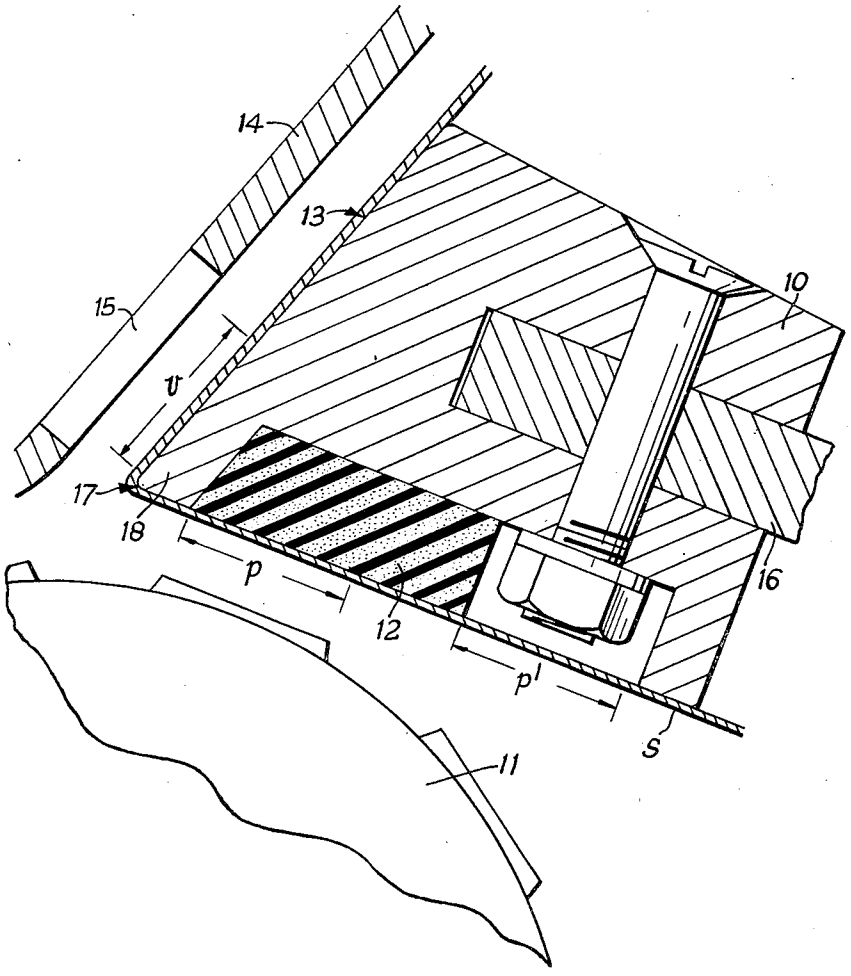
March 28, 1961 H. GROSS ET AL 2,976,800

PRINTING MECHANISMS

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Fig. 1.



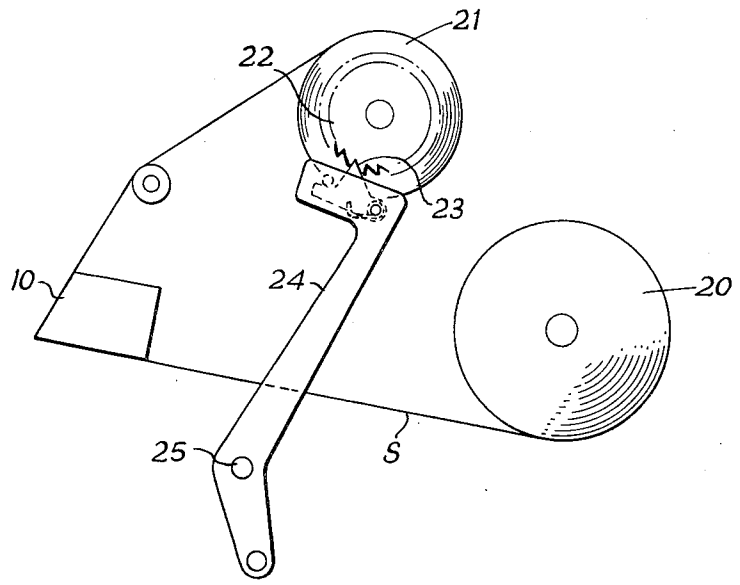
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Fig. 2.



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PRINTING MECHANISMS

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6 Claims. (Cl. 101—93)

This invention relates to printing mechanisms of the type used in adding machines such as cash registers to record on a detail strip the different items entered into the machine, and in which each item on the strip is brought to a viewing position during the machine operation in which said item has been printed. It is customary in cash registers having such printing mechanism to provide a viewing window in the machine casing and where said window is open so as to permit any desired information to be written on the strip adjacent each entry, such printing mechanisms are known as "autographic" printers. The invention embraces printing mechanisms having either a covered window or an open window, and the term "viewing position" used hereinafter is to be understood to include an autographic position at which details appertaining to the printed items may be written on the strip through an open window.

Printing mechanisms of the aforesaid type have a relatively movable platen and type elements between which the detail strip is fed, and as by the end of each operation it is necessary to advance the strip from the printing position to the viewing position, the platen is customarily provided with a printing surface made of rubber or similar resilient material and another surface which is normal to the viewing direction and over which the strip travels after leaving the printing position. It has also been customary, in a machine of the above type, to provide a roller adjacent the or each corner of the platen over which the strip is guided. An arrangement is, however, known by which the strip is "shuttled" during each operation, being first given a reverse movement and then, after printing, a forward movement which is sufficiently greater than the reverse movement to bring the printed item to the viewing position, while leaving a suitable and economic clearance space between the items. Such an arrangement, while making for economy in the length of detail strip required for a given number of items, is complicated and expensive to produce.

The present invention has for an object a printing mechanism of the type referred to which avoids the use of a roller or rollers to guide the detail strip between the printing position and the viewing position, and also the use of shuttling mechanism without, however, sacrificing the advantage of the shuttling arrangement, viz. the economy resulting from the relatively close spacing of the items on the strip. To this end the printing mechanism comprises means for feeding the detail strip only in the forward direction and in a stepwise manner upon each operation of the machine, during which movement said strip is guided from a resilient printing surface of the platen to a viewing surface through a distance such that the item printed during said operation will be completely positioned on said viewing surface, the said resilient printing surface being spaced from the viewing position of the item by a distance not substantially greater than two and one-half times the length of the type characters. The viewing surface may be a surface of the platen, and the detail strip is then guided to said viewing

surface in direct engagement with a corner of the platen between the printing and viewing surfaces. The said corner of the platen can be radiussed, which provides the advantage of reducing friction during the feed movement of the strip.

The invention is illustrated in the accompanying drawings in which:

Figure 1 is a fragmentary sectional view showing the platen and one of the type elements; and

Figure 2 illustrates diagrammatically one arrangement of paper strip feed by way of example.

In the drawings, **10** designates the platen and **11** (Figure 2) one of the type elements, here illustrated as a type wheel, though the invention is equally applicable to printers having type bars. The platen is disposed above the type wheels and is recessed at its lower surface to accommodate a rubber or like resilient insert **12** which is secured within the recess as by an adhesive and the underface of which forms the surface which supports the detail strip S at the printing position and is herein referred to as the printing surface. One side face **13** of the platen is suitably inclined to provide a viewing surface and the adjacent wall **14** of the machine casing is provided with a viewing opening **15**. The platen is carried by an arm **16** so as to be movable towards and away from the type wheels during each operation of the machine in known manner. The detail strip S, which is held under tension by any known or convenient means, passes along the lower platen surface and then upwardly to the inclined surface **13** in close contact with the corner **17** between said surfaces. The detail strip S is advanced in stepwise manner during each operational cycle of the machine. Figure 2 shows one convenient arrangement for effecting this movement, where **20** designates the supply spool, **21** the take-up spool and **22** a ratchet wheel rigid with spool **21**. A spring-loaded pawl **23** cooperates with ratchet wheel **22**, said pawl being carried by an arm **24** pivoted in the machine at **25** and to which rocking movement is imparted during each operation cycle as by a link or cam. The link or cam may be actuated by depression of any one of a bank of manually operable amount keys or, in the case of a motorized machine, from the motor.

In order that the items printed on the detail strip shall be clearly legible at the normal distance of the operator from the machine while, however, avoiding the use of undesirably large type elements, we prefer to employ type elements of which the character length is between about 0.12 and 0.18 inch, particularly about 0.15 inch. We further prefer to provide a detail strip feed of between 0.2 and 0.3 inch, particularly 0.25 inch for each operation, which allows a clearance space between adjacent items, and therefore between the printing position p and the viewing position v, of between 0.08 and 0.12 inch particularly 0.1 inch. This provides for the use of type elements having a linear or peripheral measurement of not more than about three inches. Thus, in the case of type wheels, these will not be larger than one inch in diameter. The clearance space between adjacent items is here less than the type character height; it is usually preferable that this clearance shall not exceed the type character height, except perhaps where such height is less than 0.12 inch.

It is nevertheless possible, with the printing mechanism according to the invention, to employ type characters having a length of about 0.25 inch without resulting in an excessive detail strip length for a given number of entries. The clearance space between successive items could then be as high as 0.625 inch and the detail strip feed would then be 0.875 inch. Such clearance space, however, (and thus the distance between the insert **12** and the item viewing position v on the surface **13**) would

generally not be necessary as the thickness of the metal tongue 18 between the platen surface 13 and the resilient insert 12 could be as low as 0.03 inch and we have found that a thickness of 0.06 inch provides adequate strength. If economy is required both in the size of the type elements and in the length of the detail strip used, type characters having a length as small as 0.06 inch can be used quite satisfactorily, especially if the clearance space between adjacent printed items is then relatively large, i.e. not substantially less than or even greater than the type character length.

Allowing a margin of 0.01 inch between the item printing position *p* and the end of the resilient insert 12 adjacent the corner 17, a further margin of 0.03 inch between said corner and the item viewing position *v*, and a thickness of 0.06 inch for the tongue 18, a strip feed of 0.25 inch is sufficient for type characters having a length of 0.15 inch. It is to be understood that this is the feed movement at the commencement of winding the strip on to an empty take-up spool and that, unless means is provided for reducing the angular movement of the take-up spool as the strip diameter increases, this feed movement, and consequently the clearance space between the items will progressively become larger. No other movement of the strip is necessary as the portion which is to receive the next printed impression (here shown at position *p*1) will be in the required position when the last printed item is in the viewing position.

The angular relationship between the printing and viewing surfaces of the platen will vary in dependence upon the relative positions of the platen and type elements. With the platen disposed above the type elements, as shown in the drawing, with its printing surface inclined at about 20° to the horizontal, the viewing surface is then conveniently rearwardly inclined and is thus at an acute angle to the printing surface. Such angle may vary between quite wide limits, but angles of between 60° and 80° have been found satisfactory, an angle of 70° providing a convenient viewing position and/or autographic surface.

Where the corner 17 is given a radius, this should not exceed the thickness of the tongue 18. A suitable radius is 0.03 inch.

We claim:

1. In an adding machine, in combination, a casing, a window in said casing, item printing mechanism within said casing comprising a relatively movable platen and type elements, the platen having a resilient printing surface cooperating with the type elements during each operational cycle of the machine, means to feed a detail strip unidirectionally and in stepwise manner over said resilient surface to enable the items set up on the type elements to be successively printed on said strip, said platen having an angular portion providing a corner about which the strip is guided in direct engagement therewith from the resilient printing surface to a position at which the item printed on said strip during any said operational cycle of the machine is located in a viewing position opposite the said window before commencement of the next following operational cycle of the machine, one surface of said angular portion extending from said resilient printing surface and the other surface of said angular portion extending past said window located in the viewing position thereof, said resilient printing surface being spaced from said item-viewing position by a distance not substantially greater than two and one-half times the length of the characters on the type elements.

2. In an adding machine, in combination, a casing, a window in said casing, item printing mechanism within said casing comprising a relatively movable platen and type elements, the platen having a resilient printing surface cooperating with the type elements during each operational cycle of the machine, means to feed a detail strip unidirectionally and in stepwise manner over said resilient surface to enable the items set up on the type elements to be successively printed on said strip, said platen having an angular portion providing a corner about which the strip is guided in direct engagement therewith from the resilient printing surface to a position at which the item printed on said strip during any said operational cycle of the machine is located in a viewing position opposite the said window before commencement of the next following operational cycle of the machine, one surface of said angular portion extending from said resilient printing surface and the other surface of said angular portion forming a support for that part of the detail strip located in the viewing position, said resilient printing surface being spaced from said item viewing position by a distance not substantially greater than two and one-half times the length of the characters on the type elements.

3. Printing mechanism as claimed in claim 1, wherein the resilient printing surface is spaced from the item viewing position by between 0.03 and 0.625 inch.

4. Printing mechanism as claimed in claim 1, wherein the type character length is between 0.12 and 0.18 inch and the clearance space between successive printed items is between 0.08 and 0.12 inch.

5. Printing mechanism as claimed in claim 2, wherein the said corner of the platen is radiussed, said radius not exceeding the spacing between the item viewing position and the adjacent end of the resilient printing surface.

6. Printing mechanism as claimed in claim 2, wherein the said surfaces forming the angular portion of the platen are disposed to subtend an angle of between 60° and 80°.

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