Feb. 15, 1938. W. POLLARD 2,108,549

SEPARATING AND FEEDING SHEETS

Filed Oct. 7, 1936 2 Sheets-Sheet 1

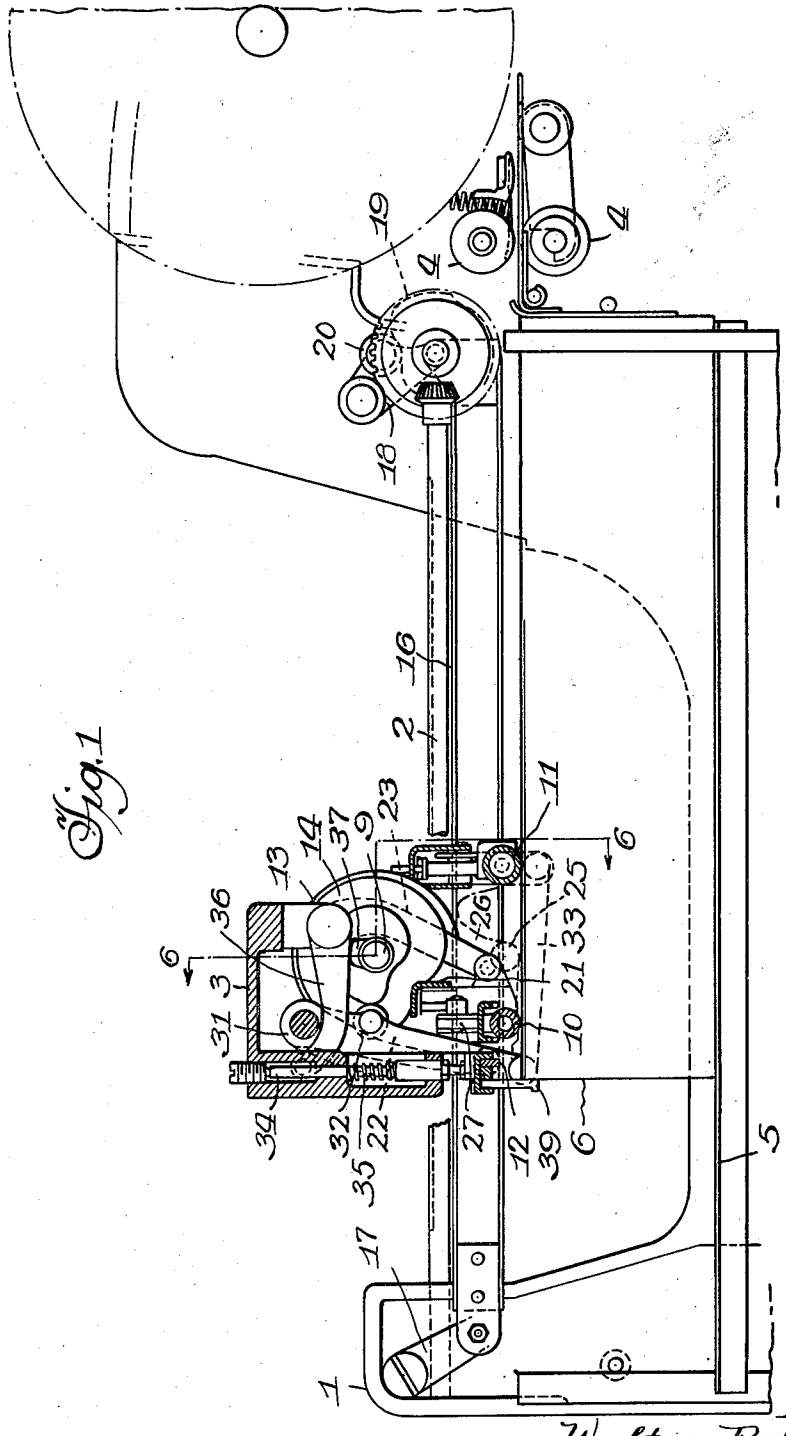


Fig. 1

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Fig. 2

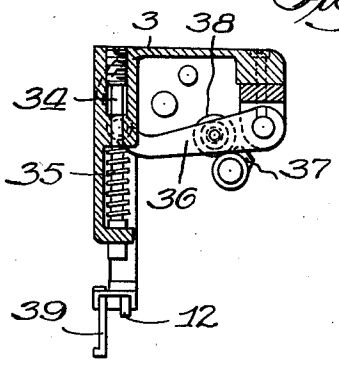


Fig. 3

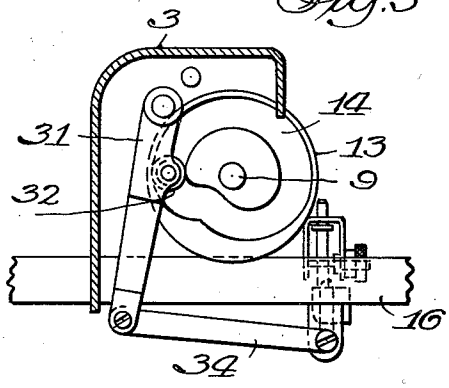


Fig. 4

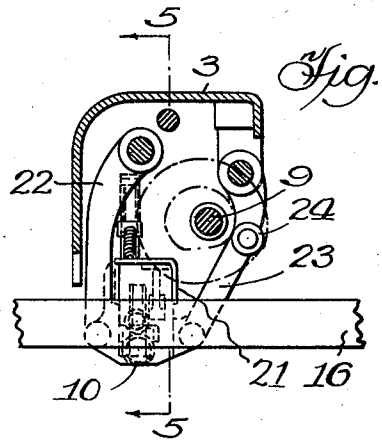


Fig. 5

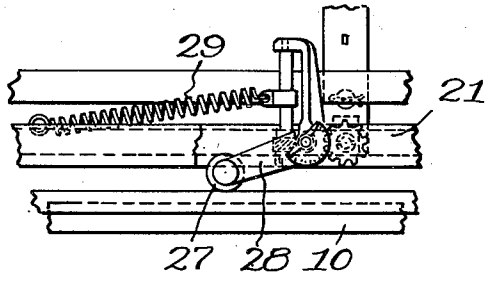
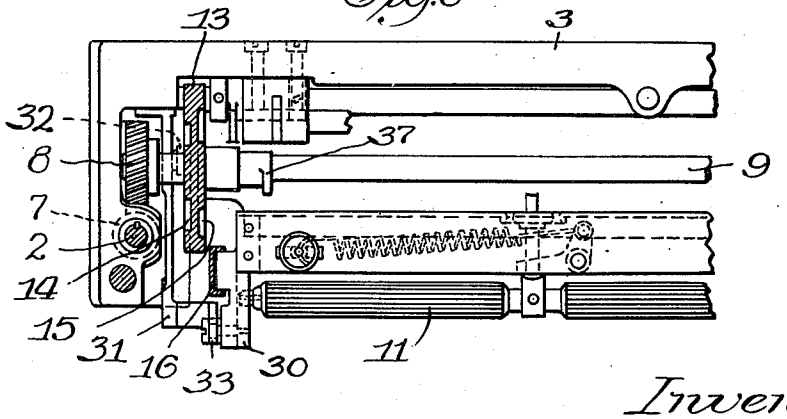


Fig. 6



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Patented Feb. 15, 1938 2,108,549

UNITED STATES PATENT OFFICE

2,108,549

SEPARATING AND FEEDING SHEETS

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Application October 7, 1936, Serial No. 104,397
In Great Britain October 11, 1935

8 Claims. (Cl. 271—19)

The present invention relates to improved means for separating and feeding sheets to printing machines.

In sheet separating devices at present known the separation takes place at the forward end of the pile, that is to say at the end near the feed rollers of the machine. According to one known type of sheet separator the pile rests upon a feed board provided with a rear stop plate, the forward edges of the sheets registering under clamping fingers which rise clear of the pile to permit the separator to withdraw the top sheet, buckle the same between it and the rear stop plate and then to feed it forward over the clamping fingers, which meantime have descended to grip the pile, and so to the feed rollers of the machine. With such separators which act upon the forward end of the pile experience has shown that there is a tendency for more than one sheet to be separated at a time, and the object of the present invention is to overcome this tendency or alternatively to lessen it.

According to this invention, a sheet separating and feeding device for printing machines includes a separating member adapted to separate a sheet at or near a rear stop member for the pile of sheets and buckle it between itself and a feeding member, the latter being adapted to feed the separated sheet between the feed rollers of the machine.

According to a further feature of the invention a sheet separating and feeding device for printing machines also includes a presser plate adapted to descend on the pile at the stop member end after a sheet has been separated, thereby preventing further separation until the feeding member has advanced the sheet to the feed rollers of the machine.

According to a still further feature of the invention, the feeding member is adapted to exert pressure on the sheet about to be separated while the sheet is buckled between it and the separating member.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a side elevation of the device, partly in section, certain parts being omitted for clearness;

Figures 2, 3, and 4 are detailed sectional elevations illustrating respectively the presser plate, the operating means of the feed member and the separating member and its operating means;

Figure 5 is a fragmentary section of the device showing the separating means, taken on the line 5—5 of Fig. 4, and

Figure 6 is a fragmentary section of the device, mostly on the line 6—6 of Fig. 1.

Referring to the drawings, the sheet separating and feeding device is incorporated as a unit in a frame 1, which may be cast integral with or separate from the frame of the printing machine. Mounted in the frame 1 there is a splined shaft 2 driven from the main driving shaft (not shown) of the printing machine through a train of gears.

The separating member 10, feeding member 11 and presser plate 12 and their actuating means are mounted in a cross frame 3 slidable on the frame 1 towards and away from the feed rollers 4 of the printing machine over the paper feed board 5 on which is placed a stack of sheets 6, engaged at its rear end by the stop plate or pins 39.

Mounted on the shaft 2 in the frame 3 there is a worm 7 (Fig. 6) meshing with a worm gear 8 fast on a cam shaft 9 mounted in the frame 3.

Secured to the cam shaft 9 there is a cam member 13 which has cam grooves 14 and 15 formed in its respective sides. The cam groove 14 governs the horizontal reciprocatory movement of the feeding member 11 and the cam groove 15 that of the separating member 10. These two members also perform vertical reciprocatory movement which is derived from a lateral longitudinal slideway 16, suspended from links 17, 18 and operated by a cam 19 acting upon the follower 20 of link 18.

The sheet separating member 10 is mounted in a sub-frame 21 suspended from links 22, 23 pivoted in the cross frame 3 (Fig. 4). The follower 24 seated on link 23 rides in the cam groove 15 of cam 13, so that rotation of this cam results in the horizontal reciprocation of the separating member 10, same being moved from the full line position (Fig. 1) into the dotted position 25 in which the uppermost sheet 26 of the pile 6 is buckled between it and the feed member 11, which is pressed on to said uppermost sheet 26 during the buckling operation.

The sub-frame 21 is provided at either end with a roller (not shown) adapted to be engaged by the adjacent slideway 16, whereby the separating member is afforded a vertical reciprocatory movement in addition to its horizontal reciprocatory movement due to the cam groove 15, such movements being so timed that member 10 is pressed on the uppermost sheet 26 during the buckling operation, but is raised therefrom during the sheet feeding operation.

The separating member 10 is spring pressed downwardly so that it may have a good grip on the sheet, and for this purpose it is engaged by a roller 27 mounted on one arm of a bell crank 28 pivoted in the sub-frame 21, the other arm of the bell crank being connected with a spring 29 anchored in the sub-frame 21. The spring has an adjustable connection to the bell crank arm, so as to be able to adjust the pressure with which the separator 10 is applied to the sheet.

The feeding member 11 is mounted in end slides

30 (Fig. 6) running in the slideways 16 and afforded vertical reciprocatory movement thereby, horizontal reciprocatory movement being communicated to the slides 30 through links 33 by levers 31 pivoted in the cross frame 3 and having followers 32 engaging in the cam groove 14.

The presser plate 12 is mounted on vertical rods 34 resiliently pressed downwardly by springs 35 and vertically reciprocated by arms 36 pivoted in the cross frame 3 and having followers 38 (Fig. 2) engaged by cams 37 fast on the cam shaft 9.

The various cams are so formed and arranged and their movements are so timed that the following sequence of operations takes place:—

The feed member 11 is caused by the slideways 16 to be pressed upon the uppermost sheet 26 of the pile 6 and the separating member 10 is also caused to descend thereon. The separating member is now moved by the action of cam groove 15 towards the feeding member whereby the sheet is buckled therebetween as shown in Fig. 1. As soon as the rear end of the sheet has been drawn away from the stop member 39 the presser plate descends on the next following sheet under the action of the cams 37 and prevents further separation. After the sheet has been buckled the separating member 10 is raised by the action of the slideways 16 to release the sheet and at the same time pressure on the feeding member 11 is relieved to the appropriate extent to enable same to feed the sheet forward between the feed rollers 4 of the printing machine by the action of the cam groove 14. This accomplished the feeding member is raised to release the sheet altogether and withdrawn, the presser plate 12 being also raised to release the next following sheet, whereupon the cycle is repeated.

It will be understood that various forms of the invention other than that described above may be used without departing from the spirit or scope of the invention.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In a sheet separating and feeding device for a machine having feed rollers and a rear stop for a pile of sheets, a separating member adjacent said stop, a feed member forward of the separating member, and actuating means for said members whereby the separating member buckles a sheet from the pile forwardly against the feeding member, and said feeding member thereafter feeds said sheet between the said rollers.

2. In a sheet separating and feeding device for a machine having feed rollers, a separating member adjacent the rear of the pile of sheets to be fed, a feeding member, a presser plate operative to clamp the rear end of the pile after separation of a sheet, means actuating the separating member to buckle a sheet against said feeding member, and means actuating said feeding member to forward the buckled sheet beteed the feed rollers.

3. In a sheet separating and feeding device for a machine having feed rollers, a separating member adjacent the rear of the pile of sheets to be fed, a feeding member, a presser plate operative to clamp the rear end of the pile after separation of a sheet, means actuating said feeding member to exert pressure on the separated sheet during buckling, and thereafter to feed said sheet between the feed rollers.

4. A sheet separating and feeding device for a machine having feed rollers driven from a main driving shaft, including a separating member, a feeding member, a presser plate, a cross frame over the pile of sheets to be fed carrying said separating and feeding members and said presser plate, cams mounted on the cross frame operable from the main driving shaft, link and lever means actuated by one of said cams to impart timed, horizontal reciprocating movements to the separating member, link and lever means actuated by another of said cams to impart timed, horizontal reciprocating movements to the feeding member, and resilient means actuated from another of said cams to periodically engage the presser plate against said pile.

5. A sheet separating and feeding device for a machine having feed rollers driven from a main driving shaft, including a separating member, a feeding member, a presser member, a cross frame over the pile of sheets to be fed carrying said separating and feeding members and said presser member, slideways at the sides of the device mounted for longitudinal rocking movement and operatively connected to said separating and feeding members to impart vertical reciprocating movement thereto, cam means actuated from the main driving shaft to impart timed rocking movement to said slideways, cams mounted on the cross frame operable from the main driving shaft, mechanism actuated by said cams to impart timed horizontal movements to the separating member and to the feeding member, and linkage including a resilient member actuated from one of said cams to periodically engage the presser member against the pile.

6. A sheet feeding device adapted to separate and feed sheets singly in succession from a pile, comprising a separating member movable to separate the rear end of a sheet forwardly from the pile and thereafter to release said sheet, a feeding member pressed upon said pile during separation to cause the separated sheet to be buckled between the separating member and thereafter movable to feed said sheet forwardly from the pile, and cam means to actuate said separating and feeding members in timed relation.

7. In a feeding and separating device for a pile of sheets, a feeding member, a separating member, means to resiliently engage the separating member with the top of the pile, means to move the separating member toward the feeding member to buckle a sheet from said pile, means to move the feeding member in contact with said sheet to forward it from the pile, and means to successively raise the separating member and the feeding member out of contact with the pile.

8. In a feeding and separating device for a pile of sheets, a feeding member adapted to engage the pile intermediate its ends and a separating member movable to separate the rear end of a sheet from the pile and to buckle said sheet forwardly against the feeding member.

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