March 1, 1955 J. F. CURRAN ET AL 2,703,239

SHEET FEEDING MECHANISMS

Filed Aug. 13, 1949 2 Sheets-Sheet 1

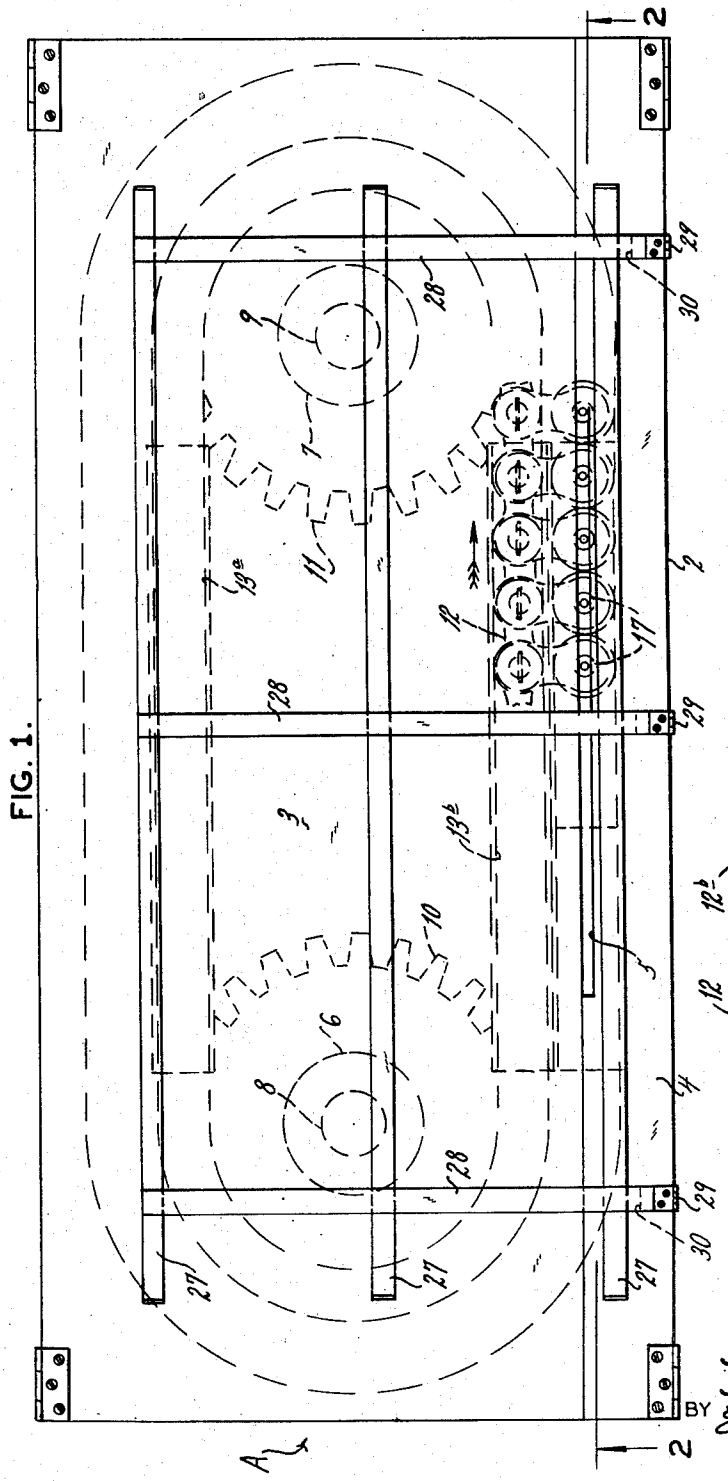


FIG. 1.

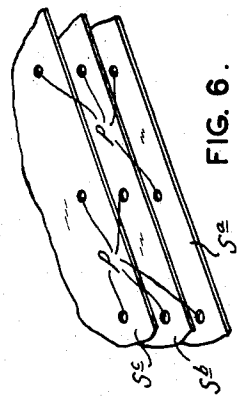


FIG. 6.

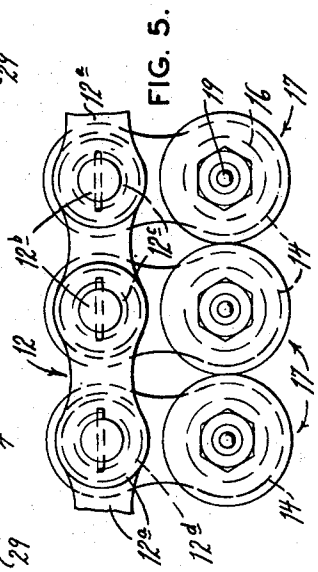


FIG. 5.

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SHEET FEEDING MECHANISMS

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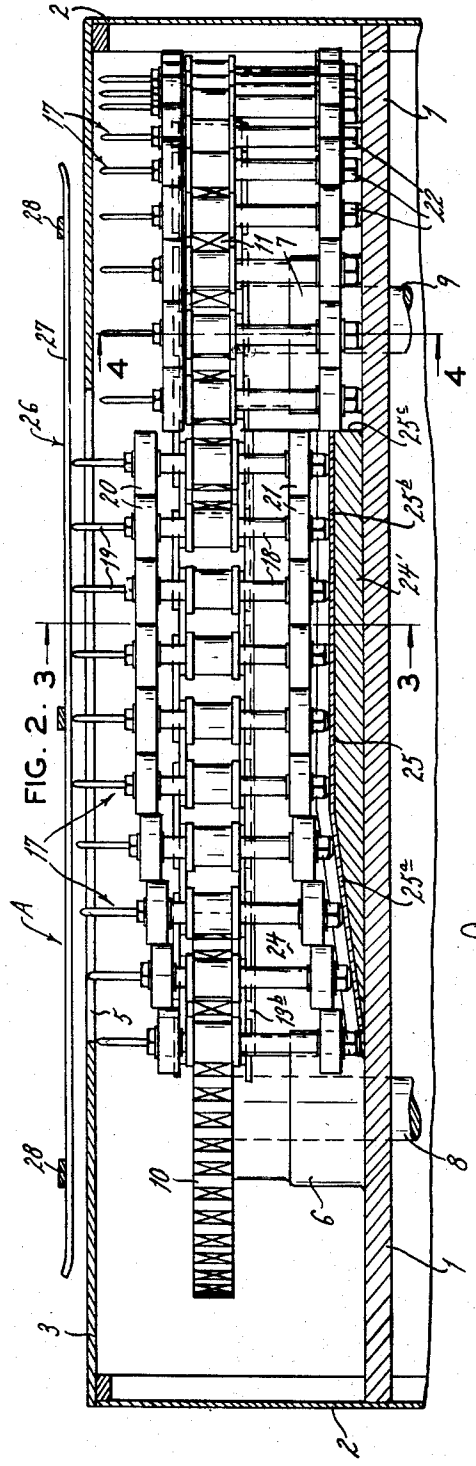


FIG. 2.

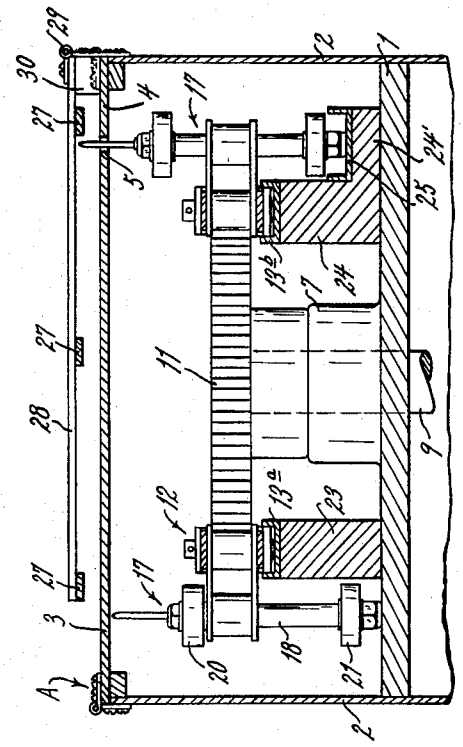


FIG. 3.

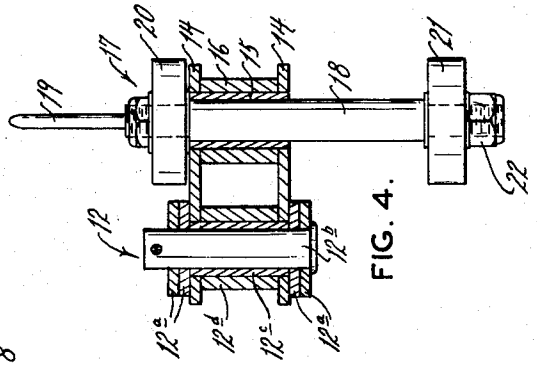


FIG. 4.

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SHEET FEEDING MECHANISM

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Application August 13, 1949, Serial No. 110,084

3 Claims. (Cl. 271—2.1)

This invention relates generally to web-feeding mechanisms and more specifically to web-feeding mechanisms adapted particularly for use with collating machines through which a plurality of strips of paper are fed in precise registration with respect to each other to points where said strips of paper are glued and severed so as to produce individual sets of sheets of paper, the predominant object of the invention being to provide a web-feeding mechanism of the type mentioned which, because of its improved construction and arrangement, is capable of feeding the strips of paper in precise registration with respect to each other at very high speed.

As is well known to persons familiar with such matters, freight bills, invoices, and many other forms, are prepared for use by users so that each thereof comprises a plurality of printed sheets which are glued or otherwise secured together to provide individual sets which may receive typed or written matter thereon to provide an original sheet and the desired number of carbon copy sheets in each set. These sheets come from the presses by which they are printed in the form of rolls of strip paper, and collating machines are employed for feeding the strips in proper order and in precise registration with respect to each other to points where the strips are glued together and where said strips are severed into sets. The paper strips are each provided with spaced perforations along an edge thereof to facilitate feeding the sheets, and obviously, it is absolutely essential that these perforations of the various strips be in precise registration to provide for proper registration of the sheets of the sets which are ultimately produced, and in order to attain the high speed of production which is so desirable.

The web-feeding mechanism of this invention is of such improved construction and arrangement that it is capable of feeding the strips of paper through a collating machine in precise registration with respect to each other and at such high speed as to increase the production of the collating machine far beyond that realized in the use of feeding mechanisms of the types heretofore employed as parts of collating machines.

Fig. 1 is a top, plan view of the improved feeding mechanism of this invention.

Fig. 2 is a longitudinal section taken on line 2—2 of Fig. 1.

Fig. 3 is a cross-section taken on line 3—3 of Fig. 2.

Fig. 4 is an enlarged section taken on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary plan view of a portion of the improved feeding mechanism.

Fig. 6 is a fragmentary perspective showing portions of the strips of paper fed through a collating machine by the improved feeding mechanism of this invention.

In the drawings, wherein is shown for purposes of illustration, merely, one embodiment of the invention, A designates the improved feeding mechanism generally. The feeding mechanism A includes a base plate 1 (Figs. 2 and 3) which is located within a housing 2, said housing having side and end walls and a top portion. The top portion of the housing 1 is provided by a plate 3 which is hingedly supported by one side wall of said housing, and a relatively narrow plate 4 which is hingedly supported by the opposite side wall of said housing, as is shown to good advantage in Fig. 3. By referring to Fig. 1 it will be noted that the plate 4 is provided with a recess which, when the plates 3 and 4 are in their closed positions, provides the top portion of the housing 2 with an

elongated slot 5 that serves a purpose to be hereinafter set forth.

Supported by the base plate 1 is a pair of spaced bearings 6 and 7 which aid in the support of a pair of vertical shafts 8 and 9, one of said shafts being a drive shaft which is actuated by a suitable motor (not shown), and the other of said shafts being a driven shaft. The shaft 8 has fixedly mounted at the upper portion thereof a sprocket wheel 10 while the shaft 9 has fixedly mounted at the upper portion thereof a similar sprocket wheel 11. Mounted on the sprocket wheels 10 and 11 for operation thereabout is a sprocket chain 12, there being a pair of channel-shaped trackways 13*a* and 13*b* which are supported by the base plate 1 and are spaced apart transversely of the housing 2 for supporting the opposed portions of the sprocket chain that extend between the sprocket wheels 10 and 11.

The sprocket chain 12 is made up of a plurality of pairs of vertically spaced links 12*a*, the adjacent pairs of links being pivotally attached together by pivot pins 12*b* which extend through fixed sleeves 12*c* that are embraced by rollers 12*d* which are engaged by the teeth of the sprocket wheels 10 and 11 when the sprocket chain is being driven by the sprocket wheels. Pivotally connected to the sprocket chain 12 by each pivot pin 12*b* of said sprocket chain is a pair of vertically spaced links 14 which are similar in shape and size to the links 12 of the sprocket chain. The pairs of vertically spaced links 14 extend outwardly from the sprocket chain, as is shown to good advantage in Figs. 4 and 5, and the outer portions of each related pair of links 14 are joined by a fixed sleeve 15 which is embraced by a rotatable roller 16.

Supported by each pair of links 14 is a paper feeding member 17 which comprises a shank portion 18 that extends through the sleeve 15 of the related pair of links 14 and is freely movable therethrough in a vertical direction. The upper portion of each of the shank portions 18 of the paper feeding members is substantially reduced in diameter to provide a paper feeding pin 19, and a shank portion of slightly reduced diameter is located immediately beneath said paper feeding pin 19. Also, at the lower end of the shank portion of each paper feeding member 17 a portion of slightly reduced diameter is provided. Mounted on the shank portions of slightly reduced diameter of each paper feeding member 17 is a pair of rollers 20 and 21, which preferably are provided with roller bearings in order that they will rotate freely with respect to the shank portion with which they are related. It is to be noted that the peripheral faces of the rollers 20 and 21 of each paper feeding member 17 contact with the peripheral faces of the rollers 20 and 21 of paper feeding members 17 which are positioned adjacent to said each paper feeding member 17 and at opposite sides thereof. As a result of this arrangement the shank portions 18 of all of the paper feeding members are maintained in a true vertical position at all times. At the lower end of the shank portion of each paper feeding member 17 a nut 22 is applied thereto, said nuts 22 being provided with curved bottom portions.

The trackways 13*a* and 13*b* are provided with supports 23 and 24 that are supported by the base plate 1 and said support 24 includes an extension 24' (Fig. 3) which supports a ramp 25. The ramp 25 is in the form of a channel-shaped member which at its entry end contacts closely with the base plate 1 and which inclines upwardly from its point of contact with said base plate, as indicated at 25*a* in Fig. 2, said ramp including a substantially horizontal portion 25*b* which extends from the elevated end of said inclined ramp portion 25*a* and which terminates at the exit end of the ramp in an abrupt drop, as is indicated at 25*c* in Fig. 2.

The improved paper feeding mechanism of this invention includes a paper guiding structure 26 which includes a plurality of strips 27 of suitable material that are turned upwardly slightly at their opposite ends and which extend longitudinally of the paper feeding mechanism. These longitudinal strips have associated therewith and secured thereto transverse strips 28, said transverse strips being secured by hinges 29 to blocks 30 that are secured to the top plate 4 of the paper feeding mechanism. Por-

tions of the transverse strips **28** which are located immediately adjacent to the hinges **29** rest upon the blocks **30** when the paper guiding structure **26** is in its effective position, as is shown in Fig. 3, so as to support said paper guiding structure in a position where the longitudinal strips **27** thereof are spaced a slight distance upwardly from the upper surfaces of the top plates **3** and **4** of the paper feeding mechanism.

In the operation of the improved paper feeding mechanism of the present invention the printed strips of paper to be fed by the feeding mechanism A are in the form of rolls mounted for unwinding movement on suitable shafts (not shown). The printed strips of paper are provided with spaced perforations, as shown in Fig. 6, wherein the strips of paper are designated by the reference characters *Sa*, *Sb*, and *Sc*, and the perforations are designated by the reference character P. When the feeding mechanism is to be put in use the paper guiding structure **26** is raised on its hinges and the leading portion of the lowermost strip of paper *Sa* is extended along the top of the housing **2**, said strip of paper being arranged so that paper feeding pins **19** of paper feeding members **17** which are elevated by the ramp **25**, and which extend through the slot **5** in the top portion of the housing **2**, extend through certain of the perforations P of the strip of paper. The leading portion of the second strip of paper *Sb* is similarly arranged in place so that the elevated paper feeding pins extend through perforations P thereof, and then the leading portion of the third strip of paper *Sc* is likewise arranged in place so that the elevated paper feeding pins extend through the perforations thereof. The three strips of paper are then fastened together preliminarily, by a wire staple, for instance, and the paper guiding structure **26** is lowered to its normal, operative position.

The paper feeding mechanism is then set in operation, causing the sprocket chain **12** to travel in the direction indicated by the arrow in Fig. 1, and the elevated paper feeding pins **19** which extend through the perforations P of the strips of paper *Sa*, *Sb*, and *Sc*, traveling with the sprocket chain **12**, will carry the strips of paper along with them until each paper feeding member **17** reaches the end **25***c* of the ramp **25** when such paper feeding member will drop abruptly downward so as to withdraw the paper feeding pin thereof from the perforations of the strips of paper being fed. Likewise, as the nuts **22** of the paper feeding member **17** successively move up the inclined portion **25***a* of the ramp **25** to the elevated, horizontal portion **25***b* of said ramp, the paper feeding pins **19** of said paper feeding members are elevated so that they are extended into apertures P of the strips of paper *Sa*, *Sb*, and *Sc*, and the operation of feeding the strips of paper is continued.

It is apparent, therefore, that a certain number of paper feeding pins **19** are at all times extended through apertures of the strips of paper being fed, these pins being associated with paper feeding members **17** which are elevated by the ramp **25**. These effective feeding pins remain elevated only during their passage along the horizontal portion **25***b* of the ramp after which they drop downwardly, and paper feeding pins **19** of other paper feeding members **17**, moving up the inclined portion **25***a* of the ramp, are elevated so as to cause them to project through perforations of the strips of paper being fed by the paper feeding mechanism and thus continue the paper feeding operation performed by the paper feeding mechanism.

We claim:

1. A paper feeding mechanism for feeding paper having perforations formed therethrough, comprising a sprocket chain made up of like chain links and supported by sprocket wheels for continuous movement in an endless horizontal plane and in a single direction, a pair of links extended transversely from each chain link of said sprocket chain, paper feeding members supported by said pairs of transverse links for travel with said sprocket chain, said paper feeding members being supported by said pairs of transverse links for vertical movement parallel to the axes of said sprocket wheels to elevated positions where portions of a plurality of said paper feeding members may project through perforations of paper being fed by the mechanism which are located along one edge only of said paper being fed, a roller mounted on each of said paper feeding members which is of such diameter that the circumferential face of the roller of each paper feeding member contacts with the circumferential faces of the rollers of adjacent paper feeding members, and means for moving said paper feeding members to such elevated positions.

2. A paper feeding mechanism for feeding paper having perforations formed therethrough, comprising a sprocket chain made up of like chain links and supported by sprocket wheels for continuous movement in an endless horizontal plane and in a single direction, a pair of links extended transversely from each chain link of said sprocket chain, paper feeding members supported by said pairs of transverse links for travel with said sprocket chain, said paper feeding members being supported by said pairs of transverse links for vertical movement parallel to the axes of said sprocket wheels to elevated positions where portions of a plurality of said paper feeding members may project through perforations of paper being fed by the mechanism which are located along one edge only of said paper being fed, a pair of spaced rollers mounted on each of said paper feeding members which are of such diameter that the circumferential faces of the spaced rollers of each paper feeding member contact with the circumferential faces of the spaced rollers of adjacent paper feeding members, and means for moving said paper feeding members to such elevated positions.

3. A paper feeding mechanism for feeding paper having perforations formed therethrough, comprising a sprocket chain made up of like chain links and supported by sprocket wheels for continuous movement in an endless horizontal plane and in a single direction, a pair of links extended transversely from each chain link of said sprocket chain, paper feeding members supported by said pairs of transverse links for travel with said sprocket chain, said paper feeding members being supported by said pairs of transverse links for vertical movement parallel to the axes of said sprocket wheels to elevated positions where portions of a plurality of said paper feeding members may project through perforations of paper being fed by the mechanism which are located along one edge only of said paper being fed, a pair of vertically spaced rollers mounted on each of said paper feeding members which are of such diameter that the circumferential faces of the spaced rollers of each paper feeding member contact with the circumferential faces of the spaced rollers of adjacent paper feeding members, and means for moving said paper feeding members to such elevated positions.

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