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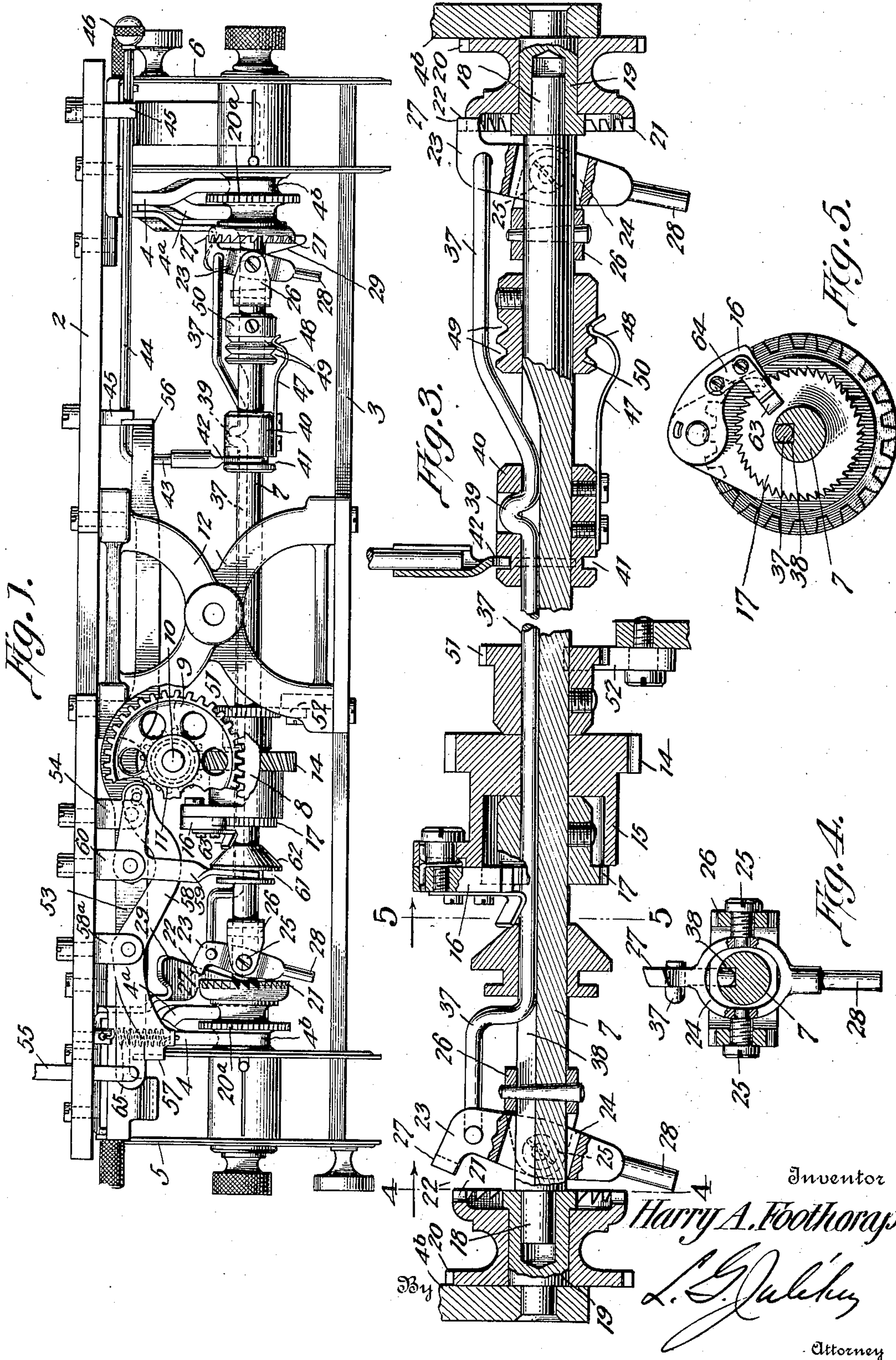
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RIBBON MECHANISM FOR TYPEWRITING MACHINES

Original Filed Dec. 14, 1914

2 Sheets-Sheet 1



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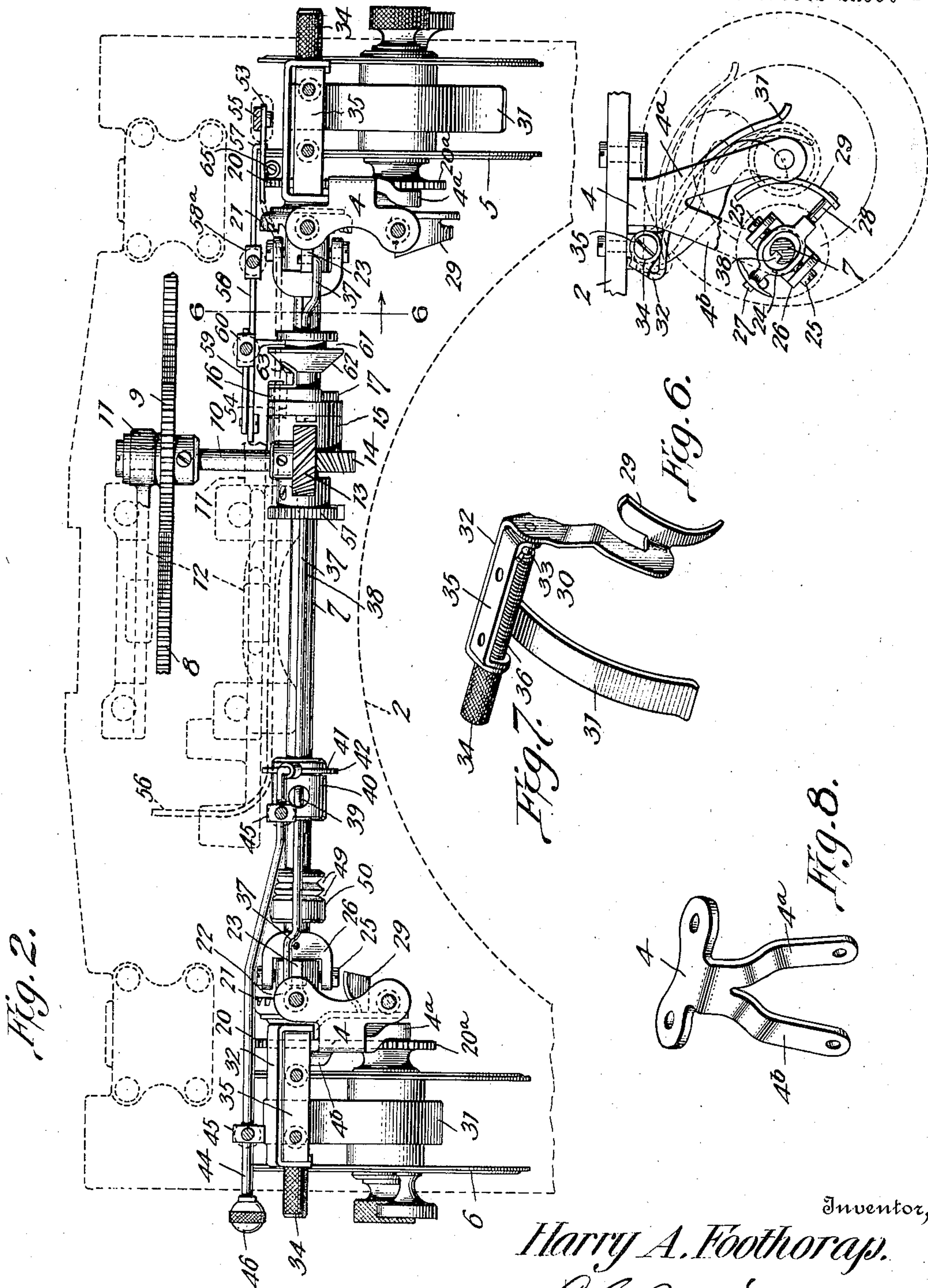
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UNITED STATES PATENT OFFICE.

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RIBBON MECHANISM FOR TYPEWRITING MACHINES.

Original application filed December 14, 1914, Serial No. 877,216. Divided and this application filed August 17, 1918. Serial No. 250,314.

To all whom it may concern:

Be it known that I, HARRY ARTHUR FOOTHORAP, citizen of the United States of America, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Ribbon Mechanism for Typewriting Machines, of which the following is a specification.

This invention relates to a novel ribbon mechanism adapted more particularly for use in connection with machines of that type characterized by a stationary platen and downwardly acting printing mechanism.

The mechanism shown in the accompanying drawings is also shown and described in applicant's Letters Patent of the United States No. 1,286,573, issued on an application of which this is a division. Only so much of the mechanism disclosed in said patent as is necessary to the understanding of the features of the invention claimed herein is shown and described in the present application. For a complete description of the mechanism herein shown and its associated parts reference may be had to said patent.

The object of the invention, speaking generally is to provide an efficient and economical feed and ribbon reverse mechanism for a flat platen typewriter of the visible writing type.

Another object of the invention is to produce a ribbon mechanism of the specified character, including a novel efficient and inexpensive automatic ribbon feed, which receives the necessary power for its operation from the carriage propelling mechanism, and the primary elements of which are respectively carried by the escapement brackets.

Another object is to provide a simple and efficient automatic reverse for the ribbon, the reversing mechanism including setting means controlled by the ribbon to determine the subsequent operation of the reversing mechanism by power applied from the carriage propelling mechanism.

Still other objects of the invention will appear as the necessity for their accomplishment is developed in the succeeding de-

scription of the illustrated embodiment of the invention.

To the accomplishment of the above recited objects and others which will more fully hereinafter appear, one embodiment of the invention resides in the construction and arrangement of parts illustrated in the accompanying drawings, described in the following specification, and succinctly defined in the appended claims.

In the accompanying drawings:

Figure 1 is a rear elevation of a portion of the ribbon mechanism.

Figure 2 is a plan view of the portion of the ribbon feeding mechanism, the adjacent structure being shown in dotted line.

Figure 3 is a longitudinal section through the subject matter of Figure 1, but on a somewhat larger scale and with the center broken out.

Figure 4 is a transverse section on the line 4—4 of Figure 3.

Figure 5 is a detail section on the line 5—5 of Figure 3.

Figure 6 is a detail section on the line 6—6 of Figure 2.

Figure 7 is a detail prospective view of one of the setting devices for the ribbon reversing mechanism.

Figure 8 is a detail view of one of the supporting brackets.

The machine to which my ribbon mechanism is shown applied is what is known as the Elliott-Fisher billing machine which is of that type in which the platen is stationary and above which moves longitudinally a line space frame supporting a carriage which is movable transversely of the platen to letter space the writing accomplished by a downwardly acting printing mechanism mounted on and movable with said carriage.

The typewriter carriage, the upper portion of which is not shown, is provided with a bottom which constitutes a deck 2, below which is disposed a type ring 3 on which is mounted on a forwardly opening arc a series of type bars (not shown). From the deck 2 adjacent to the opposite ends thereof, are suspended a pair of brackets 4, bifurcated to form bearing arms which are somewhat offset, as shown in Figure 8. The front arms 4^a are designed for the support

of the ribbon spools 5 and 6, while the rear arms 4^b serve as support for the ribbon feed shaft 7. As the detail structure of the ribbon spools, and the means for guiding the ribbon past the printing point and from one spool to the other is not pertinent to this invention, the same is not specifically described.

It has been stated that the ribbon feeding mechanism receives the necessary power for its operation from the carriage propelling mechanism. For this purpose there is extended across the rear of the main machine frame, upon which the carriage travels, a feed rack 8, with which meshes the ribbon feed pinion 9, mounted on the ribbon driving shaft 10, which is a short shaft extended at right angles to the rack 8, and journaled in bearings 11, formed in the front and rear escapement brackets 12.

On the inner end of shaft 10, is a small worm gear 13 meshing with a somewhat larger worm gear 14 mounted on the ribbon feeding shaft 7 and designed to be clutched thereto when the ribbon is to be fed and to be released therefrom to effect the release of the ribbon during the retraction of the carriage or free forward movement thereof. The wheel 14 has a hollow hub 15 on one end of which is mounted a driving pawl 16 spring urged into engaging relation with the driving ratchet 17 fixed to the shaft 7 and having its hub extended into the hollow hub 15 of the gear 14, as shown.

Under normal writing conditions, the rotation of the pinion 9 by reason of its movement with the carriage while enmeshed with a fixed rack, will rotate the shaft 10 and through the worm gears 13 and 14 will rotate the shaft 7 through the medium of the pawl 16 and the ratchet 17. This movement of the shaft 7 is intended to be imparted to one of the ribbon spools. The shaft 7 is therefore provided with reduced ends 18 journaled in bearings 19 fixed to and extended inwardly from the arms 4^b of the bracket 4 and upon the exterior of these bearings 19 are mounted driving pinions 20 meshing with the spool pinions 20^a and having their hubs provided with crown ratchets 21, each of which forms one element of a clutch designated as a whole by 22.

The two clutches 22 are designed to be brought into action alternately to drive the ribbon spools in alternation. The other element of each clutch 22 is in the form of a lever 23 having an annular central portion 24 which surrounds the shaft 7 and is fulcrumed upon two opposed fulcrum screws 25 screwed into the ends of a lever supporting yoke 26 keyed or otherwise secured to the shaft 7.

At one end of the lever 23 is a tooth 27 designed to engage the teeth of the ratchet 21 and the opposite end 28 of the lever is of

reduced cylindrical form to engage a reversing cam 29 constituting one arm of a controlling device designated as a whole by 30 and having another arm 31 which is in effect a follower resting upon the periphery of the wound portion of the ribbon and designed to follow in toward the axis of the ribbon spool as the ribbon is unwound therefrom for the purpose of presenting the reversing cam 29 into position to be engaged by the end 28 of the adjacent lever 23. When the cam is in such position, the rotation of the shaft 7 will move the lever 23 along the cam which will swing the lever into engagement with the adjacent crown ratchet and thus clutch the adjacent driving gear to the shaft 7 to establish a driving connection between the depleted spool and the ribbon feeding mechanism.

The controlling device 30, consisting of the cam arm 29, follower arm 31 and connecting piece 32, is mounted to swing from a pin 33 having a knurled head 34 and mounted to rotate in a bearing bracket 35 secured to the bottom of the carriage deck 2, a spring 36 serving to swing the controlling device toward its active position as the resistance opposed to such movement by the ribbon wound on the adjacent spool is gradually withdrawn. The two clutch levers 23 are connected by a reversing bar 37 mounted to move in a longitudinal channel 38 in the shaft 7 and bent to form a lateral projection 39 engaging a cylindrical shifter 40 mounted on the shaft 7 to rotate therewith but shiftable longitudinally thereof to move the reversing bar endwise in one direction or the other for the purpose of engaging one lever 23 and disengaging the other.

The shifter 40 is formed with an annular groove 41 to receive a yoke 42 carried by the down-turned end 43 of a reversing rod 44 slidable in bearings 45 suspended from the deck 2. The outward end of the reversing rod 44 is formed with a handle or head 46 exposed at one side of the machine for convenient manipulation by the operator when it is desired to effect the reversal of the ribbon feed by hand. To positively retain the clutch levers 23, the reversing bar 37 and shifter 40 in the position to which they are moved either by the automatic operation of the controlling devices or by the manual operation of the reversing rod, a retaining device is provided. This device comprises a retaining spring 47 screwed or otherwise secured to the shifter 40 and bent to form a catch 48 designed to engage either of two annular grooves 49 formed in a collar 50 fixed to the shaft 7. To prevent reverse rotation of the shaft 7, the latter is provided with a fixed ratchet 51, the teeth of which are spaced to correspond with the spacing of the carriage and engaging a pawl 52 carried by

a relatively fixed part, as shown in Figure 3.

It will now be seen that as the carriage advances, the engagement of the rack 8 and pinion 9, the former being stationary and the latter movable with the carriage, will effect the rotation of the ribbon feed shaft 7, through the medium of the interposed gearing and thus drive the ribbon spool whose clutch lever 23 is in engaging position, the opposite or disengaged spool being rotated independently by the ribbon being withdrawn or unwound therefrom. Also, it will be seen that as such ribbon is unwound, it will permit the follower 31 of the adjacent controlling device 30 to approach the axis of the spool until the reversing cam 29 of said device is presented in position to be engaged by the tail 28 of the disengaged clutch lever 23. During the next few advances of the carriage after this relation of the parts has been established will be accompanied by a continued feeding of the ribbon and by the shifting of the disengaged clutch lever into engagement, the simultaneous disengagement of the other clutch lever 23 being, of course, effected by the reversing bar 37. When the carriage is retracted, the ribbon feeding shaft 7 will not rotate because in the line of gearing between the feed pinion 9 and said shaft is interposed the pawl and ratchet 16 and 17. Therefore, while the pinion 9, shaft 10 and gears 13 and 14 will be rotated backward during the retraction of the carriage, the pawl 16 will move idly back over the ratchet 17 to avoid reverse rotation of any of the parts beyond the pawl. Any tendency of such parts to rotate will be effectually resisted by the pawl 52.

It is also desirable to throw the ribbon feeding mechanism out of action and to thus discontinue the feed of the ribbon whenever the carriage is released from the carriage feeding mechanism, as, for instance, in jumping or skipping the carriage from one point to another as in tabulating. This end is obtained by providing ribbon release mechanism which, in the present embodiment of my invention, is operated by the

53 indicates the carriage release lever (see Figure 1) fulcrumed in a bracket 54 suspended from the deck 2 adjacent to its rear edge and having at one end a connection 55 extending to the carriage release key not shown. The other end 56 of the carriage release lever (see Figure 2) is bent rearwardly to engage and operate the holding dog of the carriage escapement in a manner explained in my Patent No. 1,203,519 of October 31, 1916. Adjacent to the connection 55, the carriage release lever 53 overlies the laterally deflected end 57 of the ribbon release lever 58 fulcrumed in a bracket 58^a dropped from the deck 2. The opposite end of the lever 58 is connected to one arm of a bell crank cam shifter

59 fulcrumed in a bracket 60 and having its other arm bifurcated to engage an annular groove 61 formed in a cam 62 of truncated cone shape, mounted to slide longitudinally on the shaft 7 and designed to engage an inclined finger 63 extending from a plate 64 secured to one side face of the pawl 16 and extended inwardly, or toward the axis of the shaft 7 to dispose the finger in position to be engaged by the cam 62. Normally, however, the pawl 16 is in engagement with the ratchet 17 and the cam 62 is retained in its inactive position by a spring 65 secured to one end of the lever 58 and to the deck and tending to retract the ribbon release mechanism as well as the carriage release lever engaged thereby.

It will now be seen that whenever the carriage is released from the escapement by the operation of the carriage release lever 53, the ribbon release lever 58 will be swung to operate the cam 61 which will force the cam 62 under the finger 63 and thus lift the pawl 16 out of the engagement with the ratchet 17. As long as the cam 62 is retained in this position, the pinion 9, 13, and 14 will rotate idly with the pawl 16 ineffective and the finger 63 traveling upon the face of the cam 62. The ribbon feed shaft 7, of course, remains stationary and any feeding movement of the ribbon is discontinued until the operator relieves the pressure on the carriage release mechanism and permits the retraction thereof and of the ribbon release mechanism at which time the withdrawal of the cam 62 from the finger 63 will permit the pawl 16 to re-engage the ratchet 17 and restore the ribbon feeding mechanism to operative condition.

What I claim is:—

1. In a typewriter, the combination with a movable carriage, ribbon spools movable therewith and a feed shaft common to said spools, of a relatively fixed rack, gearing between the rack and shaft whereby the movement of the carriage will rotate the shaft, means for operatively connecting either spool with the shaft and ribbon release mechanism operative to render the gearing effective or ineffective to drive the shaft.

2. In a typewriter, the combination with a movable carriage, ribbon spools mounted thereon, and a ribbon feed shaft common to both spools, of a relatively fixed rack, gearing between the shaft and rack whereby the movement of the carriage will effect the rotation of the shaft, means for operatively connecting either of said spools with the shaft, ribbon release mechanism for rendering the ribbon feeding mechanism inoperative and carriage release mechanism arranged to operate the ribbon release mechanism to release the ribbon when the carriage is released for free movement.

3. In a typewriter, the combination with a movable carriage, ribbon spools and a ribbon feed shaft, of a relatively fixed rack, gearing between the rack and shaft and including a pawl and ratchet permitting retraction of the carriage without driving the shaft, a cam carried by the shaft to disconnect the pawl and ratchet, a cam shifter, a ribbon release lever for operating the shifter and a carriage release lever arranged to operate the ribbon release lever.
4. In a typewriter, the combination with a movable carriage, of a pair of ribbon spools, ribbon feeding mechanism operated by the movement of the carriage and ribbon controlled ribbon reversing mechanism also operated by the movement of the carriage.
5. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of ribbon feeding mechanism operated by the movement of the carriage, ribbon reversing mechanism also operated by the movement of the carriage and controlling means for the ribbon reversing mechanism, said controlling means being in turn controlled by the ribbon wound on the ribbon spools.
6. In a typewriter, the combination with a movable carriage, of ribbon spools movable therewith, ribbon feeding and ribbon reversing mechanism movable with the carriage and operated by the movement thereof and automatic means controlling the operation of the reversing mechanism, and both manual and automatic devices controlling the operation of the ribbon reversing mechanism.
7. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of ribbon feeding mechanism, ribbon reversing mechanism, a controlling device, movable to different positions, and serving in one position to cause the operation of the ribbon reversing mechanism through the movement of the carriage.
8. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of ribbon feeding mechanism operated by the movement of the carriage, ribbon reversing mechanism operated by the carriage to disconnect one of the ribbon spools from the ribbon feeding mechanism and to connect the other spool to said ribbon feeding mechanism, and a controlling device coacting with the ribbon reversing mechanism in one position and having its position controlled by the ribbon wound on one of the spools.
9. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of a ribbon feeding shaft rotated by the movement of the carriage, gearing between the ribbon feeding shaft and the spools, ribbon reversing mechanism including clutches in the line of said gearing and an automatic position controlling device coacting with the clutches through the movement of the carriage to engage one clutch and disengage the other.
10. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of ribbon feeding mechanism operated by the movement of the carriage, clutches controlling the operation of the respective spools by the feeding mechanism and reversing cams coacting with the clutches through the movement of the carriage.
11. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of means for driving the ribbon spools through the movement of the carriage, clutches controlling the operation of the respective spools, reversing cams coacting with the clutches through the movement of the carriage to determine the spool to be driven and means coacting with the ribbon to determine the positions of the cams.
12. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of a ribbon feeding shaft rotated by the movement of the carriage, a driving connection between each ribbon spool and the shaft, said driving connection including a clutch, one member of which is constantly rotatable with the shaft and a reversing cam movable into and out of position to be engaged by said clutch member as the feeding shaft rotates.
13. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of a ribbon feeding shaft rotated by the movement of the carriage, a pair of connected clutch members carried by and movable with the shaft, other clutch members geared to the ribbon spools and adapted to be engaged alternately by the clutch members first named and cams alternately coacting with the clutch members carried by the shaft and by reason of the rotation of said shaft.
14. In a typewriter, the combination with a movable carriage and ribbon spools movable therewith, of a ribbon feeding shaft movable with the carriage and operated by the movement thereof, clutches between said shaft and the ribbon spools, two of the clutch members being connected and mounted on the feeding shaft to rotate therewith and to move relative thereto into and out of engaging position, and a pair of independent ribbon controlled reversing cams each of which is movable into position to coact with one of the connected clutch members to move said member to its engaging position as said member is caused to traverse the cam by the rotation of the shaft.
15. In a typewriter, the combination with a movable carriage and ribbon spools mov-

able therewith, of ribbon feeding mechanism operated by the movement of the carriage and including a ribbon feeding shaft, a pair of clutch levers pivotally mounted on the shaft, a reversing bar connecting said levers, a pair of ratchet gears geared to the ribbon spools and disposed to be engaged by the clutch levers and a pair of controlling devices each including a reversing cam adapted to coact with a clutch lever and a follower coacting with the ribbon to determine the position of the cam.

16. In a typewriter, the combination with a carriage and ribbon spools, of bearings, clutch members rotatable on the bearings and geared to the spools, a ribbon feeding shaft journaled in the bearings, clutch members mounted on the bearings, means for moving the last named clutch members into

and out of engaging position and means for driving the shaft through the movement of the carriage.

17. In a typewriter, the combination with a carriage and ribbon spools, of a ribbon feeding shaft, clutches for connecting the shaft to the spools, a reversing bar connecting the clutches and carried by the shaft, a shifter also carried by the shaft to move said bar, driving mechanism for the feeding shaft and means carried by the shaft and controlling the connection of the driving mechanism therewith.

In testimony whereof I affix my signature in the presence of two witnesses.

HARRY ARTHUR FOOTHORAP.

Witnesses:

J. F. CULVERWELL,
MARSHALL H. DEAN.