April 1, 1941. J. A. B. SMITH 2,236,611

TYPEWRITING MACHINE

Filed Dec. 30, 1938 2 Sheets-Sheet 1.

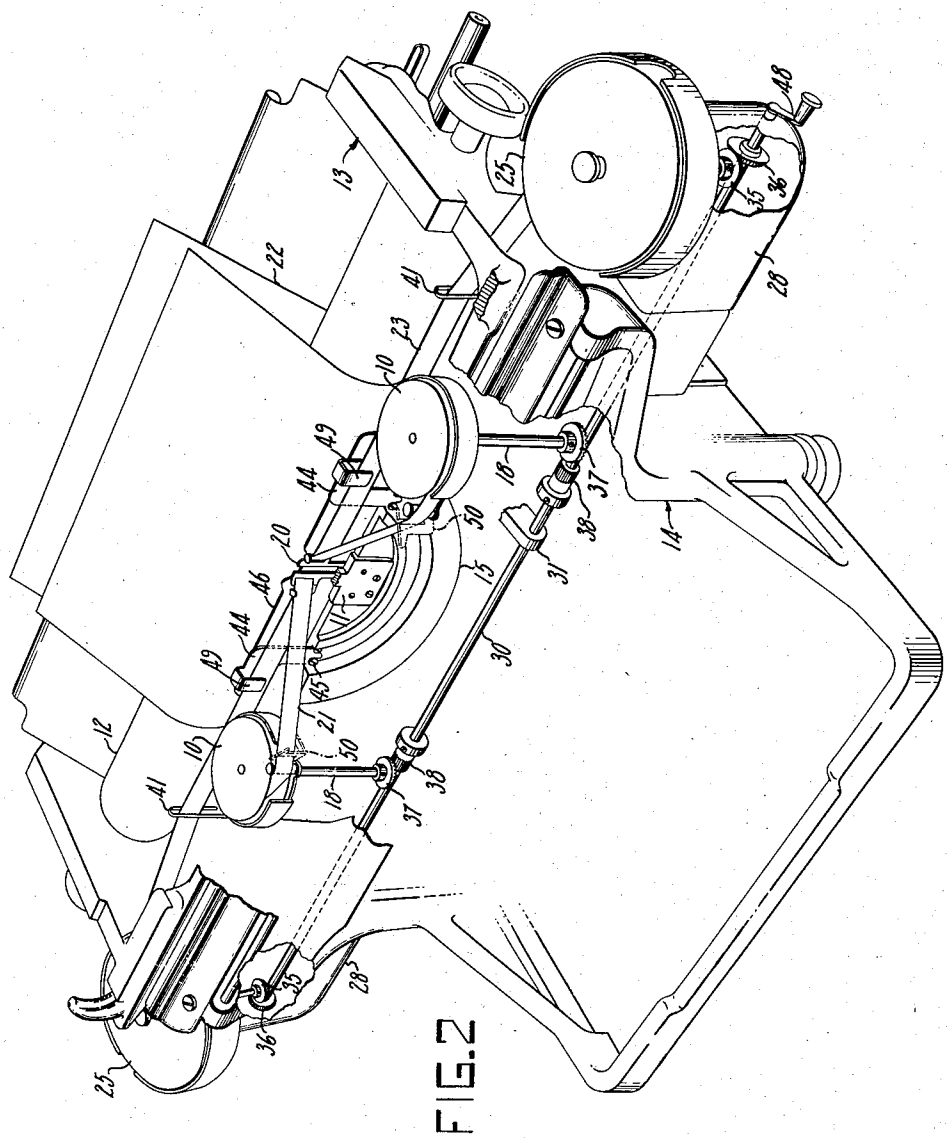


FIG. 2

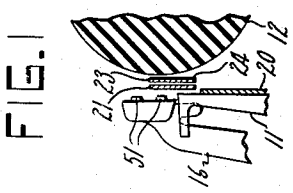


FIG. 1

INVENTOR
JESSE A. B. SMITH
BY
L. G. Julian
ATTORNEY

April 1, 1941. J. A. B. SMITH 2,236,611

TYPEWRITING MACHINE

Filed Dec. 30, 1938 2 Sheets-Sheet 2

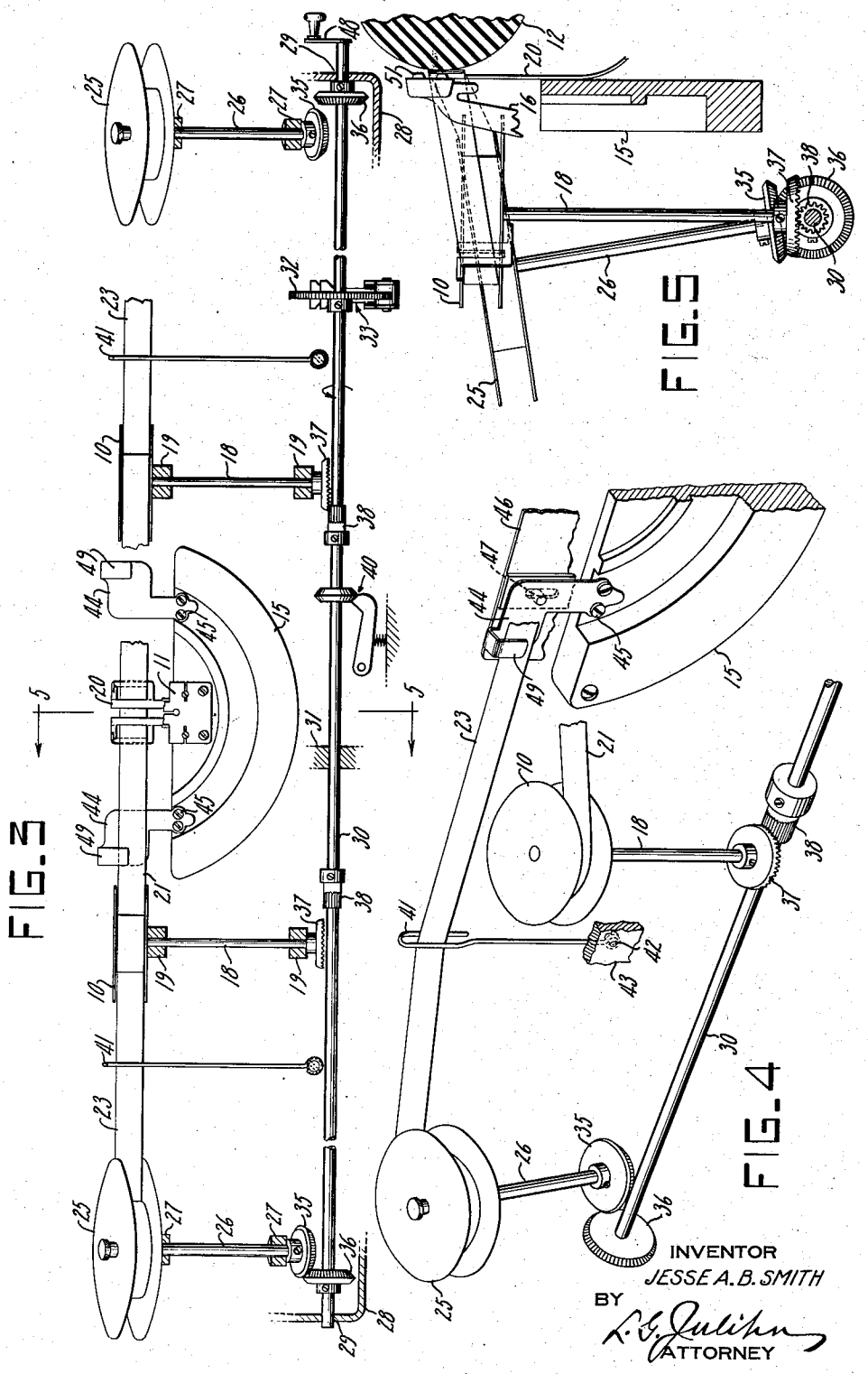


FIG. 3

FIG. 5

FIG. 4

INVENTOR
JESSE A. B. SMITH
BY
ATTORNEY

Patented Apr. 1, 1941 2,236,611

UNITED STATES PATENT OFFICE

2,236,611

TYPEWRITING MACHINE

Jesse A. B. Smith, Stamford, Conn., assignor to Underwood Elliott Fisher Company, New York, N. Y., a corporation of Delaware

Application December 30, 1938, Serial No. 248,552

4 Claims. (Cl. 197—151)

This invention relates to typewriters and more particularly to inking devices associated with the types.

For making copies from the typing impressed on an original or master sheet, the typing on the latter is done with a particular ink as, for example, ink suitable for the well known hectograph copying process. Another process may be employed to print the copy directly from the deposit of ink on the typed master sheet.

A ribbon of textile fabric impregnated or charged with such copying ink has been employed. It was intended that the types, inasmuch as they printed through the comparatively thick textile-fabric ribbon impregnated with the copying ink, were to make a suitably heavy imprint on the master sheet. It has been found, however, that the imprint through the copy-ink-impregnated fabric tended to be excessively heavy. There is also some disadvantage in that the type faces become clogged with the copying ink gathered by the types in striking the ink-impregnated fabric ribbon, and hence inconveniently frequent and troublesome cleaning of the types was necessary.

It was then proposed to use a ribbon made of paper and coated only on one side with the copying ink. The other side of the paper, namely, the side which is struck by the types, was not coated and thus the clogging of the types with ink was avoided. It has been found, however, that the types in printing through the one-side-coated comparatively thin paper medium did not put a sufficiently heavy deposit of ink on the master sheet and the service of the latter for printing direct or offset copies therefrom was therefore correspondingly limited and inefficient.

It is an object of the present invention to overcome the aforesaid difficulties substantially along the following lines.

There may be employed the paper ribbon coated on only one side with the copying ink.

For broadening or accenting the ink impressions and thus gaining a sufficiently adequate deposit of copying ink on the master sheet, the types do not strike directly upon the ink-bearing paper ribbon but upon an intermediate, preferably inkless, ribbon of textile fabric. The ink-bearing paper ribbon may be fed from one to another spool in steps of sufficient extent so that no two successive imprints overlap and thus a fresh area of inking ribbon may be available for each imprint. The paper ribbon is therefore preferably run through the machine only once in respect to a line of imprints therealong. The paper ribbon may, of course, be wide enough to afford two or more lines or tracks of imprints and for changing the line of imprint the bichrome shift mechanism of the typewriter may be used or the ribbon may be inverted.

The intermediate fabric ribbon is also fed step by step from one spool to another and since it acts primarily simply as an imprint broadening medium, its feed at each imprint may be materially less than that of the paper ribbon. Therefore, the length of the intermediate fabric ribbon may be materially less than that of the paper ink-bearing ribbon which is extra long in that it is to afford a fresh area for each imprint.

Both ribbons may be threaded through one and the same ribbon vibrator.

The ribbon feed actuator, such as the usual pawl and ratchet wheel device that is cooperable with the types may feed both ribbons. The respective pairs of spools for the two ribbons may be differentially geared to said device so that the ribbons are fed at different rates. The arrangement may be such that an intermediate fabric ribbon, say, twelve yards long is run off in the same time that a paper ink-bearing ribbon sixty yards long is run off. The paper ribbon may be directed so that its course is substantially in a straight line immediately before and after coursing through the ribbon vibrator. The intermediate fabric ribbon may have the usual angular course to and from the ribbon vibrator.

The intermediate fabric ribbon is protective against puncturing of the paper ink-bearing ribbon by the types. This renders the paper ribbon less liable to tearing apart while in use. It also avoids the possibility, if the paper were punctured by the types of depositing copy-blurring paper particles with the ink on the master sheet.

The foregoing and other objects, features and advantages will be apparent from the following description of an application of the invention.

In the accompanying drawings:

Figure 1 is a fragmentary side view taken on a section through the ribbons at the printing point.

Figure 2 is a perspective of a typewriter embodying the invention, parts of the typewriter being shown broken away and sectioned for clearness.

Figure 3 is a front elevation diagram of the two-ribbon mechanism.

Figure 4 is a perspective diagram of the left-

side half of the two-ribbon mechanism in the machine.

Figure 5 is a cross sectional side view taken on the trace 5—5 of Figure 2.

A pair, left and right, of ribbon spools 10 may be disposed, Figure 2, so that they are spaced apart from opposite sides of the printing point represented by a central type guide 11 and stand forward of a revoluble platen 12 mounted in a paper carriage 13 movable laterally on main frame 14 of the machine.

The upper portion of said type guide 11 is represented in Figure 1 but is indicated as being broken off in Figure 2. Said type guide 11 is secured to a type-bar segment 15 suitably supported by the framework. Type bars 16, fragmentarily shown in Figures 1 and 5, are pivoted in said segment in usual arcuate array to swing upwardly and rearwardly to the common printing point represented by said type guide 11.

Said ribbon spools 10 may be removably attached in well known manner each to a companion upright shaft 18 to rotate therewith, each shaft 18 being journaled in bearings 19 supported by the framework and conventionally indicated at Figure 3.

A ribbon vibrator 20 is disposed behind the type guide 11 between the latter and the platen 12 and may be constructed as exemplified in Patent No. 926,050 to F. A. Cook dated June 22, 1909. Suitable operating connections, not shown, whereby said ribbon vibrator 20 is cooperable with the type bars 16, are also exemplified in said Cook patent.

A preferably inkless ribbon 21 made of textile fabric courses from the forward side of one ribbon spool 10 to the ribbon vibrator 20 and from the latter it courses to the forward side of the other ribbon spool 10. Said fabric ribbon 21 is threaded through or engages said vibrator 20 so as to be movable up and down by the latter to and from the printing point at the type strokes.

An original or master sheet 22 is placed around the platen 12 and is typed in ink suitable for taking off copies from said master sheet as, for example, by means of the well known hectograph process.

The type bars 16 make reduplicative imprints or ink deposits on the master sheet 22 by means of an ink-bearing paper ribbon 23 which is also threaded through the ribbon vibrator 20 so that its course lies between the first mentioned fabric ribbon 21 and said master sheet 22. Said paper ribbon 23 is coated on only one side, the side nearest the platen, with the reduplicative ink as is indicated in Figure 1 by the heavily shaded side 24 of said paper ribbon.

Ribbon spools 25 for the paper ribbon 23 may be disposed on opposite sides of the machine outside of the main frame 14 as in Figure 2. Each paper ribbon spool 25 is in any suitable manner detachably secured to a companion substantially upright shaft 26 so as to rotate with the latter. Each shaft 26 may be journaled in suitable bearings 27 within a casing 28 attached to the outer side of the machine frame 14 to dispose the paper ribbon spool outside of said frame, it being noted that the ribbon spool 25 is at the top of said casing.

The two casings 28, on opposite sides of the machine, afford end bearings 29, Figure 3, for a transverse ribbon-rotating shaft 30, which serves for both pairs of ribbon spools 10 and 25 and which may have a middle bearing 31 supported by the framework. The axes of the ribbon spool shafts 18 and 26 may intersect the axis of the transverse shaft 30, and because the paper-ribbon spools 25 are to be larger in diameter than the fabric-ribbon spools 10, the upright shafts 26 for said paper-ribbon spools may be tilted forwardly as at Figure 5, so that said larger spools 25 clear the path of the carriage.

A ribbon feed actuator mechanism cooperable with the types for rotating the two pairs of ribbon spools 10, 25 through the transverse rock shaft 30 comprises a ratchet wheel 32 fastened to said shaft 30 and a pawl device diagrammatically indicated at 33, Figure 3. A ratchet wheel engaging pawl of said device may be operatively connected to the type bars 16, through a universal bar, not shown, substantially as exemplified in the F. A. Young Patent No. 959,829 dated May 31, 1910. Thus, at each operation of a type bar 16 to print on the master sheet 22, the transverse shaft 30 turns a comparatively small part of a revolution in the direction of the arrow, Figure 3.

Each of the upright shafts 26, for the ink-bearing paper-ribbon spools 25, has fastened to its lower end a bevel pinion 35 engageable by a companion bevel gear 36 fastened to the transverse shaft 30. Similarly, each of the upright shafts 18 for the fabric-ribbon spools 10 has fastened to its lower end a crown gear 37 engageable by a companion pinion 38 fastened to said transverse shaft 30. Said shaft 30 is shiftable endwise in opposite directions in its bearings 29, 31 to shift its two bevel gears 36 and its two pinions 38 laterally so that, as will be obvious, only one or the other of each pair of spools 10, 25 will be connected to said transverse or ribbon feeding shaft 30. The arrangement may be such so that with said shaft 30 shifted to the right, as shown in Figure 3, the right hand one of the pair of fabric-ribbon spools 10 and the left hand one of the pair of paper-ribbon spools 25 are connected, through their corresponding gears, to said transverse shaft 30 and the opposite one of each of said pairs of spools is not so connected. Thus, referring to Figure 3, upon rotating the shaft 30 in the direction of the arrow, by means of the pawl device 33, the fabric ribbon 21 is fed rightwardly and the ink-bearing paper ribbon 23 is fed leftwardly past the printing point. It will be obvious that by shifting the transverse shaft 30 leftwardly from the Figure 3 position, the two gear connections shown in mesh in Figure 3 will be thrown out of mesh and the two gear connections shown out of mesh will be thrown into mesh so that the feed of each ribbon by rotation of the shaft 30 in the direction of the arrow will be reversed. 40 diagrammatically represents a detent device for detenting the shaft 30 in either of its positions.

The gearing 35, 36 for the paper-ink-ribbon spools 25 is proportioned so that at least step of the ink-bearing paper ribbon 23 is sufficiently large to avoid overlapping of the imprints therealong so that a fresh or unused area of said paper ribbon is used for each type imprint upon the master sheet 22. This conduces to effecting an adequate deposit of reduplicative ink upon the master sheet for each imprint and also conduces to avoiding irregularity in the deposits. Because of such comparatively coarse feed of the ink-bearing paper ribbon 23, the length of the latter for a complete run off from one spool to the other is made long, say, sixty-five yards, and the paper-ribbon spools 25 are correspondingly made of sufficiently large diameter. The usual length of

an ordinary or general-purpose typewriter ribbon is, say, twelve yards, which may also be the length of the inkless fabric ribbon 21. In order that a complete run-off of the shorter fabric ribbon 21 from one spool to the other may occur in about the same time as does a complete run-off of the longer ink-bearing paper ribbon 23, the gearing 37, 38 for the fabric-ribbon spools is of a correspondingly different ratio from the gearing 35, 36 of the paper-ribbon spools 25 as is represented by the obviously different relative diameters of said gearings 35, 36, 37 and 38, in the drawings.

The ink-bearing paper ribbon 23 runs from the rear side of one of its spools 25 to the rear side of its opposite spool 25. It is directed between the back of the fabric-ribbon spools 10 and the front of the platen by the forward legs of two wire loops 41 having lower supporting extremities attached at 42 to a suitable part 43, Figure 4, of the framework. The rear legs of said loops 41 keep the paper ribbon from fouling against the parts of the carriage. Plates 44 attached to the type bar segment 15 at 45 rise above the latter for guarding the paper ribbon 23 from fouling against the usual laterally stationary wing scale 46 which is case-shiftable with the platen 12. Said wing scale, mounted on a case shiftable rock frame, not shown, and spring pressed forwardly about a pivot axis at its lower edge, may slidably bear, during its case shift movements, on studs 47, Figure 4, projecting from the back of the plates 44. Such slidable bearing serves to keep the wing scale upright in either case shift position. Said plates 44 may be arched over the paper ribbon 23 to form tongues 49 in front of said paper ribbon 23 to guard the latter from fouling forwardly against the back of the ribbon spools 10. Thus, the course of the ink-bearing paper ribbon 23 into and out of the ribbon vibrator 20 is substantially in a straight line and it is subjected to little or no flexure in coursing through said vibrator. There is also, by reason of such substantially straight line course of the paper ribbon through said vibrator, very little or no rubbing pressure against the back of the fabric ribbon 21. These features conduce to durability of the paper ribbon 23.

The tops of the wire loops 41 and the tops of the arches forming the tongues 49 on the plates 44 may of course be high enough to clear upward movement of the paper ribbon 23 with the ribbon vibrator 20.

At or just before the completion of a ribbon run-off from one spool to another, the transverse ribbon feeding shaft 30 may be manually shifted endwise to reverse the feed preparatory to a run-off in the opposite direction. The ribbon feeding shaft 30 may be turned manually at will by means of a crank 48.

The reference numeral 50, Figure 2, indicates a ribbon reversing lever through which the fabric ribbon passes, such lever being associated with the usual Underwood automatic ribbon feed reversing mechanism substantially as exemplified in the W. F. Helmond Patent No. 1,865,632, dated July 5, 1932. It may be stated at this point that the disposition of the spools 10, in the illustrated machine, for the fabric ribbon 21 is substantially as in the Underwood typewriter. The beads provided usually in the regular typewriter ribbon to actuate the ribbon reversing levers 50 may be omitted in the present inkless fabric ribbon 21.

The inkless fabric ribbon 21 may be of the same kind of textile fabric or other durable material as is used ordinarily for general-purpose typewriter ribbons. The ink-bearing paper ribbon 23 may be made from what is known as 9 lb. stock.

It will be seen, now, that the types 51 impress the paper ink-ribbon 23 upon the master sheet 22 through the medium of the intermediate inkless fabric ribbon 21 to make the type imprints upon said sheet. This, in distinction from the usual sharp outlines of the characters on the types, blunts or accentuates the outlines of the type imprints on said sheets and correspondingly puts adequate but not excessive imprint-forming deposits of the reduplicative ink on the master sheet so that the latter may yield a satisfactorily ample number of copies. The described arrangement employing the paper ink-ribbon coated only on one side and the use of the intermediate fabric ribbon 21 avoids accumulations of ink on the types and thus the latter do not become clogged. The intermediate fabric ribbon conduces to the durability of the paper ink-ribbon in that it keeps the latter out of contact with the back of the ribbon vibrator which is usually made of thin metal. Further, the intermediate fabric ribbon, inasmuch as it substantially keeps the paper ink-ribbon out of contact with the ribbon vibrator 20, reduces the tendency of the ink to gather on the back of the ribbon vibrator as would be the case if there was solely employed the ink-impregnated fabric ribbon.

The invention is not limited to having the intermediate ribbon inkless since, as will be obvious, a standard inked ribbon may be used, instead of the inkless ribbon, for blunting the types to accent the imprint obtained from the paper ribbon 23. For this purpose, therefore, such substitute inked intermediate ribbon would be equivalent to an inkless ribbon, and deposit of its ink upon the back of the inked paper ribbon would be merely incidental.

Variations may be resorted to within the scope of the invention and portions of the improvements may be used without others.

What is claimed is:

1. In a typewriting machine having a platen and types, an ink ribbon, an intermediate ribbon through which the types impress the ink ribbon upon a work sheet on said platen, a ribbon vibrator serving for both ribbons, and two pairs of spools, one pair for each ribbon, each ribbon coursing from one of its spools to said ribbon vibrator and from the latter to its other spool.

2. In a typewriting machine having a platen and types, an ink ribbon, an intermediate ribbon through which the types impress the ink ribbon upon a work sheet on said platen, a ribbon vibrator serving for both ribbons, two pairs of spools, one pair for each ribbon, each ribbon coursing from one of its spools to said ribbon vibrator and from the latter to its other spool, a ribbon feed actuator cooperable with said types, and two gear connections, there being one gear connection to each pair of spools from said actuator, said gear connections being of different ratios whereby a run-off of a given length of said ink ribbon from spool to spool is effected while the run-off of a materially lesser length of said intermediate ribbon from spool to spool is effected.

3. In a typewriting machine having a platen and types, an ink ribbon, an intermediate rib-

bon through which the types impress the ink ribbon upon a work sheet on said platen, ribbon vibrator mechanism coordinated with said types for moving said ribbons jointly to and from the printing line, and two ribbon-feeding connections operable in co-ordination with said types, each connection being to a corresponding one of said ribbons.

4. In a typewriting machine, mechanism for facilitating the production of a reduplicative master sheet, comprising, a platen, an ink-ribbon and mounting means therefor, another ribbon and mounting means therefor, types movable toward and from a printing point, a ribbon vibrator adapted to receive both ribbons and correlate them at the printing point with the ribbon of the first said mounting means at the rear of the ribbon of the second said mounting means, and means for feeding the ribbons step-by-step simultaneously but with relatively different increments of feed.

JESSE A. B. SMITH.