No. 896,539. PATENTED AUG. 18, 1908.

E. B. HESS.

WRITING MACHINE.

APPLICATION FILED NOV. 11, 1907.

4 SHEETS—SHEET 1.

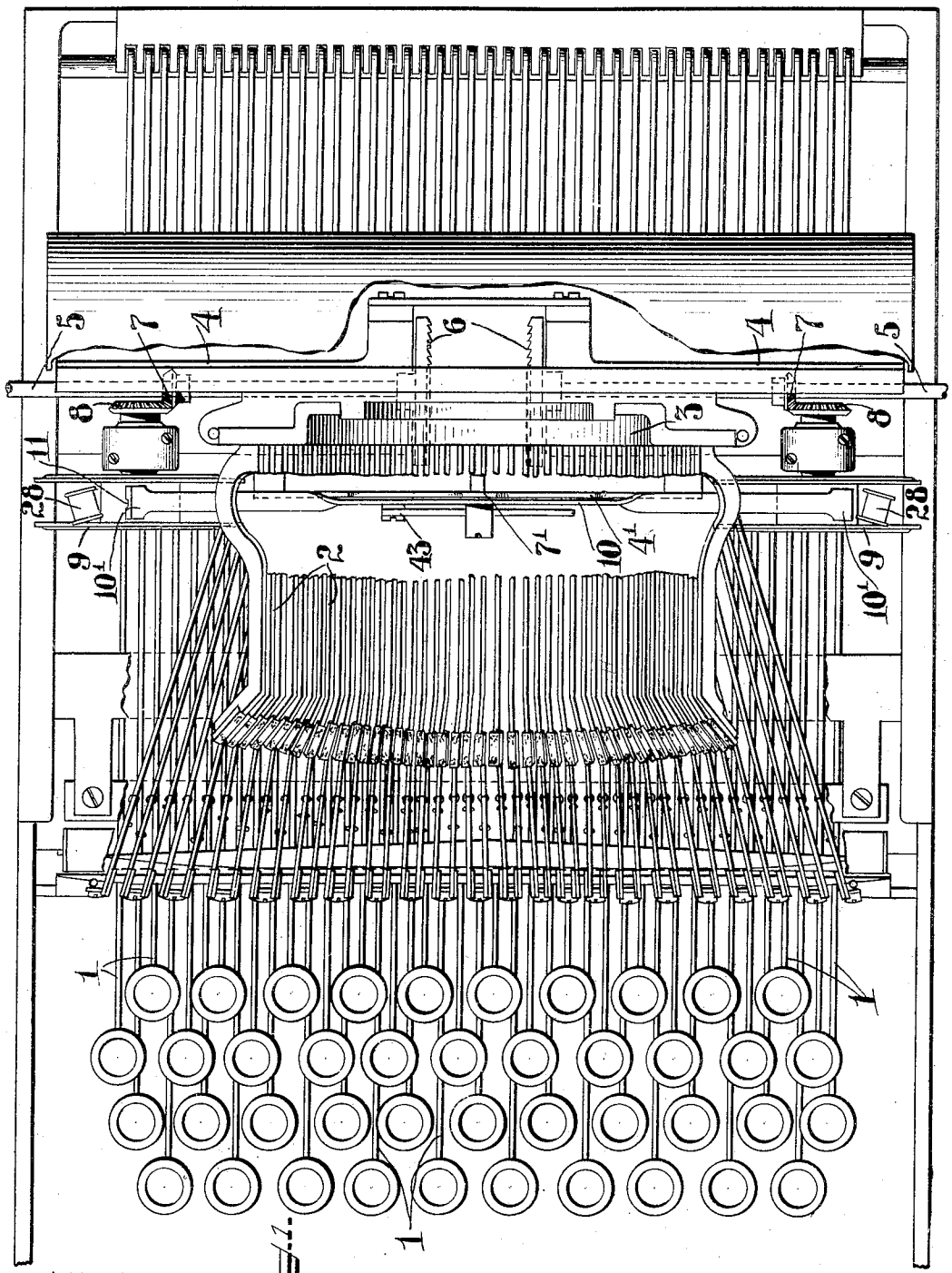


Fig. 1.

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L. F. Browning.

by

Inventor:

Edward B. Hess

Edward C. Davidson Atty

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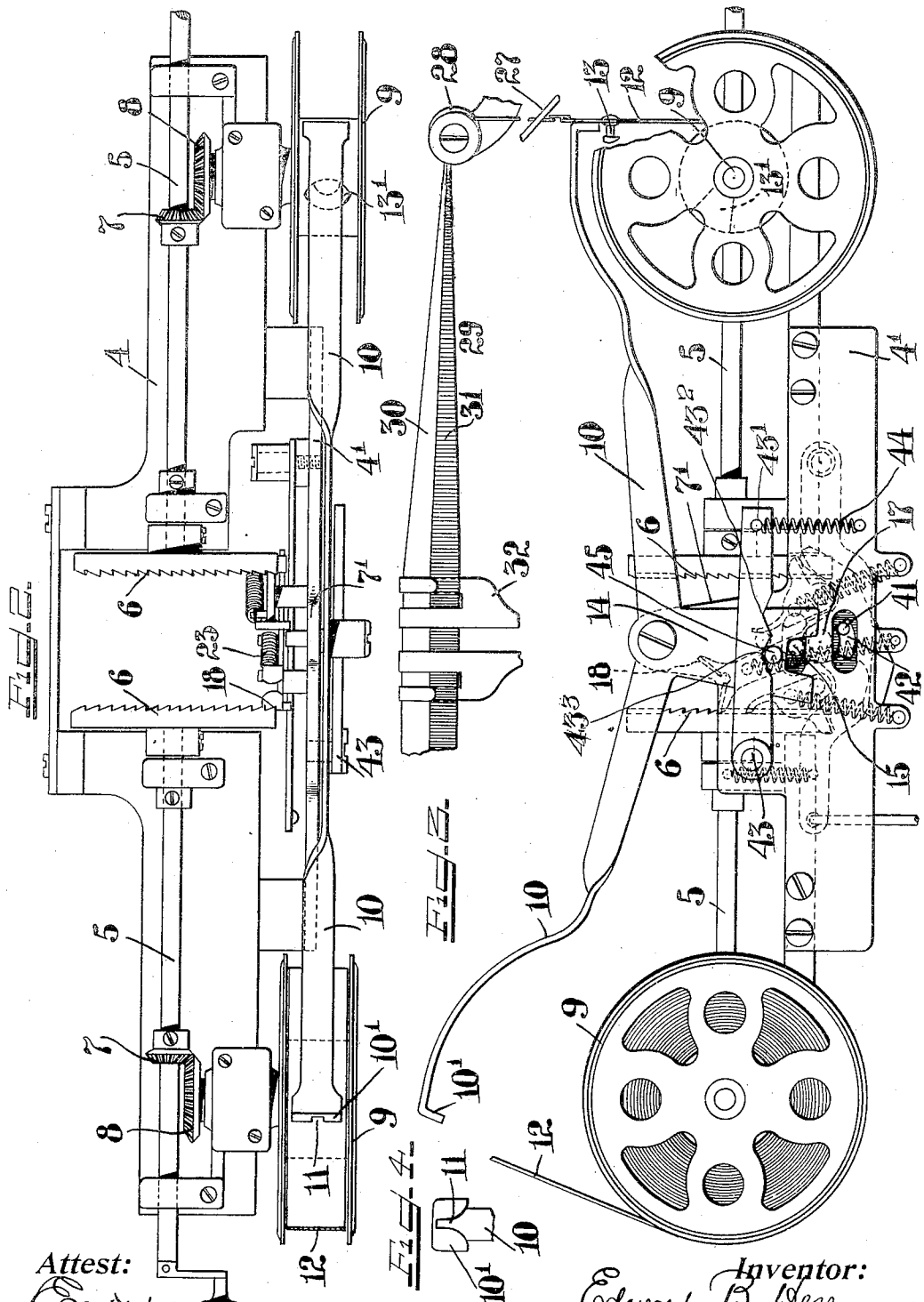


Fig. 2.

Fig. 3.

Fig. 4.

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C. Mitchell

L. L. Browning.

Inventor:

Edward B. Hess.

by Edward C. Davidson Atty

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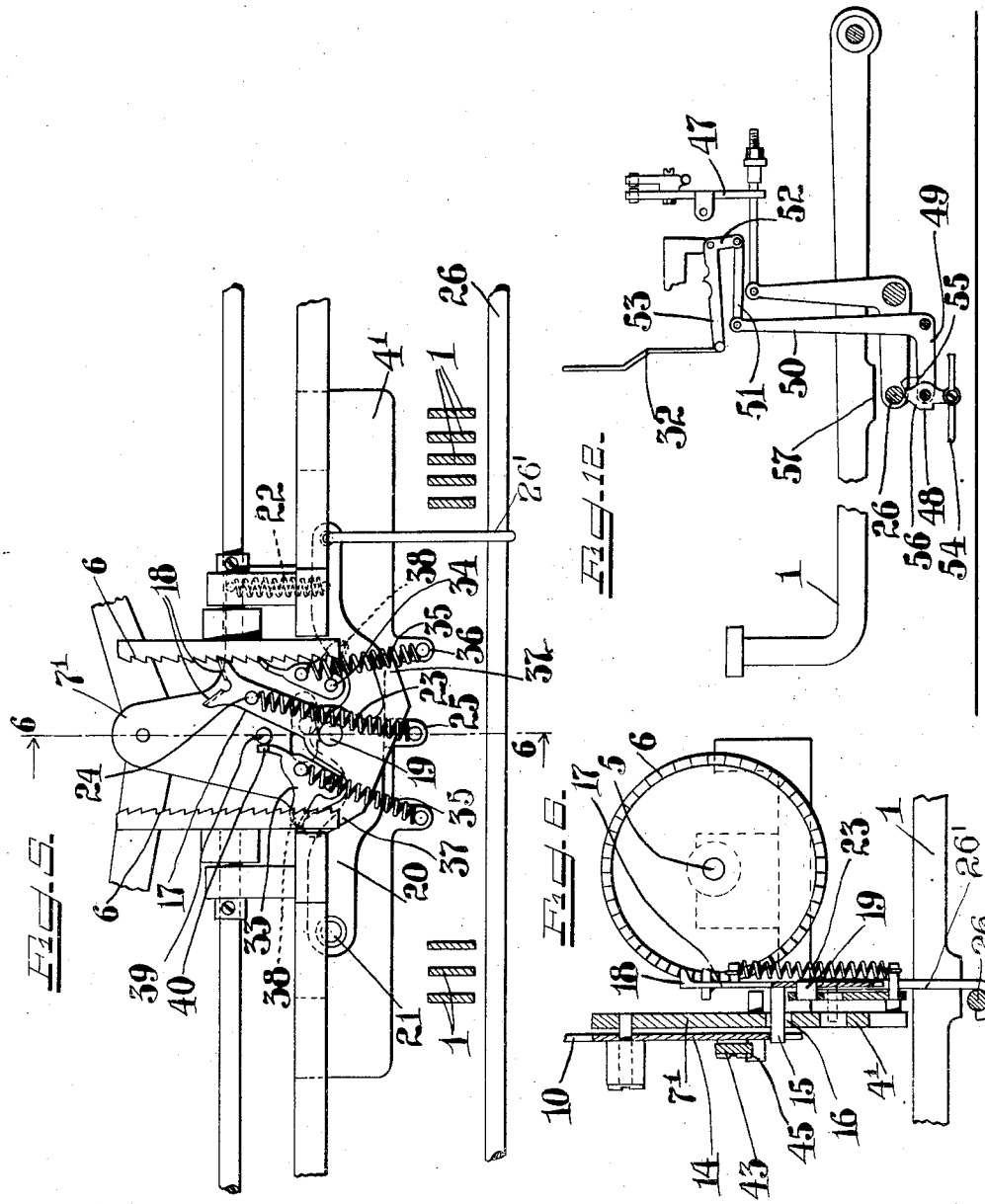


Fig. 5.

Fig. 12.

Fig. 6.

Attest:

S. D. Whitaker

L. F. Browning

Inventor:

Edward B. Hess

by Edward C. Davidson Atty

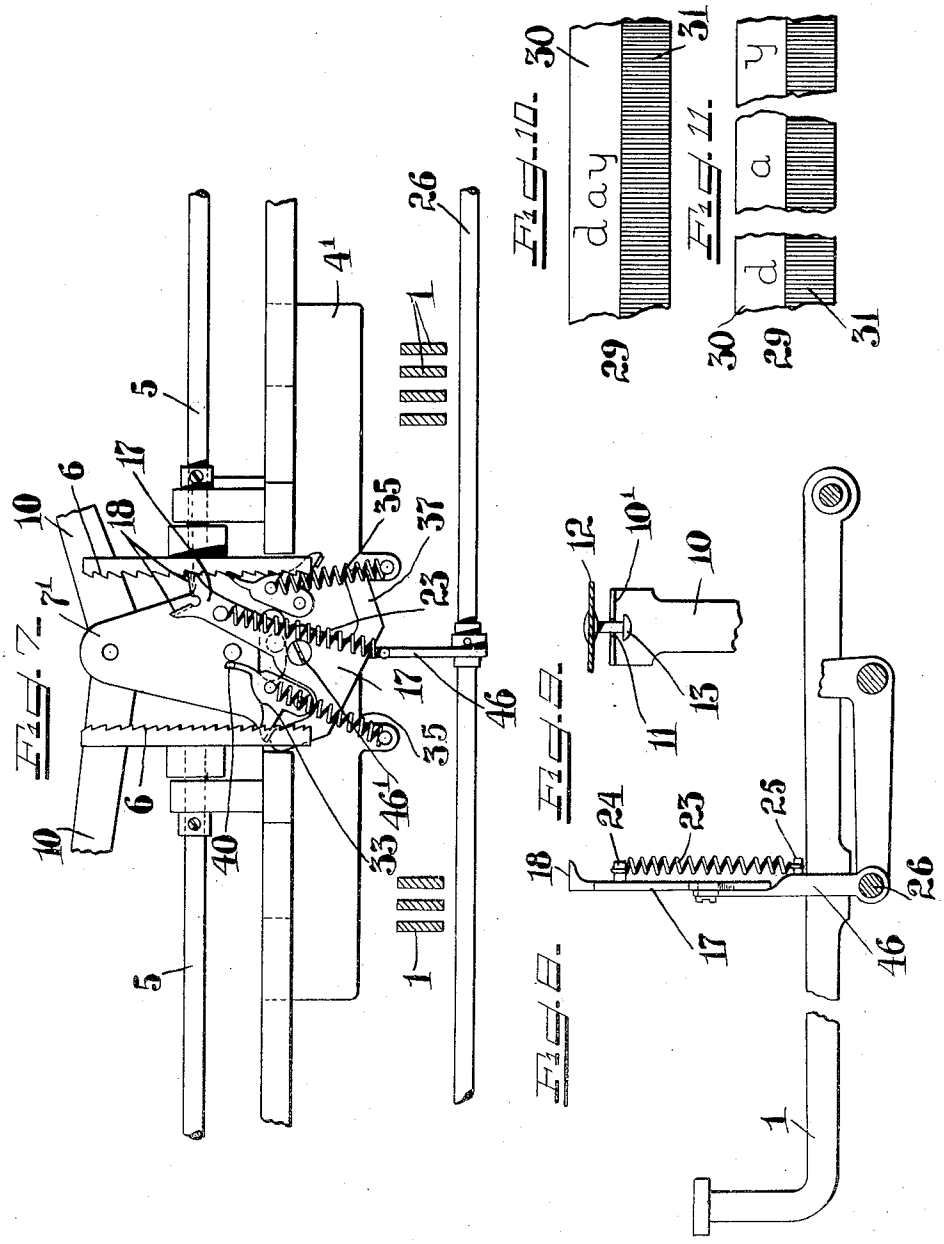
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4 SHEETS—SHEET 4.



Attest:
S. D. Mitchell
L. L. Browning

by

Inventor:
Edward B. Hess
Edward C. Davidson
Atty

UNITED STATES PATENT OFFICE.

EDWARD B. HESS, OF NEW YORK, N. Y., ASSIGNOR TO ROYAL TYPEWRITER COMPANY, OF HOBOKEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

WRITING-MACHINE.

No. 896,539. Specification of Letters Patent. Patented Aug. 18, 1908.

Application filed November 11, 1907. Serial No. 401,561.

To all whom it may concern:

Be it known that I, EDWARD B. HESS, a citizen of the United States of America, residing in the borough of Brooklyn, city and State of New York, have invented certain Improvements in Writing-Machines, of which the following is a specification.

This invention relates to ribbon mechanism.

It comprises a novel arrangement of apparatus whereby automatic reverse of the ribbon is effected and direct manual operation of ribbon in either direction permitted: and also means of adjusting the throw of the ribbon to insure with respect to the several finger pieces of the machine, proper relation, at the moment of printing, between the type and a selected zone of a polychrome ribbon to thereby eliminate the danger of having the lower ends of such letters as "y", "g". and "c", encroach at the bottom upon an adjoining zone or extend beyond the lower edge of the ribbon, and similarly to insure that the upper ends of letters such as "d" shall not extend above the upper edge of the ribbon or encroach upon the upper zone of the ribbon when printing is being effected from the lower zone.

In the accompanying drawings Figure 1 is a general plan view, partly broken away, of so much of a machine as is deemed desirable to illustrate this invention: Fig. 2, a detail plan view on a larger scale showing the ribbon reverse devices: Fig. 3, a front elevation thereof: Fig. 4, an elevation of one end of the rocking lever that effects reverse of the ribbon feed: Fig. 5, a rear elevation of the ribbon reverse devices: Fig. 6, a section through Fig. 5, on the line 6, 6: Fig. 7, a rear elevation similar to Fig. 5 showing a modification: Fig. 8, a detail longitudinal view showing a key lever and the pawl for driving the ribbon spools in reverse direction: Fig. 9, a detail view showing the end of the rocking ribbon reverse lever engaged by an obstruction on the ribbon or on the spool type: Figs. 10 and 11 show a section of bichrome ribbon having placed thereon the letters "d", "a", "y", to indicate the relation of the zones of the ribbon to the type at the moment of impact of the type: and Fig. 12 is a detail longitudinal view indicating the ribbon vibrator adapted for use of a polychrome ribbon and actuating devices therefor.

1 indicates key levers equipped with usual finger pieces that may be pivotally mounted in any appropriate way.

2 indicates the type bars normally lying toward the front of the machine and pivotally mounted in a segment 3. The arrangement may be that of ordinary front strike machine construction. Below the type bars and segment and above the key levers there extends transversely between the side plates of the machine a frame 4 in which are mounted two rotatable shafts 5 carrying upon their adjacent inner ends crown ratchet wheels 6, 6, and having at their outer ends cranks by which they may be rotated by hand. Each shaft 5 has a bevel pinion 7 gearing with a pinion 8 on the shaft of a ribbon bobbin spindle 9. The bobbins are disposed respectively at the right and left hand sides of the machine and the toothed faces of the crown ratchets 6 face each other being disposed suitably adjacent each other and equi-distant from the longitudinal center line of the machine. On the front of frame 4 is rigidly secured a transverse plate 4′ from which there extends upwardly a standard 7′ in the end of which is pivoted at its center a lever 10 whose ends are inclined upwardly and respectively overlie the bobbins 9. Each end of the lever is formed with a flange 10′ substantially at right angles to the body of the lever and formed with a slot or recess 11, the open end of which is enlarged as seen in Fig. 4. These recessed ends of the lever are to be engaged by projections brought into action by the travel of the ribbon. In this instance such projections are shown mounted on the bobbin tapes 12 and are in the form of projecting headed studs 13 (which when the tape is wound enter sockets 13′ in the hubs of the bobbins) the shanks of which enter the recesses 11 in the ends of the rocking lever 10 and operate to throw it alternately from one position to another to thereby effect automatic reverse of the ribbon feed. The lever 10 has at its center a downward projection 14 recessed at the end to straddle a pin 15 extending through a slot 16 in standard 7′ and secured to a rocking pawl 17 formed at its upper end with opposite like teeth or points 18 and adapted to be swung from a position of engagement with one crown ratchet into a position of engagement with the other. This movement is effected when

lever 10 is rocked and its part 14 acts upon 15. The pawl 17 is pivoted at 19 on a horizontally disposed lever 20 having one end pivoted at 21 upon the plate 4′ and the other held up by a suitable spring such as 22. A coiled spring 23 attached to a pin 24 on the side of the rocking pawl 17 above its pivot is attached at its lower end to a projection 25 on the lever 20. The disposition of this spring 23 is such with reference to the axis 19 of the pawl that when the pawl is moved into engagement with one of the crown ratchets, the reaction of the spring tends to maintain it and when swung laterally to engage the other crown ratchet, the line of strain of the spring passes to the other side of the axis 19 and tends to hold the pawl in engagement with the latter ratchet.

26 is a universal bar above which lie the key levers 1. It is connected by link 26′ with the free end of lever 20. When the universal bar is depressed, pawl 17 is drawn downwardly and when the universal bar rises the pawl engages a tooth of one of the crown ratchet wheels and advances it one step. In this way automatic step by step feed of the ribbon is effected in either direction according to the position of the feed pawl determined by the position of lever 10. As shown in Fig. 3, the ribbon on the right hand bobbin has run out and the projection 13 on the tape of that bobbin is about to engage the right hand end of lever 10. The effect of such engagement will be to elevate that end of the lever and shift pawl 17 to the crown ratchet at the right.

27 indicates a ribbon guide of any appropriate construction of which there is to be one adjacent each bobbin and 28 indicates an idler roller over which the ribbon passes and of which, of course, there will be one at each side of the machine. The guides 27 act as means to insure engagement of the studs 13 with the slots or notches in the bent ends of lever 10. These ribbon guides, 27, are of a well known construction and are made either of sheet metal or of wire and, in either case, each has a slot through which the ribbon passes. The guides are secured to the side frames, or side plates of the machine and project inwardly into appropriate relation to the ribbon.

29 is the ribbon shown as having two zones 30, 31 of different color or character.

32 is the usual ribbon vibrator such as is employed in front strike machines. It may be operated as hereinafter described or in other suitable ways.

It has not been thought necessary to show the platen and other details of a typewriting machine not relating particularly to the subject matter that is claimed herein.

It is desirable to employ in connection with the ratchet wheels detent pawls. Such pawl are marked 33 there being one for each ratchet wheel. They are pivoted at 34 on plate 4′ and have applied to them coiled springs 35 attached to pins on the pawls above their pivots and to projections 36 on plate 4′. To effect positive actuation of these pawls the feed pawl 17 has at the bottom an extension on each side of its pivot,—that is to say, this pawl is given generally the shape of an inverted T. When, as viewed in Fig. 5, the feed pawl is swung to the right, one of its lateral projections 37 strikes a projection 38 on the corresponding detent pawl and throws the latter out of engagement with its ratchet wheel. Spring 35 of this detent pawl passing to the other side of the axis of the pawl holds its end against a stop pin 39 on the standard 7′. When the feed pawl is swung to engage the other ratchet, it strikes the projecting operating end 40 of the other detent pawl and throws it into engagement with its ratchet with which the feed pawl also passes into engagement. During this movement of the feed pawl, its other projection 37 engages the projection 38 of the detent pawl first mentioned and carries it out of engagement with its ratchet wheel. A pin 41 on the front face of the feed pawl below its axis 19 projects through slot 42 in the pawl operating lever 20. This is merely for the purpose of limiting the engagement of the feed pawl with the teeth of the crown ratchets. Lever 10 is held in either of its normal positions by an arm 43′ pivoted at 43 and having a spring 44 applied to its free end. Two V-shaped recesses 43^2, 43^3 in its lower edge coöperate with a pin 45 on the downward extension 14 of lever 10. This spring pressed notched lever may be called an impulse device. Contiguous inclined walls of the notches 43^2, 43^3 meet, forming at the lower edge of arm 43′ a V-projection. There is direct, or interlocking, connection between arm 43′ and lever 10, and also between lever 10 and the rocking pawl. The parts are so proportioned and arranged that projection 13 traveling with the ribbon gradually moves lever 10, without disturbing or affecting the feed pawl, until pin 45 has passed from one notch in arm 43′ (over the edge of said V-projection) on to the inclined wall of the other notch, which wall under stress of spring 44 acts upon the pin giving it a quick impulse of movement that suddenly completes the reversal of lever 10 and causes the driving pawl to be thrown quickly from one driving ratchet to the other without interruption of feed of the ribbon. The specific arrangement of lever 20 with the feed pawl pivoted on it, reaction spring 22 and link connection to the universal bar was devised by another and is therefore not specifically claimed herein.

In the modification shown in Fig. 7, the feed pawl 17 and associated parts are constructed and behave as already described except that in Fig. 7 the coiled spring 23 of the

feed pawl is attached directly at its lower end to an arm 46 extending upwardly from the universal bar 26 and to which the feed pawl 17 is pivoted at 46'. When the universal bar is depressed, this link or arm 46 carries downwardly the feed pawl and its spring 23. In this case the lever 20 and spring 22 are not required, the usual universal bar spring serving to effect the return movement of that bar and the upward feed thrust of pawl 17. In other respects, the construction and behavior is the same as that of the organization shown in Figs. 2—6 inclusive.

The organization described is compact and economical in construction and efficient in operation. The spring 22 (Fig. 5) may also serve as the universal bar spring. I have shown crown ratchets since, in my judgment, they are best adapted to perform the required operations described but obviously changes in this respect as well as other details may be made without departing from the principles of construction and operation of the organization illustrated. The operator may, by manipulation of the rock lever 10 or of the feed pawl direct, so control the pawls that the ribbon may be manually wound in either direction.

The means illustrated in Fig. 12, for actuating the ribbon vibrator are disclosed and claimed by me in my application, Ser. No. 390,702, filed August 30, 1907. The universal bar 26 operates the escapement devices 47 and overlies a block pivoted in the forwardly extending horizontally disposed arm 49 of a bell crank lever which may be located centrally of the machine and whose upright arm 50 has attached to it a rearwardly extending link 51 that is connected with the downwardly extending short arm 52 of a bell crank lever whose forwardly extending longer arm 53 is jointed to the ribbon vibrator 32. The block 48 may be set in different angular positions by means of a link 54 attached thereto and, as described in my application above mentioned, extending to devices in the key board by which it may be effectively operated. The block 48 has two operating surfaces 55 and 56 of different radius or elevation. As shown in Fig. 12, the surface 55 of greatest elevation is in a position to be engaged by the universal bar and therefore on depression of that bar such amplitude of movement will be imparted to the arm 50 of the bell crank lever as to afford a maximum upward movement of the ribbon vibrator to bring into printing position the lower zone of the ribbon. If the upper part of the block 48 be swung rearwardly, then the lower surface 56 thereof will underlie the universal bar which then will operate to produce a less extent of movement of the ribbon vibrator so that the upper zone of the ribbon will be brought into printing position. When the upper part of the block is swung to the front, there is no surface thereof with which the universal bar will contact in its downward movement and therefore the ribbon vibrator will remain stationary as is required for stencil work.

The width of the respective zones of a ribbon is in practice very small being only about one-quarter of an inch. Owing to inevitable variations in the distance between the respective key levers and the universal bar, and for other reasons, there has been a great deal of difficulty in attaining such perfect adjustments of parts in machines of this class as to insure that the type to be printed from will not encroach upon an adjoining zone of the ribbon or extend beyond either the upper or lower edge of the ribbon as the case may be. In printing, for instance, the small letter "d" from the upper zone of a ribbon, unless the throw, for that particular type bar, of the ribbon vibrator is extremely accurate there is danger either that the lower portion of the letter will encroach upon the lower zone of the ribbon, or, on the other hand, that its upper end will extend beyond the upper edge of the ribbon. The same is true of those letters, such as "g", having parts extending below the line.

Figs. 10 and 11 show on a somewhat enlarged scale a bichrome ribbon and what should be the disposition with respect to the zones of the ribbon of letters such as "a", "d" and "y" at the moment of impression. To afford adjustment for each of the printing positions of the ribbon with respect to each of the type, I have adopted the following novel means. On the under edge of each key lever over the universal bar there is a projection 57. By, if necessary, filing or alining these projections, the exact point during the depression of the key lever at which it should engage the universal bar may be arrived at with the greatest nicety thereby affording control of the exact extent of movement of the ribbon vibrator so that in each instance those type impressions which extend above and below the line may be effected with certainty from the desired zone. There is a relatively wide margin of adjustment for letters such as *a*. For letters such as "d" and "y", the adjustment should be such as that at the moment of impression the tops and bottoms of the type will be equi-distant from the upper and lower edges of the zone of the ribbon from which the impression is taken.

In the ribbon reverse mechanism herein described, the ends of the lever 10, or those parts of the reverse controlling devices that are operated upon by the projections traveling with and adjacent the ends of the ribbon, are so disposed that the part or surface operated upon by such projections, to effect reverse of the ribbon, occupies a position in a line tangent to the hub and parallel with which travels the end of the ribbon that

draws forward the lever operating projection on the bobbin tape. Since the ribbon passes from the spool over a guide, as 27, in unwinding a full spool the path of the ribbon becomes gradually more and more into parallelism with said tangential line, the lever being out of contact with the ribbon and bobbin tape until finally it is engaged by the projection adjacent the ribbon end. The strain that is then imposed is in one direction only and that is the direction most effective to produce the operation of reversing the ribbon driving devices; thus, when the lever 10 is employed the line of strain of the button 13 upon the end of the lever is at right angles to traverse horizontally a line passing through the axes of the lever. Moreover since the ribbon is not in contact with the lever there is an absence of friction that would tend to retard travel of the ribbon and require additional power. When the button or projection 13 is referred to as adjacent the end of the ribbon, it is, of course, to be understood that it may be, as shown, attached to the usual tape which is secured to the bobbin and to the outer end of which the ribbon is joined by suitable connecting means.

I claim:

1. Ribbon reverse mechanism for a typewriting machine comprising ribbon bobbin spindles located respectively at each side of the center line of the machine, ratchet wheels for driving them located adjacent each other intermediate said spindles, a driving gear connection between each ratchet wheel and its corresponding ribbon bobbin spindle, a ratchet wheel feed pawl located intermediate the two ratchet wheels and adapted to be moved out of engagement with one wheel and into engagement with the other, a lever pivoted intermediate its ends and having its ends extending adjacent said spindles, an operative connection between the lever and the ratchet feed pawl whereby when the lever is rocked the pawl is transferred from one ratchet wheel to the other and means for automatically rocking the lever at the time the ribbon feed is to be reversed.

2. Ribbon reverse mechanism for a typewriting machine comprising ribbon bobbin spindles located respectively at each side of the center line of the machine, ratchet wheels for driving them located adjacent each other intermediate said spindles, a driving gear connection between each ratchet wheel and corresponding ribbon bobbin spindle, a ratchet wheel feed pawl adapted to be moved out of engagement with one wheel and into engagement with the other, a lever pivoted intermediate its ends and having its ends extending adjacent said spindles, an operative connection between the lever and the ratchet feed pawl whereby when the lever is rocked the pawl is transferred from one ratchet wheel to the other, means for automatically rocking the lever at the time the ribbon feed is to be reversed and means whereby the respective ribbon bobbin spindles may be manually rotated.

3. Ribbon reverse mechanism for a front strike key lever typewriting machine comprising ribbon bobbin spindles located respectively at each side of the center line of the machine, ratchet wheels for driving them located adjacent each other intermediate the type bars and key levers and intermediate the ribbon bobbin spindles, a driving connection between each ratchet wheel and corresponding ribbon bobbin spindle, a ratchet wheel feed pawl adapted to be put out of engagement with one wheel and into engagement with the other, a lever pivoted intermediate its ends and having its ends extending adjacent said spindles, an operative connection between the lever and the ratchet feed pawl whereby when the lever is rocked the pawl is transferred from one ratchet wheel to the other and means for automatically rocking the lever at the time the ribbon feed is to be reversed.

4. Ribbon reverse mechanism for a typewriting machine comprising ribbon bobbin spindles located at each side of the center line of the machine, crown ratchet wheels located facing and adjacent each other intermediate said spindles, a ratchet feed pawl pivoted intermediate said wheels, adapted to engage either of them and having lateral projections on each side of its pivot, detent pawls one for each ratchet wheel rocking about fixed axes and adapted to be thrown out of and into engagement with their wheels by said projections, a lever pivoted intermediate the ratchet wheels and having its ends extending adjacent said spindles, a recessed projection extending from the lever and embracing a projection on the feed pawl whereby when the lever is rocked, the feed pawl is transferred from one ratchet wheel to the other and means whereby the lever is automatically rocked at the time the ribbon feed is to be reversed.

5. Ribbon reverse mechanism for a typewriting machine comprising ribbon bobbin spindles located at each side of the center line of the machine, crown ratchet wheels located facing and adjacent each other intermediate said spindles, a ratchet feed pawl pivoted intermediate said wheels, adapted to engage either of them and having lateral projections on each side of its pivot, detent pawls one for each ratchet wheel rocking about fixed axes and adapted to be thrown out of and into engagement with their wheels by said projections, a lever pivoted intermediate the ratchet wheels and having its ends extending adjacent said spindles, a recessed projection extending from the lever and embracing a projection on the feed pawl whereby when the lever is rocked the feed pawl is

transferred from one ratchet wheel to the other, and means whereby the lever is automatically rocked at the time the ribbon feed is to be reversed.

6. Ribbon reverse mechanism for a typewriting machine, comprising a pair of ribbon bobbins located respectively on opposite sides of the center of the machine, driving ratchets operatively connected therewith and located intermediate the bobbins, ribbon deflecting guides, one for each bobbin, each located in a plane above its corresponding bobbin and over which the ribbon passes laterally to the ribbon guide, adjustable ratchet driving means whereby either ratchet may be automatically driven, and means adapted to be clutched by a projection traveling with the ribbon to automatically adjust the ratchet driving means to effect reverse feed of the ribbon.

7. Ribbon reverse mechanism for a typewriting machine, comprising a pair of ribbon bobbins located respectively on opposite sides of the center of the machine, their driving spindles, a gear on each spindle, driving ratchets located intermediate the bobbins, their spindles, a gear on each spindle meshing with the gear of the corresponding bobbin spindle, ribbon deflecting guides, one for each bobbin, each located in a plane above its corresponding bobbin and over which the ribbon passes laterally to the ribbon guide, adjustable ratchet driving means whereby either ratchet may be automatically driven, and means adapted to be clutched by a projection traveling with the ribbon to automatically adjust the ratchet driving means to effect reverse feed of the ribbon.

8. Ribbon reverse mechanism for a typewriting machine, comprising a pair of ribbon bobbins located respectively on opposite sides of the center of the machine, their driving spindles, a gear on each spindle, driving ratchets located intermediate the bobbins, their spindles, a gear on each spindle meshing with the gear of the corresponding bobbin spindle, ribbon deflecting guides, one for each bobbin, each located in a plane above its corresponding bobbin and over which the ribbon passes laterally to the ribbon guide, adjustable ratchet driving means whereby either ratchet may be automatically driven, means adapted to be clutched by a projection traveling with the ribbon to automatically adjust the ratchet driving means to effect reverse feed of the ribbon and means for manually revolving either ratchet shaft to wind the ribbon in either direction.

9. A front strike typewriting machine comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins located respectively on opposite sides of the center of the machine, driving ratchets one for each bobbin turning about axes at an angle to those of the ribbon bobbins and located between the bobbins, an operative connection between each ratchet wheel and its bobbin, a ratchet driving pawl adapted to be engaged with either ratchet wheel and means for operating said pawl extending in opposite directions therefrom to adjacent the ribbon bobbins and constructed and arranged to be operated by projections traveling with the ribbon to shift the pawl from one ratchet wheel to the other.

10. A front strike typewriting machine comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins turning about axes arranged in a general direction fore and aft of the machine, bobbin driving ratchets one for each bobbin arranged intermediate the two bobbins and turning about axes having a general direction transversely of the machine, an operative connection between each ratchet and its bobbin, a driving pawl adapted to be engaged with either ratchet wheel, pawl operating means extending therefrom to adjacent the respective bobbins and constructed and arranged to be operated by projections traveling with the ribbon.

11. A front strike typewriting machine, comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins located respectively adjacent the ends of the segment bearings therefor located in front of the type bar pivots, bobbin driving ratchet wheels located between the ribbon bobbins and respectively operatively connected with the bobbins, a driving pawl for said ratchets adapted to be shifted from one ratchet to the other and pawl operating means extending therefrom toward the respective bobbins and constructed and arranged to be operated by projections traveling with the ribbon.

12. A front strike typewriting machine comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins located respectively adjacent the ends of the segment bearings therefor located in front of the type bar pivots, bobbin driving ratchet wheels located between the ribbon bobbins, respectively operatively connected with the bobbins and turning in bearings located in rear of the type bar pivots, a driving pawl for said ratchet adapted to be shifted from one ratchet to the other and pawl operating means extending therefrom toward the respective bobbins and constructed and arranged to be operated by projections traveling with the ribbon.

13. A front strike typewriting machine comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins, bobbin actuating ratchets located between the bobbins and respectively connected therewith, a ratchet

operating pawl adapted to be swung from engagement from one ratchet into engagement with the other and pawl controlling means normally out of engagement or contact with the ribbon but constructed and arranged to be operated by projections traveling with the ribbon.

14. A front strike typewriting machine comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins, bobbin driving ratchet wheels located between the bobbins and respectively operatively connected therewith, ratchet operating means adapted to be moved from engagement with one ratchet into engagement with the other, means operatively connected with said ratchet operating means and extending therefrom to adjacent the ribbon and adapted to be engaged by a projection traveling therewith and acting upon said means so that the operating strain of either of said projections will be exerted upon said means in one direction only.

15. A front strike typewriting machine comprising a platen, a segment below the platen and type bars pivoted therein combined with ribbon bobbins located respectively on opposite sides of the center of the machine, a ribbon connected with both bobbins and adapted to be wound upon either, actuating ratchet wheels respectively operatively connected with the bobbins, ratchet wheel driving mechanism adapted to be disengaged from one ratchet and engaged with the other, controlling means for said mechanism extending to adjacent the ribbon bobbins to points lying in lines tangent to the hubs of the bobbins and parallel to which the inner end portion of the ribbon passes while being unwound, said controlling means being arranged to be engaged by projections adjacent the ends of the ribbon.

16. Ribbon reverse mechanism for a front strike typewriting machine comprising ribbon bobbins, bobbin driving mechanism adapted to drive the respective bobbins alternately in opposite directions and comprising laterally extending controlling parts whose ends alternately occupy points in lines tangent to the hubs of the bobbins and parallel to which the inner end portion of the ribbon passes while being unwound, and are adapted to be operated upon by projections adjacent the ends of the ribbon.

17. Ribbon reverse mechanism for a front strike typewriting machine comprising a reverse lever arranged transversely of the machine and having ends which alternately lie in lines tangent to the hubs of the bobbins and parallel to which the inner end portion of the ribbon travels while being unwound, and which are adapted to be operated upon when in said position by a projection adjacent the end of the ribbon.

18. In ribbon reverse mechanism for a front strike typewriting machine, a reverse lever, adapted to be rocked vertically, lying between the parts of the ribbon adjacent their spools and whose ends occupy, alternately, points lying in lines substantially tangent to the hub of a bobbin and parallel with which the inner end portion of the ribbon travels in leaving the bobbin, and which are adapted to be acted upon to effect rocking of the lever by projections traveling with, and adjacent the ends of, the ribbon.

19. Ribbon reverse mechanism for a front strike typewriting machine comprising ribbon bobbins arranged respectively on opposite sides of the center of the machine, bobbin driving ratchet wheels arranged between the bobbins and operatively connected therewith, a double pointed swinging pawl adapted to be engaged with either ratchet wheel, a coiled extension spring applied to the pawl in such manner that its reaction holds the pawl in engagement with that ratchet which it is then operating and that the line of strain thereof passes to the other side of the pivot of the pawl when the latter is shifted into engagement with the other ratchet, means for rocking the pawl upon its pivot and having parts constructed and arranged to be acted upon by projections traveling with, and adjacent the ends of, the ribbon.

20. Ribbon reverse mechanism for a typewriting machine comprising ribbon bobbin spindles located at each side of the center line of the machine, ratchet wheels located facing and adjacent each other intermediate said spindles, a ratchet feed pawl pivoted intermediate said wheels, adapted to engage either of them and having lateral projections on each side of its pivot, detent pawls one for each ratchet wheel rocking about fixed axes and adapted to be thrown out of and into engagement with their wheels by said projections, a lever pivoted intermediate the ratchet wheels and having its ends extending adjacent said spindles, a recessed projection extending from the lever and embracing a projection on the feed pawl whereby when the lever is rocked, the feed pawl is transferred from one ratchet wheel to the other and means whereby the lever is automatically rocked at the time the ribbon feed is to be reversed.

21. Ribbon reverse mechanism for a typewriting machine comprising ribbon bobbin spindles located at each side of the center line of the machine, ratchet wheels located facing and adjacent each other intermediate said spindles, a ratchet feed pawl pivoted intermediate said wheels, adapted to engage either of them and having lateral projections on each side of its pivot, detent pawls one for each ratchet wheel rocking about fixed axes and adapted to be thrown out of and into en-

gagement with their wheels by said projections, a lever pivoted intermediate the ratchet wheels and having its ends extending adjacent said spindles, a recessed projection extending from the lever and embracing a projection on the feed pawl whereby when the lever is rocked the feed pawl is transferred from one ratchet wheel to the other, and means whereby the lever is automatically rocked at the time the ribbon feed is to be reversed.

22. Ribbon reverse mechanism for a front strike typewriting machine comprising ribbon bobbins, bobbin driving mechanism adapted to drive the respective bobbins alternately in opposite directions and comprising laterally extending controlling parts whose ends alternately occupy points in lines tangent to the hubs of the bobbins and parallel to which the inner end portion of the ribbon passes while being unwound, and are adapted to be operated upon by projections adjacent the ends of the ribbon and means in the path of the ribbon acting to insure engagement of said projections and the ends of said controlling parts.

23. Ribbon reverse mechanism for a front strike typewriting machine comprising a reverse lever arranged transversely of the machine and having ends which alternately lie in lines tangent to the hubs of the bobbins and parallel to which the inner end portion of the ribbon travels while being unwound, and which are adapted to be operated upon when in said position by a projection adjacent the end of the ribbon and means in the path of the ribbon acting to insure engagement of said projections and the ends of the reverse lever.

24. Automatic ribbon reverse mechanism, comprising reversible ribbon feeding means, controlling means for the feeding means comprising a reverse lever with which the ribbon is normally out of engagement, spring actuated impulse means for effecting positive instantaneous actuation of the controlling means to cause reversal of the ribbon feeding means said impulse means becoming effective on the controlling means in advance of the reversal of the ribbon feeding means, thereby affording an uninterrupted feed of the ribbon during the act of reversing its feed, a projection traveling with the ribbon and adapted to engage and operate said reverse lever and means independent of the lever acting to guide the ribbon and insure engagement of said projection with the lever.

25. Ribbon reverse mechanism for a front strike typewriting machine comprising a reverse lever that extends transversely of the machine from bobbin to bobbin under the type bars and over the key levers and whose ends alternately lie in lines tangent to the links of the respective bobbins and parallel to which the inner end portion of the ribbon travels while leaving the respective bobbins, and means traveling with the ribbon adjacent its ends and adapted to operate upon the ends of the lever to move it and effect reverse feed of the ribbon.

26. In an automatic ribbon reversing mechanism, two independently operable ribbon feed ratchets, a pivoted feed pawl adapted to be rocked into two positions to alternately engage the respective ratchets, a reverse lever directly acting upon the pawl to so rock it and with which the ribbon is normally out of engagement, a projection traveling with the ribbon and adapted to engage and gradually rock the lever, and a spring actuated impulse device directly engaged by the lever and by it brought into effective operation, while the pawl remains in engagement with one of the ratchets, to positively react upon the lever to thereby effect instantaneous rocking of the pawl into engagement with the other ratchet.

27. In an automatic ribbon reversing mechanism, two independently operable ribbon feed ratchets, a pivoted feed pawl having two teeth one for each ratchet adapted to be rocked into two positions to alternately engage the respective ratchets, a reverse lever directly acting upon the pawl to so rock it and with which the ribbon is normally out of engagement, a projection traveling with the ribbon and adapted to engage and gradually rock the lever and a spring actuated impulse device directly engaged by the lever and by it brought into effective operation, while the pawl remains in engagement with one of the ratchets, to positively react upon the lever to thereby effect instantaneous rocking of the pawl into engagement with the other ratchet.

28. In an automatic ribbon reversing mechanism, two independently operable ribbon feed ratchets, a pivoted feed pawl, adapted to be rocked into two positions to alternately engage the respective ratchets, a reverse lever directly acting upon the pawl to so rock it and with which the ribbon is normally out of engagement, a projection traveling with the ribbon and adapted to engage and gradually rock the lever, an impulse lever having contiguous V-notches with which the lever engages and from one of which to the other the lever is gradually transferred and a spring applied to the impulse lever, whereby when the reverse lever is transferred from one notch in the impulse lever to the other the inclined wall of the latter will act to quickly complete the movement of the reverse lever and effect reversal of feed of the ribbon without interruption thereof.

29. In an automatic ribbon reversing mechanism, two independently operable rib-

bon feed ratchets, a pivoted feed pawl adapted to be rocked into two positions to alternately engage the respective ratchets, a transverse reverse lever rocking about a horizontal axis, a projection traveling with the ribbon and adapted to engage and gradually rock the lever, a lateral projection from the lever having loose interlocking connection with the pivoted pawl, a pin projecting from the lateral extension of the lever, an impulse lever having contiguous V-notches with which said pin engages and from one of which to the other the pin is gradually transferred, and a spring applied to the impulse lever, the operation being substantially as set forth.

30. In an automatic ribbon reverse mechanism, ribbon bobbin driving ratchets located adjacent each other, a pivoted driving pawl adapted to engage either ratchet, a pawl reverse lever adapted to be operated by projections traveling with the ribbon, and a direct interlocking connection between the lever and the pawl intermediate the axis and free end of the latter.

31. In an automatic ribbon reverse mechanism, ribbon bobbin driving ratchets located adjacent each other, a pivoted driving pawl adapted to engage either ratchet, a pawl reverse lever adapted to be operated by projections traveling with the ribbon, a direct interlocking connection between the lever and the pawl intermediate the axis and free end of the latter and a spring actuated impulse device having direct interlocking connection with said lever and serving when brought in operation by the lever to quickly throw the pawl from one ratchet to the other.

32. In an automatic ribbon reverse mechanism, ribbon bobbin driving ratchets located adjacent each other, a pivoted driving pawl adapted to engage either ratchet, a pawl reverse lever adapted to be operated by projections traveling with the ribbon, a direct interlocking connection between the lever and the pawl intermediate the axis and free end of the latter and a spring actuated impulse lever having contiguous V-notches engaged by a projection on the reverse lever and serving when brought in operation by the lever to quickly throw the pawl from one ratchet to the other.

33. In an automatic ribbon reverse mechanism, ribbon bobbin driving ratchets located adjacent each other, a pivoted driving pawl adapted to engage either ratchet, a pawl reverse lever adapted to be operated by projections traveling with the ribbon, a direct interlocking connection between the lever and the pawl intermediate the axis and free end of the latter and a spring applied to the pawl between its axis and free end and serving to hold the pawl in engagement with either ratchet.

34. In ribbon reversing mechanism for a typewriting machine a reversing lever pivoted intermediate its ends and having at each end a slotted flange with which the ribbon is normally out of engagement and a projection traveling with each end of the ribbon in a line substantially parallel with the flange and adapted to engage the slot therein.

35. In ribbon reversing mechanism for a typewriting machine, a rocking reversing member having a vertically disposed slot in its end with which the ribbon is normally out of engagement, and a headed stud traveling with the ribbon in a line parallel with said slot and whose shank is adapted to enter the slot to effect actuation of said member.

36. In ribbon reverse mechanism for a typewriting machine, a ribbon bobbin, a guide to which the ribbon passes as it leaves the bobbin and a reversing member having its operating end between the bobbin and guide and normally disengaged from the ribbon, and a projection traveling with the ribbon and adapted to engage the end of said member.

37. In ribbon reverse mechanism for a typewriting machine, ribbon bobbins, driving ratchets one for each bobbin, a pivoted feed pawl adapted to drive either ratchet, a reversing lever acting directly on the pawl to rock it about its pivot, a projection traveling with the ribbon and adapted to rock the reverse lever, a spring impelled impulse device directly engaged by the reverse lever and acting when brought into effective operation to instantly throw the feed pawl from one ratchet to the other to thereby reverse the feed of the ribbon.

38. In ribbon reverse mechanism for a typewriting machine, ribbon bobbins, a transverse reverse lever pivoted to rock in a transverse vertical plane and having a lateral projection adjacent its axis, bobbin driving ratchets adjacent said lateral projection and between which it is located, a standard also located between the ratchets and in which the lever has its bearing, a ratchet driving pawl located between the ratchets and adapted to engage either one and a loose but direct interlocking connection between the pawl and the lateral extension of the lever, a vertically movable spring sustained lever in which the pawl is pivoted and a connection between it and the universal bar of the machine.

39. In ribbon reverse mechanism for a typewriting machine, ribbon bobbins, a transverse reverse lever pivoted to rock in a transverse vertical plane and having a lateral projection adjacent its axis, bobbin driving ratchets adjacent said lateral projection and between which it is located, a standard also located between the ratchets and in which the lever has its bearing, a ratchet driving pawl located between the ratchets and adapted to engage either one and a loose but direct interlocking connection between the pawl

and the lateral extension or the lever, a vertically movable spring sustained lever in which the pawl is pivoted, a connection between it and the universal bar of the machine and spring controlled ratchet detent pawls pivoted on the standard and controlled by the driving pawl.

In testimony whereof, I have hereunto subscribed my name.

EDWARD B. HESS.

Witnesses:
JOHN M. LEE,
L. F. BROWNING.