(No Model.)

D. E. FELT.

DUPLICATE PRINTING MECHANISM FOR ADDING MACHINES, TYPE WRITERS, &c.

No. 590,972. Patented Oct. 5, 1897.

FIG. 1.

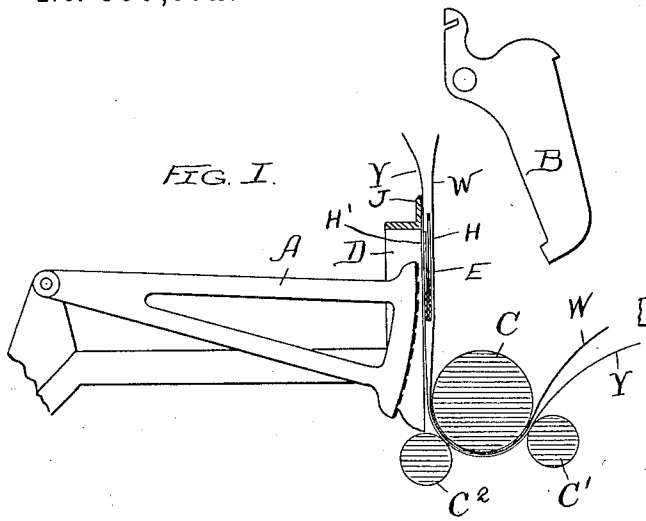


FIG. 5.

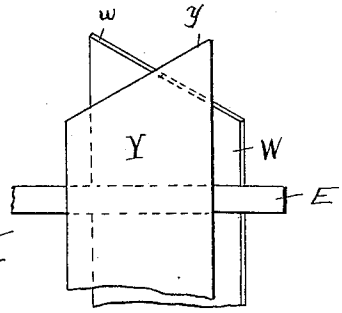


FIG. 6.

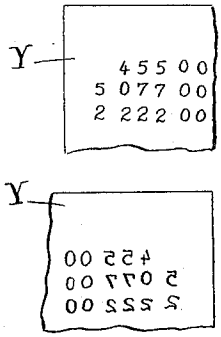


FIG. 2.

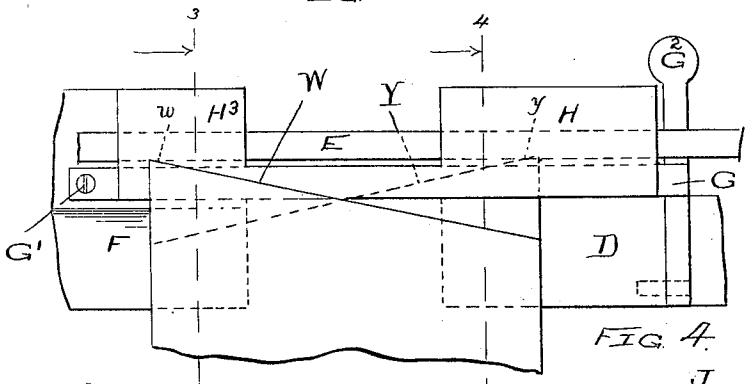


FIG. 4.

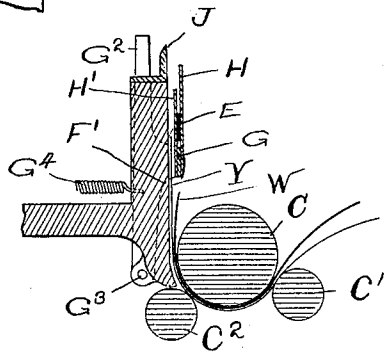
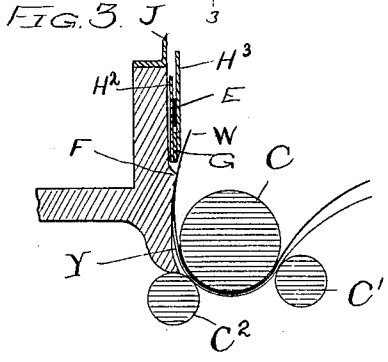


FIG. 3.



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DUPLICATE-PRINTING MECHANISM FOR ADDING-MACHINES, TYPE-WRITERS, &c.

SPECIFICATION forming part of Letters Patent No. 590,972, dated October 5, 1897.

Application filed April 28, 1897. Serial No. 634,186. (No model.)

To all whom it may concern:

Be it known that I, DORR E. FELT, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Duplicating Printing Mechanism for Adding-Machines, Type-Writers, &c., of which the following is a specification.

I have been led to this invention in my endeavors to provide calculating-machines having recording mechanism with means whereby the recording mechanism might print not only an original but a duplicate list of the numbers added and the sums or results; but while the invention has been devised with special reference to calculating-machines it may be used with advantage in any type-writing machine or machine in which type-writing mechanism is used.

By means of the invention I am enabled to print simultaneously an original and a duplicate copy by using a single set of type and a single ink-ribbon and without the employment of any carbon or manifolding paper whatever. This result is obtained by making the duplicate copy upon thin transparent paper and feeding it and the paper for the original upon the opposite sides of the inkribbon, so that both papers are impressed by the same impact of the type or type-hammer, the character being thus printed in reverse upon the back of the duplicate sheet, but showing through it, so as to be distinctly readable upon the front. I operate both papers together by one set of feed-rolls and provide guiding devices which shall separate the sheets as they approach the printing center, so that they will pass upon opposite sides of the ribbon. If a duplicate is not needed or desired, the transparent paper need not be fed to the rolls, so that no waste of paper occurs at such times.

The nature of my invention will be more fully understood from the description which I give below and from the accompanying drawings, in which—

Figure 1 is a sectional view of that portion of a calculating-machine to which the invention relates. Fig. 2 is an elevation of the paper-guiding devices. Figs. 3 and 4 are sections on the line 3 3 and 4 4, respectively, of Fig. 2. Fig. 5 is a perspective showing the two paper sheets or strips in the act of passing the ribbon. Fig. 6 shows the opposite sides of the printed duplicate sheet.

In said drawings, A represents a segment carrying the type; B, the hammer for impressing the paper and ribbon upon the type; C, C′, and C^2, the paper feed-rolls; D, the machine-frame supporting the paper-guides, and E the ink-ribbon.

W is the strip or sheet of paper on which the original copy is printed, and Y is the strip or sheet of thin or transparent paper, and both are fed through the rolls shown at the same time when the machine is used in producing duplicates. After leaving the rolls, before they reach the ink-ribbon, the papers are separated by suitable guides, so they will pass at opposite sides of the ribbon. My preferred construction, which is illustrated, is best adapted to act upon the paper when the latter is cut angling at its ends, (see Figs. 2 and 5,) the angle upon one strip being reversed from that on the other. This manner of cutting forms a point *w* upon the advance end and at one side of the strip W, and a similar point *y* upon the advance end and at the opposite side of strip Y.

When the paper issues from rolls C and C^2, it comes against guiding-faces upon the frame D, which are adapted to form a slight longitudinal bend or twist in it, the guiding-face of one side being adapted to deflect the paper from the plane of the guiding-face at the other side. Thus the face F is adapted to force the paper rearwardly, while the face F′ allows it to move upward in a straight vertical plane. The deflection imparted to one side of the paper by the face F carries that side of the paper to a plane in the rear of the ink-ribbon, and consequently when the paper has been fed to the point indicated at Fig. 2 the point *w* of the original sheet W will stand back of the ribbon, as plainly seen at Fig. 3. At the same time the point *y* upon the duplicate sheet not being deflected from a straight vertical plane will move up in front of the ribbon, as seen at Fig. 4. If now a further movement be imparted to the rolls, the two sheets of paper will separate and pass the ribbon at opposite sides of the lat-

ter because of the positions to which their advance points have been directed, as above described, such advance points leading the respective sheets in their further movement and insuring their entering the proper paths at different sides of the ribbon; but for greater certainty in the separation of the two sheets or strips of paper I prefer to mount the ribbon-shields H and H′ upon a spring-arm G, secured to the frame D at G′, the arm G extending across the path of the paper, and the shield H, preferably formed in one piece with it, and operate said arm by hand through the medium of a lever G^2, pivoted upon the frame D at G^3. By moving said lever the ribbon-shields are carried backward to the position shown at Fig. 4, and thereby the shields are prevented from interfering with the proper movement of the strip Y, and I thereby also move the ribbon back, so that said strip cannot fail to pass in front of it. At the same time by thus moving said shields the point *w* of the other strip is with greater certainty guided back of the ribbon. As soon as the papers are thus properly started the operator releases the lever G^2 and it falls back to its normal position under the power of the spring G^4, carrying the shields and ribbons also back to their operating positions. From this time of course the two paper strips will move uninterruptedly in their proper paths, and both will be printed at the same operation and from the same ink-ribbon, the impression upon the duplicate strip being a reverse impression, which, however, will be visible upon the other side of the strip by reason of its transparent character. The ribbon-shields H^2 and H^3 may also be mounted upon the arm G, and one of them may be integral with said arm, though this is not essential, as these shields are not perceptibly moved by the arm G. I do not in this construction need to waste the duplicate paper when duplicates are not desired, as the feeding of that paper can be avoided by severing it just before it enters the feed-rollers. The use of it may be resumed at any time by again entering it between the rolls C and C′.

J represents a paper-cutting edge supported by the frame D in proper position for severing the paper whenever necessary.

It will be noticed that the shields above mentioned prevent any contact by the ribbon with the paper except at the narrow space in the center where the printing is done, so that all smudging or soiling of the paper is avoided.

I claim—

1. The combination with printing devices of paper-feed rolls and paper-guides F and F′ the latter acting to impart a longitudinal bend or twist to the paper, substantially as specified.

2. The combination with impression devices and a single ink-ribbon, of paper-feed rolls for feeding the sheets of paper, guides adapted to impart a slight longitudinal bend or twist to the paper, and means for temporarily moving the ribbon at one side away from its normal position, substantially as and for the purpose set forth.

3. The combination with the ink-ribbon, of pressure feed-rolls acting to deliver two associated strips of paper to the printing devices, and bearing upon the paper throughout its width, and guiding devices located between the ribbon and feed-rolls and acting to separate the strips so they will pass upon opposite sides of the ribbon, substantially as specified.

4. The combination with the ink-ribbon, of pressure feed-rolls acting to deliver two associated strips of paper to the printing devices, and bearing upon the paper throughout its width, and guiding devices located between the ribbon and the feed-rolls and acting to engage and separate the ends of the strips so they will pass upon opposite sides of the ribbon, substantially as specified.

5. The combination with the ink-ribbon, of pressure feed-rolls acting to deliver two associated strips of paper to the printing devices, and bearing upon the paper throughout its width, and guiding devices located between the ribbon and the feed-rolls, said devices being movable at will and acting to separate the strips and direct them to opposite sides of the ribbon, substantially as specified.

6. The combination with the ink-ribbon and feed-rolls acting to deliver two associated strips of paper to the printing devices, of means for deflecting the ribbon from its normal plane, substantially as specified.

7. The combination with the ink-ribbon and feed-rolls acting to deliver two associated strips to the printing devices, of stationary guides F and F′ imparting a slight twist to the paper, and means for deflecting the ribbon, substantially as specified.

8. The combination with the ink-ribbon and feed-rolls acting to deliver two associated strips to the printing devices, of stationary guides F and F′ imparting a slight twist to the paper, and a movable device for deflecting the ribbon at will, substantially as specified.

9. The combination with the ink-ribbon and feed-rolls acting to deliver two associated strips to the printing devices, of guiding devices acting to position the ends of the strips as set forth preparatory to separation, substantially as specified.

10. The combination with the ink-ribbon and pressing feed-rolls feeding two closely-associated strips of paper toward one side of the ribbon, of means for separating the ends of the strips and guiding one of them to the other side of the ribbon, substantially as specified.

11. The combination with the ink-ribbon and pressure feed-rolls feeding the two asso-

ciated strips of paper having their ends cut in angling directions, of means for deflecting one side of the paper to the rear of the ribbon, and means for correspondingly deflecting the ribbon, substantially as specified.

12. The combination with the ink-ribbon and pressure-rolls feeding two closely-associated strips of paper, of means essentially such as described for separating the ends of the strips as they approach the ribbon, substantially as specified.

13. The combination with the ink-ribbon and the paper-feed rolls, of movable shields H and H^3, substantially as specified.

14. The combination with the ink-ribbon and paper-feeding devices, of shields interposed between the ribbon and the paper at both sides of the printing center and preventing smudging of the paper, substantially as specified.

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