Feb. 11, 1958 N. G. A. STRÖMBERG 2,823,033

DELIVERY CONTRIVANCE FOR PAPER SHEETS AND THE LIKE

Filed July 27, 1953 2 Sheets-Sheet 1

FIG. 1

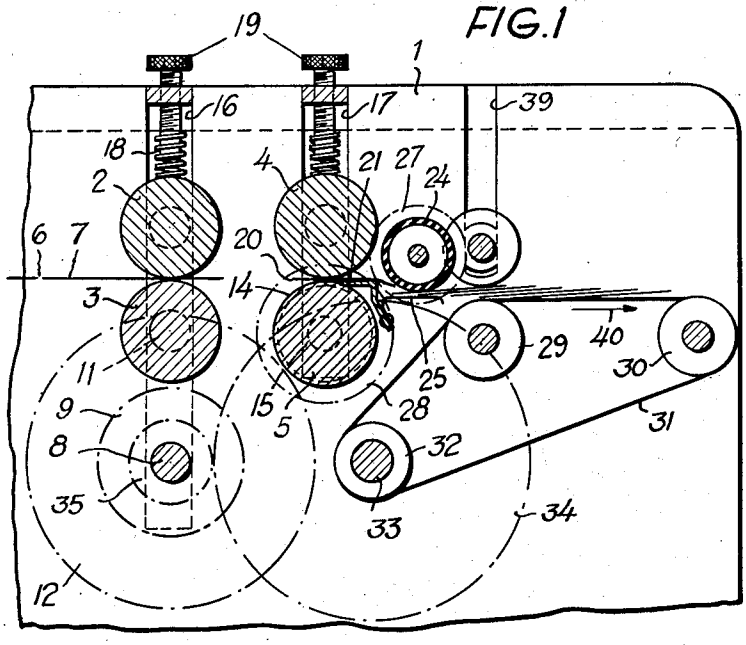
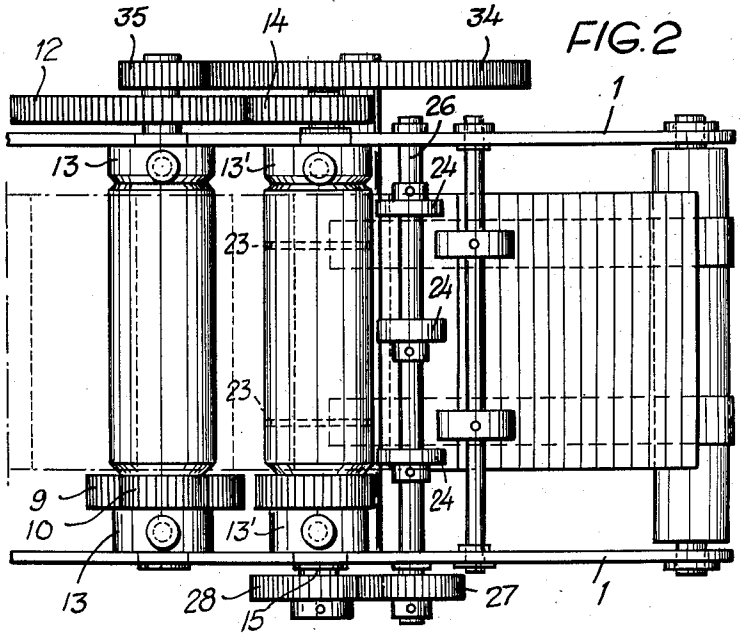


FIG. 2



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FIG. 3

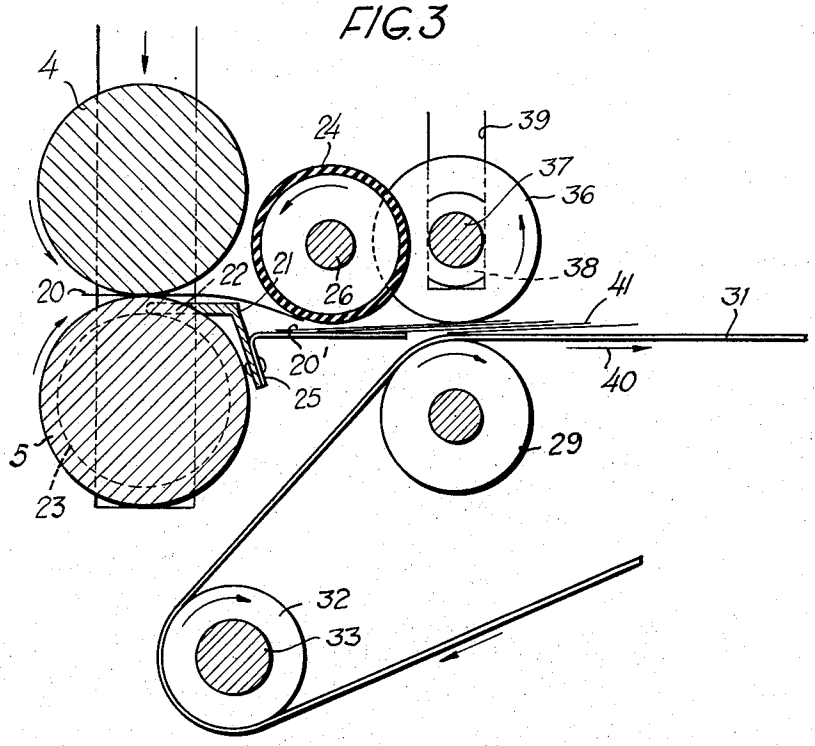
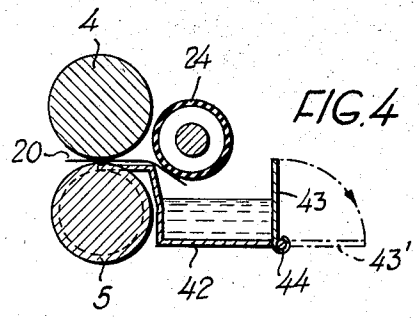


FIG. 4



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United States Patent Office 2,823,033 Patented Feb. 11, 1958

2,823,033

DELIVERY CONTRIVANCE FOR PAPER SHEETS AND THE LIKE

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Application July 27, 1953, Serial No. 370,509

Claims priority, application Sweden May 19, 1953

1 Claim. (Cl. 271—76)

The present invention relates to a contrivance for the delivery of sheets of paper or pasteboard, particularly of forms and other sheets of a small size intended to be used in tear-off machines, printing presses and other refining machines. The contrivance is of the type wherein the sheets are fed along a conveying track to which they are brought by feed rollers or the like on the tear-off machine, printing press or the like.

In the delivery of sheets, particularly such of a rather small size, difficulties of various kinds are met with. The static electricity which the sheets are charged with is frequently very troublesome, inasmuch as the sheets are caused thereby to stick to each other or to their support, so that their movement is disturbed. The conveyance of the small sheets in a manner to make them move in a uniform stream, while partly covering each other like roofing-tiles on a slowly travelling conveying track also involves special problems. If the machine is running at a high speed, it might occur that the sheet thrown off the discharging device of the machine will not have time to move away at a sufficient rate before the following sheet, so that the fore edge of the latter is caused to interfere with the rear edge of the firstmentioned sheet, instead of sliding up onto the wandering support.

The present invention has for its object to obviate these difficulties and to provide an exactly operating delivery contrivance. To this end the invention is primarily distinguished by the feature that the conveying track behind the feed rollers is provided with a bridge adapted to form a downwardly extending shoulder, so that the path of movement of the sheets behind said shoulder will be located lower down than before the same. The delivery contrivance may be provided with feeding members adapted to convey the sheet at approximately the same rate at which it is delivered by the feed rollers or the like, said sheet being at the same time pressed down the shoulder. Hereby the sheet will be moved positively so as to be brought rapidly and safely out of the way of the following sheet, which may be caused, by suitably adapting the speed of the sheet next ahead, to lay itself with its fore edge over the rear edge of the sheet next ahead.

A particularly practical embodiment of the feeding members may be provided by making the same as driven sheet rollers and springs, which latter are so arranged as to press the sheet against the sheet rollers, so that the sheet will be advanced by the same.

The springs may consist of leaf springs secured to the front side of the bridge at a distance below the upper side of the bridge so as to form the first portion of the conveying track behind the shoulder.

Further features of the invention and advantages connected therewith will appear from the following description of a form of embodiment of the delivery contrivance applied to a so-called tear-off machine, as illustrated in the accompanying drawings. Fig. 1 of the drawings shows the machine with the delivery contrivance thereof in vertical section. Fig. 2 is a corresponding horizontal

projection. Fig. 3 shows an enlargement of the delivery contrivance proper in vertical section. Fig. 4 shows a variant of the contrivance in vertical section by way of diagrammatic representation.

The tear-off machine referred to in the example shown, with which a delivery contrivance according to the invention is built together with common lateral side plates 1, 1, broadly consists of two pairs of rollers 2, 3 and 4, 5 arranged behind one another, of which the front pair of rollers 4, 5, counted in the feeding direction, rotate at a speed higher than that of the pair of rollers 2, 3 therebehind, so that a paper web 7 provided with crosswise perforations 6 and advanced by the rollers between the same, will be torn apart along the crosswise perforations, when such a perforation is located between the pairs of rollers. The rollers may have their movement imparted to them in an arbitrary suitable manner. In the example shown, the lower rollers 3, 5 of the pairs of rollers are driven from a transmission shaft 8 having secured onto the same a smaller gear wheel 9, which is in engagement with a gear wheel 10 arranged on the shaft 11 of the feed roller 3, as well as a larger gear wheel 12 in engagement with a gear wheel 14 on the shaft 15 of the feed roller 5. The bearing boxes for the shafts of the rollers 2, 3 are guided, like the bearing box 13 of the shaft 8, in vertical guides 16 in the side plates 1, and in a similar manner the bearing boxes 13' for the shafts of the rollers 4, 5 are guided in vertical guides 17 in the side plates. The bearing boxes for the shafts of the upper feed rollers 2, 4 are actuated by springs 18, the tension of which is controllable by means of screws 19, so that the bearing pressure of the rollers against the paper web 7 may be controlled.

A sheet 20, which has been torn off the paper web by means of the rollers 4, 5, is discharged from the tear-off machine and fed into the delivery contrivance, which is so constructed that the fore edge of a following sheet cannot interfere with the rear edge of a sheet next ahead, but is caused to lay itself on top of the latter. For this purpose a bridge or threshold 21 is provided immediately behind the discharge device formed by the rollers 4, 5, said bridge or threshold forming a shoulder or a downward step, so that the sheet will be caused to fall down for a distance when fed onto the following conveying track. The threshold is provided with a number of horizontal, rearwardly directed teeth 22 adapted to engage corresponding grooves 23 in the circumference of the roller 5, whereby the sheet is prevented from being entrained around by the roller 5 in a downward direction, and is instead guided onto the upper side of the threshold 21.

The first portion of the conveying track behind the shoulder is formed by springs 25 secured onto the front side of the bridge and extending with a cantilever portion substantially in a horizontal direction while forming a support for the sheets and pressing the latter up against a number of driven sheet rollers 24. The sheet rollers 24 are secured onto a shaft 26, which is driven over gear wheels 27, 28, of which the latter is splined onto the shaft 15 of the feed roller 5. The gear wheels 27, 28 are selected so that the sheet rollers 24 will have approximately the same peripheral speed as that of the feed rollers 4, 5. The feed rollers 24 are coated with a friction-increasing material, such as rubber, and the springs 25 exert a slight pressure on the sheet rollers.

Provided in the same plane as that of the leaf springs 25 and in the continuation of the latter is a band conveyor with a band 31, the upper part of which runs between rollers 29, 30 while forming the continuation of the conveying track for the sheets. The band 31 also extends round a driving roller 32, which is splined onto a driving shaft 33 mounted in the side plates. The driving

shaft 33 is provided with a large gear wheel 34 in engagement with a small gear wheel 35 on the transmission shaft 8 so as to be driven from the latter at a relatively low number of revolutions. The speed of the conveying track 31 is substantially lower than the peripheral speed of the sheet rollers 24. Provided right above the band rollers 29 are sheet rollers 36 on a shaft 37, the bearing boxes 38 of which are displaceable in vertical guides 39 in the side plates 1. The sheet rollers 36 rest on the sheets conveyed by the band, and they are entrained, that is to say are driven around by the sheets during the movement of the latter. The direction of movement of the conveying band and the sheets is marked with arrows 40.

The mode of operation of the sheet delivery contrivance described is broadly as follows:

When a sheet 20 is driven out from the rollers 4, 5 over the threshold 21, the fore edge of the same will strike upon the rollers 24 to be pressed downwardly against the leaf springs 25. The sheet 20' next in front of the sheet 20 has already passed the threshold 21 and the shoulder formed thereby so as to rest on the springs 25. It is true that said sheet is kept in engagement with the rotating sheet rollers 24, but it is braked by the sheet in front thereof so as to move more slowly than the sheet 20 which is being discharged from the rollers 4, 5. The sheet 20, which by reason of the threshold 21 is advanced at a level higher than that of the sheet 20', will thus lay itself on top of the latter, at least with the front portion thereof. The braking of the sheet 20' depends on the fact that it is introduced, together with other sheets in front thereof, between the sheet rollers 36 and the conveying band 31 traveling at a low rate. According as new sheets are discharged from the rollers 4, 5, the procedure described is repeated, the sheets then gathering successively on the conveying band while partly covering each other similar to roofing-tiles while travelling slowly in a uniform stream 41, from which they may be removed in an arbitrary suitable manner.

It should be observed that the sheets from the rollers 4, 5 in the tear-off machine are caused to move positively, in a manner such as to be guided relatively to each other in the desired manner, interference between the sheet edges and disturbances in the operation being thus avoided.

In the modification of the delivery contrivance shown in Fig. 4, the band conveyor is replaced by a delivery container 42, one side wall 43 thereof forming the threshold for the sheets 20 discharged from the tear-off machine, printing press or the like. The sheet rollers 24, which are provided with a frictional coating, here force the sheets downwardly into the container 42, wherein the sheets lay themselves on top of each other in a pile, which may be conveniently removed out of the container by the wall 43 of the same being swingable about an axis 44 and adapted to be folded down into a position 43' indicated by chain-dotted lines. To facilitate storing of a greater number of sheets in the container, the bottom of the latter may be adjustable in the vertical direction.

What I claim is:

An apparatus for delivering sheets, comprising feed means for said sheets, a bridge receiving sheets from said feed means successively on its upper surface, a sheet conveying roller to move the sheets from said bridge, the lower periphery of said sheet conveying roller being lower than said bridge upper surface, spring means secured to said bridge in a cantilever manner and adapted to press said sheets against the lower periphery of said sheet conveying roller, and a second conveyor receiving said sheets from said spring means, said second conveyor having a lower feeding rate than that of said feed rollers.

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