spool E passes around a guide-roll 36^a and around another guide-roll 37 at the opposite side of the frame to a second spool E', the shaft 37^a
95 of which passes through the top and bottom plates of a frame or bracket *a'*, carried by the frame A. A friction-spring 38 bears on the frame *a'* and also against the under face or shoulder of a nut 39 at the top of the shaft 37^a,
100

so as to frictionally resist the rotation of said shaft and its spool. At the lower part of the shaft 37^a is secured a ratchet-wheel 40, having teeth beveled in opposite directions to engage a pawl 41, carried by a lever 42, swinging upon the shaft 37^a, and from which a stud 43 extends downward into a slot in the upper arm 21 of the lever D. A spring 44 constitutes a yielding bearing for a block 42^a, carrying the pawl, so that the pawl may be set in either direction to engage the teeth of the ratchet-wheel 10, as shown in full and dotted lines, Fig. 9. As shown in full lines, Fig. 9, the pawl is so set that as the lever 42 swings in the direction of its arrow the spool E' will be intermittently turned in said direction.

The strips of paper *y y'* upon which the impressions are to be made are carried by reels Y Y', suitably supported on shafts carried by arms G G' and pass together around the platen 13 and between the latter and the type S, of any suitable construction and operated in any suitable manner—as, for instance, in the manner set forth in the Letters Patent to Burroughs, No. 504,963. As the form and character and mode of operating the type are immaterial these have not been illustrated.

On the frame A are arranged two bearing-bars 50 50, in such position that the strips of paper *y y'* will be held tightly against the platen when the latter is in printing position from swinging the frame B toward the type, (shown in Figs. 1 and 4,) but will be relaxed when the frame B swings away to the position shown in Fig. 2. There is the usual type-ribbon *b'*, carried by the usual rolls 51 51 upon the stationary frame A of the machine and passing vertically downward in front of the type S, Fig. 5, between the latter and the sheet *y'* of paper, while the ribbon *b* passes horizontally between the two sheets of paper. A guard-plate 53 extends between the bars 50 50, except at the points where the types S act. A catch F, pivoted to the frame A, serves to hold the said frame in printing position in respect to the frame X by engaging a bar 56, as shown in Fig. 1, but may be lifted to permit the frame A to swing out to insert the paper or get access to the parts. A cutter-blade 55 serves to sever the strips when required. An arm 59 is upon a rock-shaft 60 of the machine, and this shaft is operated from the operating-handle I, dotted lines, Fig. 1, in a manner not necessary to be described. As the arm 59 swings outward a stud 61 thereof bears on the arm 22 of the lever D, Fig. 4, and swings the latter, a spring 62 swinging back the lever D when the arm 59 moves back.

In the feeding of the ribbon *b*, assuming the ribbon to be all wound on the right-hand spool E, as the arm 59 swings forward the stud 61 bears on the arm 22 of the lever D and swings the latter, the spring 62 bringing back the lever D when the arm 59 moves back. As the lever D swings back and forth it swings the lever 42 by means of the stud

43, which extends into the upper arm 21 of the lever D.

With the pawl 41 in the position shown by the full lines, Fig. 9, as the lever 42 is swung back and forth the ratchet-wheel 40 and the spool E' will be intermittently turned in the direction of the arrow, and as the ratchet-wheel is turned the ribbon will be wound on the spool E'.

The lower arm 22 of the lever D and its connections to the shaft 26 turn the shaft 34, carrying the spring tension-plate 36. This friction-plate rotating in the opposite direction from that in which the spool E is turning as the ribbon *b* is being wound off it and on the spool E' tends to keep the ribbon continually taut.

In Fig. 8 the ribbon is shown feeding from the right-hand spool E to the left-hand spool E'. When the ribbon is all wound on the left-hand spool E', the spool can no longer be turned in the direction of the arrow, Fig. 9, and as the lever 42 swings the centripetal spring 44 yields and allows the pawl 41 to reverse its position, as shown by the dotted lines. As soon as the position of the pawl is reversed the swinging of the lever 42 will cause the ratchet-wheel 40 and spool E' to be turned in the opposite direction from that indicated by the arrow, and the ribbon will be fed off the spool E'. As the ribbon is fed off the left-hand spool E' it will be wound on the right-hand spool E, driven by the spring tension-plate 36. As the movement of the plate 36 is always in excess of the movement of the ratchet-wheel 40 and the spool E' the ribbon will be kept continually taut.

When the ribbon *b* is all wound off the spool E', there will be no change in the position of the pawl 41. The ratchet-wheel 40 and the spool E' will continue to turn as before. As the turning of the ratchet-wheel 40 is continued the rewinding of the ribbon *b* on the spool E' will be immediately recommenced. The position of the pawl 41 will continue to remain the same until the ribbon is all wound off the spool E, when the position of the pawl will be reversed, as before described. It will be seen that the parts are so moved that the ribbon is not fed when the two sheets of paper are drawn tightly around the platen and the parts are in position for printing, which results as the cam projection 24 swings the frame B to carry the platen toward the bars 50 50. By this means the feed takes place only when the sheets lie loosely in relation to each other and to the ribbon *b*, so that there is neither any impediment to the movement of the ribbon nor any tendency of the ribbon to rub and color the paper. When the frame A with the platen are in printing position, the overlying strips of paper and the ribbon between them will be held tightly drawn in contact with the face of the platen and between the latter and the cross-bars 50 50, so that the printing will be sharp, distinct, and regular.

When the lever D is rocked by the arm 59, the cam-plate C will be lifted, swinging the arm 16 and carrying with it the pawl 15, so as to turn the platen one step. As the lever D swings to the position shown in Fig. 2 after the printing is effected the first action is to carry the cam projection 24 from the frame B and permit the latter to swing under the action of a spring 65 to carry the platen away from the bars 50 50, so that the contact of the paper strips and the ribbon *b* is loosened when the ribbon *b* is to be fed. The ribbon *b'* is of course fed by the usual appliances in the main part of the machine, and although I have described this ribbon as passing vertically downward it may be arranged to move transversely parallel to the other ribbon.

While there has been illustrated a particular combination and arrangement of parts more especially for use with a calculating-machine, the combination and arrangement may be greatly varied, different means of feeding the ribbon may be employed, and other mechanism than that described may be employed for reciprocating and turning the platen.

While the ribbon *b'* may be used for making the original copy, this is not always necessary, as the type may be inked for the primary impression, or when a strip of thin paper is interposed between the type and the ribbon *b* the ribbon *b'* as well as the inking devices for the type may be dispensed with, the ink which is absorbed by the thin paper strip from the ribbon *b* penetrating the strip sufficiently to show upon the face thereof and make the required impression.

Without limiting myself to the precise construction and arrangement of parts shown, I claim as my invention—

1. In a duplicate-printing device, the combination with a platen and movable type, of means for feeding two superposed sheets between the platen and type, a ribbon passing between the sheets, devices for feeding the ribbon mechanically transversely to the direction in which the sheets are fed, a second ribbon interposed between the type and outer sheet, and means for feeding the same, substantially as described.

2. The combination with the main frame, type, printing-ribbon and its feeding devices, of a printing-frame detachably mounted upon the main frame, a platen movable upon the printing-frame, means for carrying two superposed strips between the platen and type, a second printing-ribbon, and means for feeding the same between the superposed strips, substantially as described.

3. The combination with type and their actuating devices, of a frame carrying superposed strips of paper, a printing-ribbon extending transversely between the strips, means for feeding the ribbon, a platen, and mechanism for moving it into contact with the strips and for moving it out of contact with

said strips to permit the separation thereof while the printing-ribbon is being fed, substantially as described.

4. The combination with type and their actuating devices, of a frame carrying superposed strips of paper and feeding mechanism therefor, a printing-ribbon extending transversely between the strips, means for feeding the same, devices for maintaining the ribbon taut, a platen, and mechanism for moving it into contact with the strips, and for moving it out of contact with said strips to permit the separation thereof while the printing-ribbon is being fed, substantially as described.

5. The combination with a frame provided with separated bearings, of a movable platen adapted to be carried to and from the bearings, means for feeding superposed sheets of paper intermediate the bearings and platen, a ribbon extending between the superposed sheets, means for feeding the ribbon, movable type, and actuating devices for the type, substantially as described.

6. The combination of a platen, type, means for feeding superposed sheets between the platen and type, a ribbon passing between the sheets, means for feeding the ribbon intermittently and transversely to the direction in which the sheets are fed, and means for carrying the platen away from the sheets during the feeding of the ribbon, and for holding it in contact with the sheets during the movement of the type, substantially as described.

7. The combination with a platen and type, of means for feeding a sheet between the type and platen, a ribbon interposed between the type and sheet, two rolls for carrying the ribbon, mechanism for positively rotating one of the rolls in one direction, and simultaneously operating devices for frictionally driving the other roll in the opposite direction, substantially as described.

8. The combination of a platen, type, and ribbon-rolls E, E', of shafts for said rolls, friction connections between one of the rolls and its shaft, and means for turning the other shafts and roll in different directions, substantially as described.

9. The combination of a platen, type, and ribbon-rolls E, E', of shafts for said rolls, friction connections between one of the shafts and its roll, and driving devices for turning said shaft in one direction, and devices for turning the other shaft in either direction, substantially as described.

10. The combination of ribbon - spools, shafts supporting the same, a vibrating arm, a pawl having a yielding bearing and ratchet-wheel adapted to be engaged by the pawl in either position to rotate one of the shafts in either direction accordingly as the pawl assumes either position, friction connections between the other spool and its shaft, and means for turning the latter shaft in one direction, substantially as described.

11. The combination of a platen, type mov-

able to and from the platen, means for feeding superposed sheets between the type and platen, devices for moving the platen to and from the type, a ribbon arranged between the sheets, and mechanism for feeding the ribbon, substantially as described.

12. The combination of a movable platen, type movable to and from the platen, means for feeding superposed sheets between the type and platen, a printing-ribbon extending transversely between the superposed sheets, mechanical means for intermittently feeding the ribbon, and separated presser-bars against which the sheets are pressed by the platen during the printing operation, substantially as described.

13. The combination of a movable platen, type movable to and from the platen, superposed sheets, and means for feeding the same between the platen and type, a printing-ribbon, means for feeding the same transversely to the direction in which the sheets are fed, and devices for maintaining the ribbon taut during the feeding operation, substantially as described.

14. The combination of a platen, type, supports for two superposed strips of paper, and means for feeding the strips between the platen and type, a printing-ribbon passing between the strips, and positively and intermittently actuated means for feeding the printing-ribbon in a direction transverse to the line in which the strips are fed, substantially as described.

15. The combination with a platen and type, of means for feeding a sheet between the type and platen, a ribbon interposed between the type and sheet, two rolls for carrying the ribbon, a shaft upon which one of said rolls is loosely mounted, frictional connections between the shaft and its roll, means for rotating the shaft, and mechanism for positively rotating the other roll, substantially as described.

16. The combination with the main frame,

type, printing-ribbon and its feeding devices, of a printing-frame pivotally mounted upon the main frame, a platen movable upon the printing-frame, means for carrying two superposed strips between the platen and type, a second printing-ribbon extending transversely between the superposed strips, and means for feeding the same, substantially as described.

17. The combination of a ribbon, feeding devices therefor, means for reversing the action of the feeding devices, and mechanism for automatically shifting the reversing means under unusual tension upon the ribbon, substantially as described.

18. The combination with a platen and type, of means for feeding a sheet between the same, a printing-ribbon interposed between the type and sheet, and automatically-actuated devices for causing the ribbon to be fed first in one direction and then in the opposite direction, substantially as described.

19. The combination with a frame carrying type and their operating mechanism, of a second frame adapted to swing into and out of printing position, means for locking it in the latter position, and a platen and ribbon-feeding devices carried upon said second frame, substantially as described.

20. The combination with the main frame and type, of a printing-frame mounted upon the main frame to be moved with respect thereto, a movable platen mounted upon the printing-frame, mechanism for moving the type to and from the platen, and mechanism for moving the platen to and from the type, substantially as described.

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

WILLIAM HENRY PIKE, JR.

Witnesses:

EDMUND GAY LANGHORNE,
JOHN TAYLOR LANGHORNE.