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2,633,354

SPROCKET TYPE PAPER FEED DEVICE

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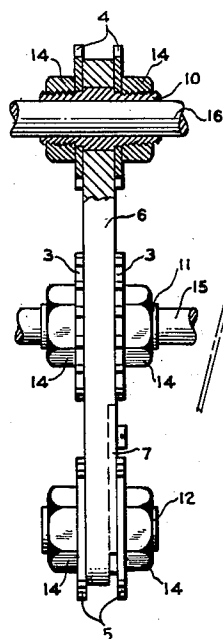


FIG. 3

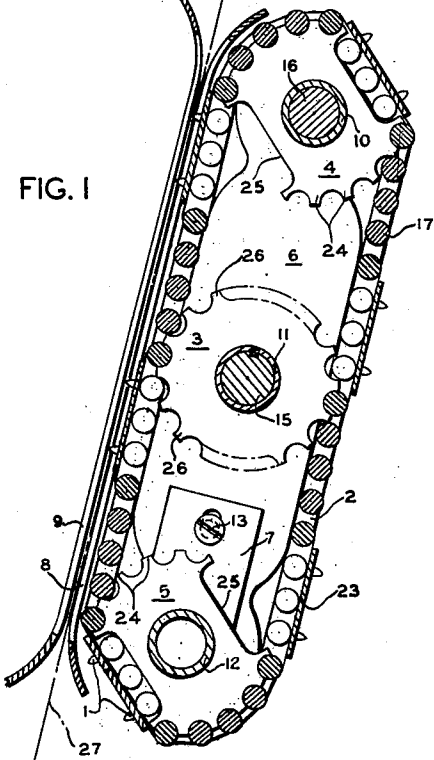


FIG. 1

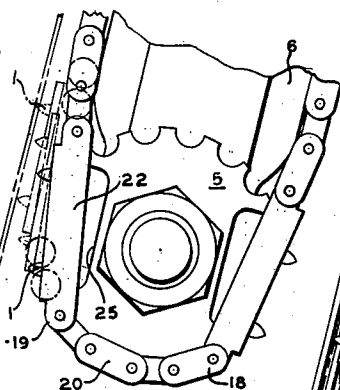


FIG. 6

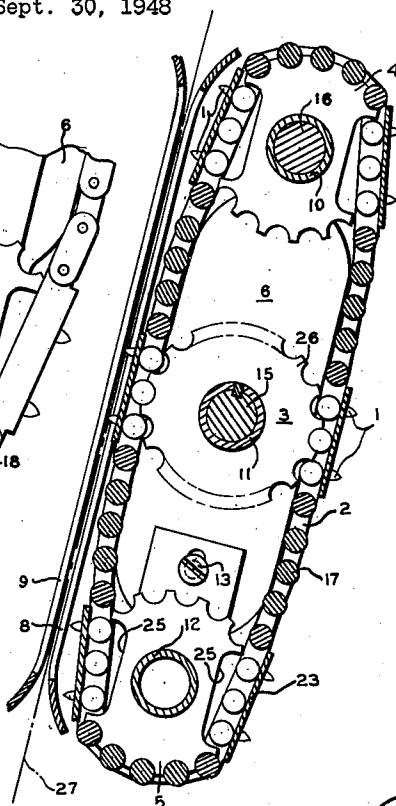


FIG. 2

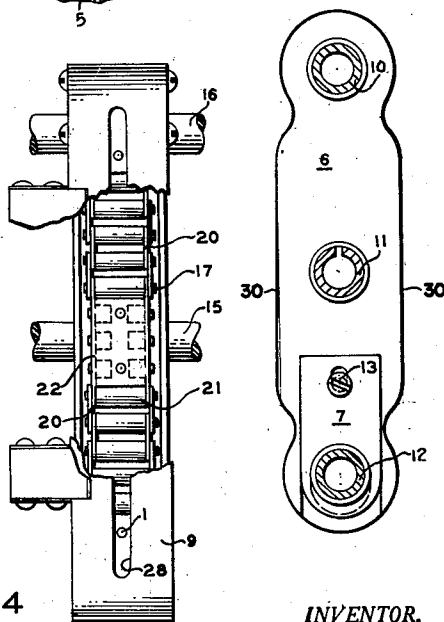


FIG. 4

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SPROCKET TYPE PAPER FEED DEVICE

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1 Claim. (Cl. 271-2.1)

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Paper feeding device

This invention relates generally to paper transporting mechanisms, and more specifically to a continuous chain and sprocket type feed mechanism.

Associated with said mechanisms are continuous strips of recording material, usually paper, preprinted in form, on which data will be printed. The strips, utilized on business machines, comprise a record of machine operations such as tabulating, accounting, or billing, through the action of type printing mechanisms. The records normally consist of an original and several carbon copies. Therefore, it is a basic requirement that preprinted forms be in perfect register with respect to each other and also with respect to the printing line. To provide means for moving the paper to and from the said printing line, the paper has therein marginal rows of perforations that are engaged by the pins of the feeding device. Necessarily, the said pins must be of the same diameter as that of the apertures in the paper for accuracy in feeding. The pins, tapered in shape, upon entering the apertures, align the many layers of recording material, and are customarily mounted on wheels or continuous chains that travel circuitous routes, with the said recording material running tangentially thereto. Therefore, the pins enter and depart from the said apertures in an arcuate path which results in the tearing or mutilating of the internal periphery of the said apertures. This condition is extremely undesirable in that errors of paper feeding result, or should it be necessary to utilize the recording material a second time, it may be impossible to do so.

It is toward this condition that the invention appertains; therefore, the principal object resides in the provision of improved paper feeding means that enter and depart from the marginal apertures linearly.

Another object is to provide means that will eliminate overthrow of the recording material.

A still further object resides in the provision of improved paper feeding accuracy.

Other objects and structural details of the invention will be apparent from the following description when read in connection with the accompanying drawing, wherein

Fig. 1 is a side elevation illustrating the parallel relationship of the chain to the paper;

Fig. 2 is also a side elevation showing the angular relationship of the chain to the paper;

Fig. 3 is a partial plan view of the sprockets and sprocket supporting member;

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Fig. 4 is a plan view of the device, broken away to show certain parts therein;

Fig. 5 is a side view of the sprocket supporting member, illustrating the chain tensioning mechanism; and

Fig. 6 is a fragmentary view in an enlarged scale of the mechanism shown in Fig. 2, indicating in dotted line the path of the pin supporting link.

The device (Fig. 1) consists essentially of a plurality of paper engaging pins 1 on a chain 2, a pair of driving sprockets 3, two pairs of idling sprockets 4, 5, sprocket supporting plates 6, 7, and paper guide plates 8, 9.

Plate 6 has journaled therein (Figs. 3, 5) short threaded sleeves 10 and 11, to which are secured sprockets 4 and 3, respectively. A second plate 7, slidably mounted on plate 6, has journaled therein a short sleeve 12, having threads thereon and to which sprockets 5 are secured. Plate 7, adjustable with relation to plate 6, provides means for varying the tension of chain 2 on the said sprockets, with locking screw 13 maintaining the desired relationship. Also, plate 6 acts as a spacer for the sprockets of each pair 3, 4, while plates 6 and 7 likewise act as a spacer for the sprockets of pair 5. The sprockets 3, 4, and 5 are retained on their respective sleeves by means of locking nuts 14. The longitudinal edges of the plate 6 are shaped to provide cams 30 over which the chain 2 rides, the lower edge of the cam adjacent the plate 3 coacting with the sprocket, as will be hereinafter explained, to move a pin carrier plate toward the plate 8.

Sprockets 3 through the associated sleeve 11 are keyed to driving shaft 15 which is in turn driven by a conventional paper feed drive. Passing through the uppermost sprockets 5 and sleeve 12 is a stabilizing or supporting shaft 16, the purpose of which is to prevent rotation of plate 6 when shaft 15 is in motion.

Chain 2 is composed of a plurality of short and relatively longer links (Figs. 1, 2, 4, and 6) interconnected by pins 17 to form an endless chain. Short links 18 consist of a plurality of side plates 20 separated by spacers 21, and are held assembled by pins 17 passing therethrough. The longer links 19 are constructed in a somewhat similar manner. However, the side plates 22 of links 19 are approximately four times the length of corresponding side plates 20, and a top plate 23 secured thereto supports the paper engaging pins 1. The term short is to be construed as meaning those links that reside on teeth 24 of sprockets 4 and 5, differentiating from the term long or longer, as to those links

that sit in the recesses 25 of the said sprockets. The purpose of the long links 19 will be hereinafter described.

The teeth 26 on driving sprockets 3 engage spacers 21, and effect rotation of chain 2 around idling sprockets 4, 5.

The long links 19 would not travel around the said idler sprockets 4, 5 if they were of true circular shape. Therefore, recess 25 is available so that the said long links will sit therein, permitting passage around sprockets 4 and 5, thereby resulting in chain 2 rotating with a smooth movement. While a recess 25 is referred to, it is evident that the area 25 is in effect a flat edge of the sprocket and while two are shown, one or more could be employed depending upon the diameter of the sprocket. The bottom of the recess or flat 25 is chordally arranged with respect to the periphery of the gear so that a contiguous following corner of the toothed section of the sprocket, as shown in Figure 6 will raise the plate 23 off the flat and move it in a direction toward the plate 8 so that the pins 1 will enter the perforations of the paper in a direction at right angles to the travel of the web. In this movement they are assisted by the coactive operation of the raising action of the corner of the sprocket and the cam 30. The flat or recessed portion decreases the diameter of the sprocket at one place and positions the plates 22 in greater spaced relation beneath the guide plate 8 than would be possible if they rode around the circumference of the gear. The space between the bottom of the recess and the under side of the plate 8 permits the pin plate 23 to be lifted substantially at right angles to the plate 8 as the short links ride up on the cam shaped edge of the plate 6 and as they are moved toward the plate by the toothed part of the sprocket immediately adjacent the following end of the recess as illustrated in Figs. 1, 2 and 6. Without this recess or flat area 25 the pins would enter the paper perforations at an objectionable angle.

The recording medium 27, manually pre-positioned on lower guide plate 8 with pins 1 extending through the perforations therein (see Figs. 1 and 2), is held in position by a displaceable top guide member 9. Guide plates 8 and 9 have therein elongated slots 28 (Fig. 4), along which pins 1 travel as chain 2 rotates, moving the recording medium in a similar direction.

Prior to the pins 1 entering the paper 27, link 19 resides at an angle relative to the said paper with a portion of chain 2 free from sprocket 4 and plate 6 (Figs. 2 and 6).

As particularly well shown in Fig. 6, the angular relationship of link 19 to paper 27 gradually decreases as the chain 2 travels until link 19 is in a plane parallel to that of paper 22. The rotation of idler sprockets 4 effects a linear path of travel, illustrated in dotted line, for said link, and subsequently pins 1 thereon, with the point of tangency of chain 2 on sprocket 4 changing relative thereto. Therefore, the pins 1 substantially enter the apertures (not shown) vertically with a linear motion, avoiding any possi-

bility of tearing or mutilating the internal periphery of said apertures.

The departing pins 1 (Fig. 2) are withdrawn from the said apertures by long link 19 entering recess 25 of sprockets 5 as said sprockets rotate clockwise. The continued rotation lowers pins 1 away from contact with paper 27 in a linear path that is analogous in operation to that of the entering pins.

Thus, it is readily apparent that the arcuate entering and departing of the feeding pins normally associated with paper feeds is avoided. Therefore, a feed of improved accuracy has been achieved.

In addition to the above, the peculiar shape of sprockets 4, 5, tends to maintain a continuous tension on chain 2, thereby preventing an undesirable feature that usually prevails in chain type feeds, i. e., unequal tension of the chain and overthrow due to the start-stop motion of the paper feed.

While I have described what I consider to be a highly desirable embodiment of my invention, it is obvious that many changes in form could be made without departing from the spirit of my invention, and I, therefore, do not limit myself to the exact form herein shown and described, nor to anything less than the whole of my invention as hereinbefore set forth, and as hereinafter claimed.

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

In a sprocket feed for a record form having feed perforations therein, a plate having a slot with which said perforations are in register, a plurality of sprocket tooth gears beneath said plate, a chain passing over said sprocket tooth gears including spaced rigid link sections, pins on said sections passing through said slots for engagement with said perforations to feed the form, said gears each being shaped to provide a chordal flat area on which said link section seats in relatively spaced relation with the under side of said slotted plate, and a cam plate over the edge of which the chain rides to coast with the arcuate movement of a corner of the gear contiguous to said flat area to lift the link off the flat area toward said slotted plate and move the pins into said perforations in a direction substantially at right angles to the direction of the feed of the form.

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