Dec. 22, 1931. W. RITZERFELD 1,837,336

DUPLICATING APPARATUS

Filed March 25, 1931 2 Sheets-Sheet 1

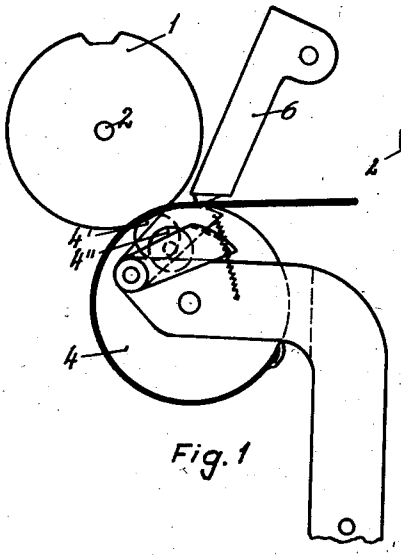


Fig. 1

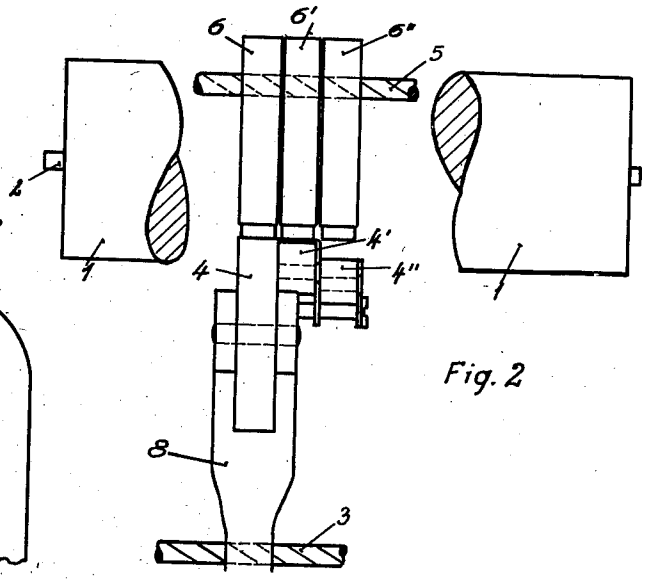


Fig. 2

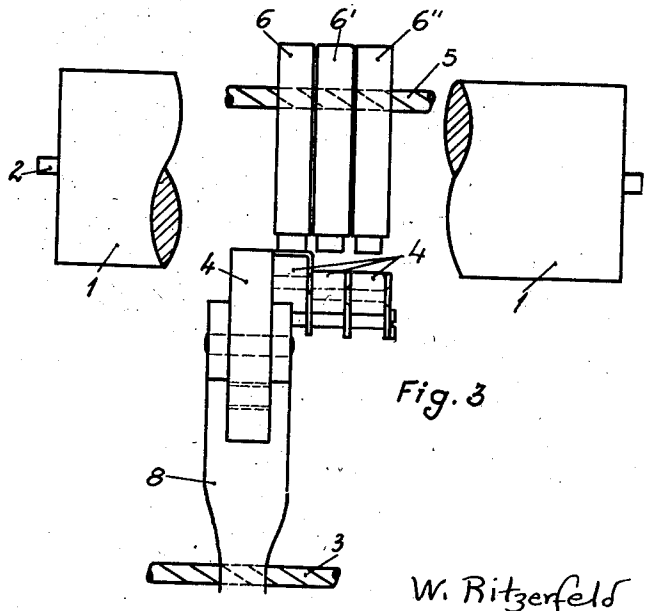


Fig. 3

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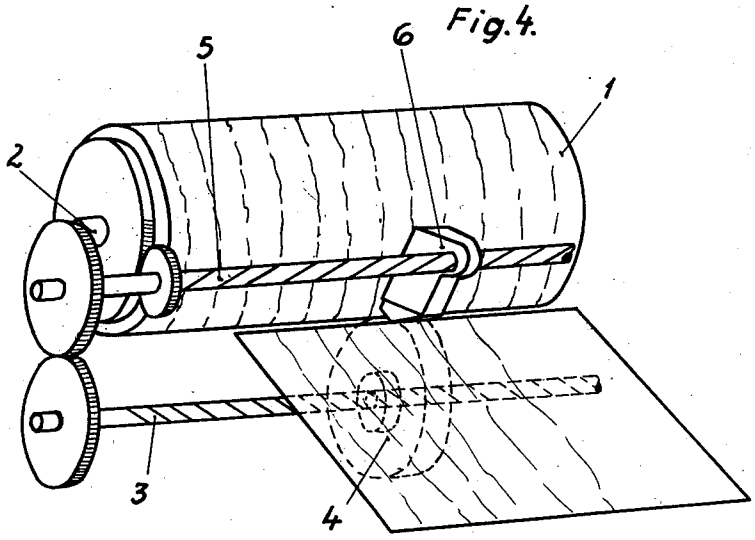
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DUPLICATING APPARATUS

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Fig. 4.



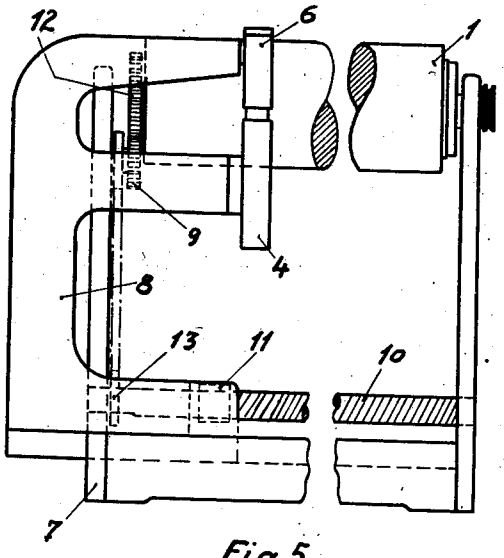


Fig. 5.

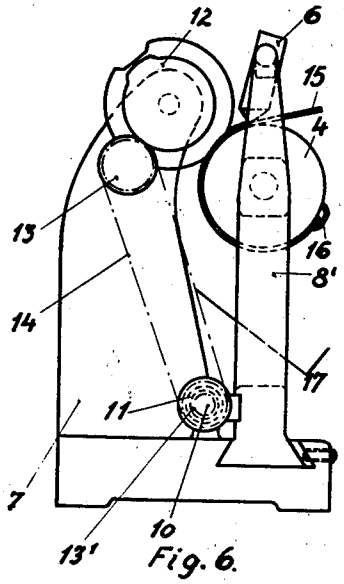


Fig. 6.

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UNITED STATES PATENT OFFICE

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DUPLICATING APPARATUS

Application filed March 25, 1931, Serial No. 525,261, and in Germany March 15, 1930.

This invention relates to a method of and apparatus for permitting book-keeping entries or the like to be copied from an original sheet, which is provided with reversed script capable of transfer by impression, on to account cards, sheets, wage bills, bags, etc., which, at the point where printing is to be performed, are previously moistened with a thin film of a readily volatile liquid serving to dissolve the copying ink of the original in simple and even manner. In this connection it is possible at will to copy off merely one line or any desired number of lines from the original sheet in one single operation. The latter possibility, viz., that of copying a plurality of lines, is more particularly applicable to those instances in which a number of entries on the original sheet are to be transferred to the same account, i. e., copied on to the one card.

The original sheet bearing the reversed or mirror script is, according to the invention, so tensioned on the printing roller of the booking machine that the lines to be copied off are disposed about the roller vertical to the axis thereof. The card to be printed is guided in the direction of the line both of the original sheet and of the card below the original sheet and is moistened on the required surface before the transfer by a moistener which is stationary during the operation. The apparatus possesses a plurality of moistening containers of single-line width conforming in number with the maximum number of lines which may be copied in one operation. If, for example, the copying device possesses exactly as many moistening containers as there are lines on the original sheet, it is possible in case of requirement to moisten and copy all lines of the sheet in one operation. If the copying device possesses a smaller number of containers, only a number of lines conforming with these containers can be copied at the same time. The containers are filled with an absorptive material, such as felt, cotton wool, wick or the like, and a readily volatile liquid.

Projecting out of the bottom of each container is the actual moistener (felt, etc.), which moves into contact with the card, sheet or the like and applies to the same a thin film of the liquid along the line to be printed. In their basic position the moistening containers are held out of contact with the card.

The latter, having been previously moistened, is pressed with the parts intended to take the impression against the original sheet tensioned on the printing roller by means of single discs or rollers, which are provided in a number corresponding to the number of containers. These pressure rollers or discs are of the same diameter as the printing roller, and in association with each there are provided any desired number of auxiliary pressure rolls or discs preferably of smaller diameter and equal in width to the width of a line, and mounted to be rotary on single levers. The pressure rollers are, in their normal position, out of contact with the printing roller, and in the same manner as the moistening devices may be engaged or disengaged by hand or automatically. The same are furthermore made to slide in a lateral direction. In place of the single pressure discs or rollers it is also possible to employ a throughgoing roller, which engages all the lines to be printed in one operation and is also capable of lateral displacement.

On the chief pressure roller or disc, i. e., the one having the same diameter as the printing roller, there is provided a tensioning device, which is capable of being opened and closed either automatically or by hand, and by means of which the card, etc., to be printed is firmly held and guided about the pressure roller or disc.

The copying operation is as follows: The moistening containers and the pressure rollers are moved to such extent laterally either automatically or by hand until the first moistener and the first pressure disc or roll with the tensioned card are situated in front of the first line to be copied. If now, for example, five consecutive lines on the original sheet are to be copied in one operation on to the same card, five moistening containers and the first or chief pressure disc together with four of the auxiliary pressure discs are actuated, so that five lines are moistened on the card to be printed, and these five moistened

lines are pressed in one operation against the five lines of the original which are to be copied. After effected impression the clip is released automatically or by hand, and the printed card falls into a basket or the like situated in front of the rollers.

To permit of secure and ready attachment of the tensioning device the first disc having the same diameter as the printing roller may be furnished with a wider form, i. e., may constitute a roller proper, and serve merely for attachment of the tensioning device and for movement of the card to be printed. In this case merely the auxiliary pressure rollers or discs press the card against the original sheet when copying is being performed.

If it is desired to copy merely one line at a time, there is provided only the one pressure member having the same diameter as the printing roller, and this, for the purpose of better attachment of the tensioning device, may also be constructed in wider form to constitute a roller proper. Assuming this disc or roller is employed solely for fixing and guiding the card, and not at the same time for pressing the card against the original sheet, there may be provided a separate pressure roller equal in width to a line space.

The invention will now be described more fully with reference to the accompanying drawings.

Fig. 1 is the side view of a copying mechanism adapted to perform both single as well as multiple line copying.

Fig. 2 is a front elevation of the apparatus according to Fig. 1.

Fig. 3 is the front elevation of a modified form of embodiment operating on the same principle.

Fig. 4 is the perspective view of an apparatus adapted for merely single-line copying.

Fig. 5 is the front view and Fig. 6 the side view of a modified form of apparatus adapted to copy merely one line at a time.

The roller 1 bearing the original sheet from which the copy is prepared moves upon its rotation, by means of its driven shaft and a suitable intermediate gear (spindles 3 and 5, which are connected with each other by gear wheels or a chain), both the pressure rollers 4 as well as the moistening containers 6, which are narrow in width conforming with the single-line spacing, and apply to the parts of the card to be printed a readily volatile liquid dissolving the reversed script on the original sheet. The pressure rollers 4 and the moisteners 6 are accordingly advanced by the intermediate gear line for line, but in the event of it not being desired to copy off consecutive lines but specific lines selected on the original may be detached from the intermediate gear, displaced in an axial direction and adjusted to the desired line. The arm 8 on the spindle 3 carries the pressure disc 4, which is equal in width to a single line spacing and possesses the same diameter as the roller 1. Beyond this there are also provided on the arm 8, additional to the pressure roller 4, auxiliary pressure members 4′, which are equal in width to a single line. On the spindle 5 are mounted the single lines moistening containers 6. Both the additional moisteners 6 as well as the pressure rollers 4′ may in case of requirement be connected and disconnected singly, so that in accordance with the number of connected moisteners and pressure rollers a corresponding number of lines are printed in one operation. It is also quite possible to copy a number of lines which are separated by an intermediate line, the particular moistener and pressure roller concerned not being connected. Or it is possible with the apparatus to print only one line at a time or, after releasing the moisteners and the pressure rollers from the intermediate gear, the same line several times in succession.

In the case of the apparatus according to Fig. 4, which is adapted for copying only one line at a time, there is provided on the spindle 5 merely one moistener 6 of line width, and on the spindle 3 one pressure disc or roller 4, which is also of a width conforming with the space between two lines and possesses the same diameter as the roller 1. The two spindles 3 and 5 are also connected together, for example by means of gear wheels, so that the moistener 6 and the pressure disc 4 may be displaced to an equal extent. The same may also be released from the intermediate gear and displaced axially when a particular line of the original is to be copied, or the same line printed on several occasions.

In Figs. 2 and 3 the printing roller 1 is mounted to be rotary in the machine bed 7. In the foot of the machine bed 7 there is guided in laterally displaceable fashion, for example by means of a dovetail or the like, a guide member 8′, which carries on its arms the moistener 6 and the pressure disc 4. Coupled with the printing roller 1 is a gear wheel 12, which possesses teeth only on a part of its periphery and engages with a pinion 9 mounted in the machine frame and coupled with a sprocket wheel 13. The sprocket wheel 13 drives by means of the chain 14 a sprocket wheel 13′ coupled with the spindle 10. The spindle 10 is mounted in the lower part of the machine frame 7, and is encompassed by a lock 11 mounted on the arm 8.

Upon the rotation of the printing roller 1 the gear wheel 12 after each time a copy is made is moved into engagement with the pinion 9, whereby the spindle 10 is caused to rotate, and the guide member 8, through the medium of the part 11, is displaced laterally to the extent of a single line spacing. To be able to copy any desired line from the original

sheet the member 11 may be opened in similar manner to the guide spindle of a lathe, and the guide member 8 displaced by hand.

The card or the like to be printed is tensioned on the pressure disc or roller 4 by means of a suitable clamping device 16. After completing copying the clamping device 16 is opened automatically or by hand. The printed card falls into a basket 17 located on the machine frame 7. To ensure that the clip will not constitute an obstacle during the copying operation the roller 1 is furnished with a recess, so that the clip is afforded a free passage between the printing roller and the pressure disc or roller, or discs or rollers respectively. For this purpose, however, the printing roller or the pressure rollers may be lifted or lowered upon each revolution of the printing roller.

The embodiments shown in the drawings relating to multiple line print naturally also apply, with corresponding modifications, to apparatus for single line print, and vice versa.

It will be understood that no restriction is made to the specific forms of embodiment shown, and that various modifications are quite possible within the meaning of the above description and the annexed claims without departing from the spirit of the invention.

What I claim as new and desire to secure by Letters Patent is:

1. A method of duplicating bookkeeping entries or the like from an original sheet furnished with reversed script capable of transfer on to cards, sheets or the like which at the point to be printed are moistened with a thin film of a readily volatile liquid, characterized in that on each occasion as desired or considered necessary either one or also a plurality of lines and on each occasion the desired number of lines are transferred all at once in one operation and copies are printed from the original account sheet, which is tensioned with its lines in the direction of rotation of the printing drum, on the cards which are fixed according to the line and guided in the direction of the line both of the original sheet and of the card and previously moistened at the point to be printed by a moistener of single-line width which is stationary during the moistening and transferring operation.

2. An apparatus for performing the method according to claim 1, characterized in that there are provided any desired number of engageable and disengageable moisteners of a width conforming with a single line space, and a number of engageable and disengageable pressure discs or rollers conforming in number with the number of moisteners, of which parts as many are actuated automatically or by hand as there are lines to be printed in one operation, i. e., moistened and pressed against the original sheet.

3. An apparatus for performing the method according to claim 1, characterized in that the printing roller carrying the original sheet is not capable of axial displacement, but on the other hand the pressure discs or roller cooperating therewith may be displaced automatically or by hand, but during the copying of the line are axially locked, for example are constructed in such fashion that both the moistening containers as well as the arm carrying the pressure rollers are each connected with a spindle, and by means of rotation thereof may be displaced laterally, and that the speed of rotation of both spindles is made to be positively the same by means of gear wheels or a chain.

4. An apparatus for performing the method according to claim 1, characterized in that the positive connection between the pressure discs and moisteners and the device for the lateral advance may be released by suitable means, and the moisteners and the pressure rollers may be displaced axially by hand, while the advance after every line may also be cut out, so that the same line may be copied a number of times in succession.

5. An apparatus for performing the method according to claim 1, characterized in that the card or the like to be printed is firmly held on the first pressure disc, which possesses the same diameter as the printing roller bearing the original, by means of a suitable device, for example a clip or the like, adapted to be opened and closed by hand or automatically, that the pressure disc for the sake of more secure attachment of the clip may be made in roller form, and that the same is either employed for attachment of the card to be printed or at the same time for pressing the card against the original.

6. An apparatus for performing the method according to claim 1, characterized in that in place of the single pressure rollers or discs one pressure roller is provided, the length of which is such that the same covers all lines capable of being moistened and printed in one operation.

7. An apparatus for performing the method according to claim 1, characterized in that the moistening containers and the pressure rollers are mounted in common on an arm which, by suitable means (spindle or the like), is displaced to the extent of one line space after each revolution of the printing roller, and that the arm after release of its connection with the spindle may be displaced laterally as desired (Fig. 5).

8. An apparatus for performing the method according to claim 1, characterized in that the line-by-line advance of the moisteners and the pressure rollers (Fig. 2), or that of the arm carrying the moisteners and the pressure rollers (Fig. 5), is performed by transmission of the rotary motion from the

printing roller, for example is such that on the shaft of the printing roller there is mounted a gear wheel, which possesses teeth only on a part of its periphery and transmits the rotary motion of the printing roller to a gear wheel, which is connected with the spindles by means of gearwheels or a chain.

9. An apparatus for performing the method according to claim 1, characterized in that for copying only one line on each occasion there is provided only one axially displaceable moistening container of the width of a single line spacing and one laterally displaceable pressure roller or disc, which is either employed for both securing the card as well as pressing the same against the original, or merely for attachment and guiding of the card, while the pressure is performed by means of an auxiliary pressure disc or roll capable of being engaged and disengaged.

In testimony whereof I have affixed my signature.

WILHELM RITZERFELD.