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E. F. C. SCHULZE

3,265,385

REMOVABLE IDLER ROLLER ASSEMBLY

Filed June 9, 1964

2 Sheets-Sheet 1

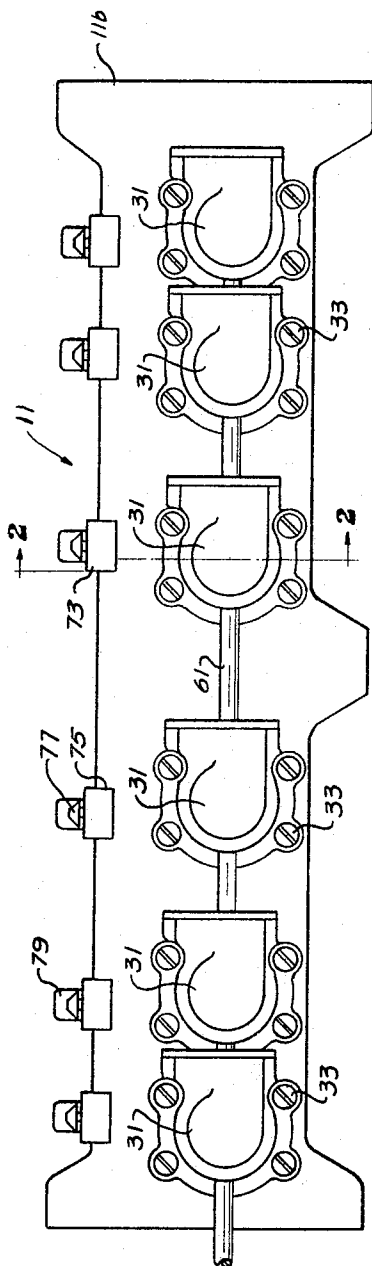


Fig. 1

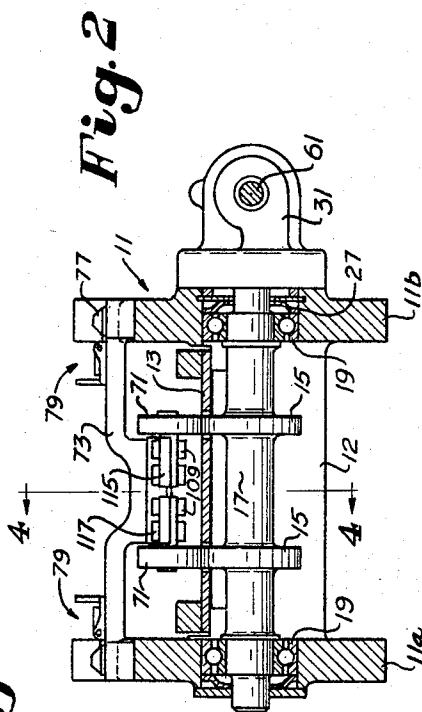


Fig. 2

INVENTOR.
ERWIN F. C. SCHULZE
BY
Russell L. Root
ATTORNEY.

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2 Sheets-Sheet 2

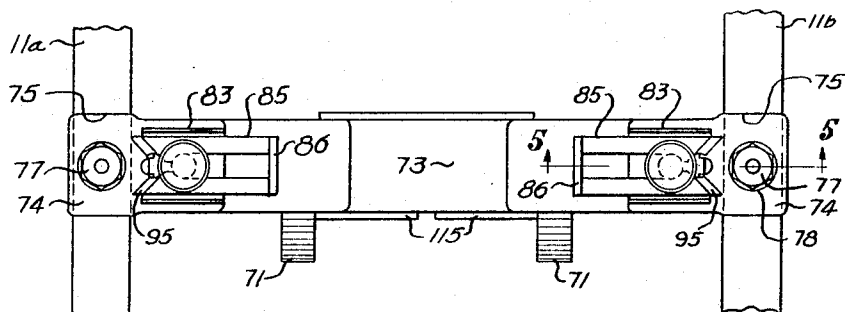


Fig. 3

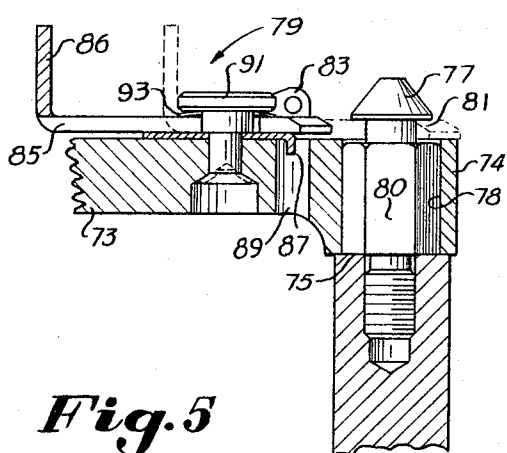


Fig. 5

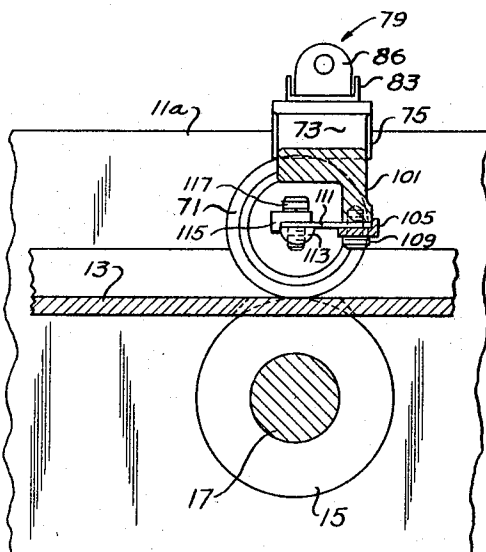


Fig. 4

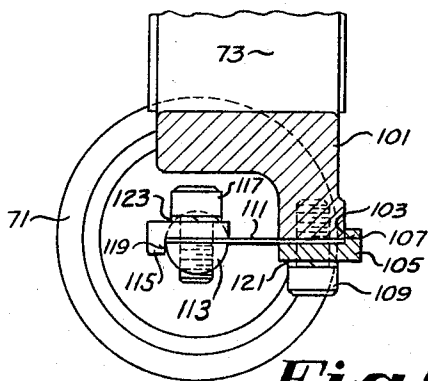


Fig. 6

INVENTOR.
ERWIN F. C. SCHULZE
BY *Russell L. Root*
ATTORNEY.

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3,265,385

REMOVABLE IDLER ROLLER ASSEMBLY

Erwin F. C. Schulze, Novelty, Ohio, assignor to Addressograph-Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

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6 Claims. (Cl. 271-51)

This invention relates to document feeding and especially to roller arrangements for feeding a document such as a tabulating card along a track, e.g. in a sorting machine.

It is usually important in high speed handling of documents that their progress along the track be controlled and uniform, and that they approximate as nearly as possible the surface speed of the feed rollers propelling them. Accordingly, the constructions heretofore employed have often had both the upper and lower rollers of each pair powered at equal surface speeds. It is also important that the feed rolls be so mounted as to preserve accurate alignment since a very slight angle of misalignment can produce a noticeable deflection of the document from the desired path of travel along the track. It has, accordingly been the custom to firmly support both upper and lower rollers in rigidly mounted bearings requiring substantial dismantling activity in order to remove any of the rollers.

While the foregoing precautions have proved to have advantage under normal operating conditions, the occurrence of a jam during running frequently causes the machine to be shut down for many hours while the rollers are dismantled to give access to the jammed documents.

The present invention has for its object the provision of a roller feed system for documents so arranged that it will be insure steady uniform feeding and accurate roller alignment under normal operating conditions, but which is also capable of being instantly dismantled by the operator, at least insofar as the upper rollers are concerned, to provide for clearing the jam in a matter of a minute or two.

According to the present invention, the foregoing object is attained by powering only one of the rollers of each pair, and mounting the other or upper roller so as to be firmly spring-pressed against the powered roller. In spite of this floating, spring-pressed arrangement, the mounting for the roller is still such as to maintain accurate alignment.

Accurate alignment is provided by mounting the roller on a supporting cross bar by means of a leaf spring which provides the pressure for urging the upper roller towards the powered roller. The latter has the special characteristic of being broad in the direction transversely of the direction of document movement which provides the stiffness necessary to accurate roller alignment with minimum chance for impairment of the aligned condition by accidental blows or the like. Accurate alignment is further assured by providing machined surfaces on the cross-bar ends which seat accurately into machined notches in the side members of the track casting. The roller-supporting crossbars are held in place by quick release coupling devices.

Other objects, features and advantages will appear hereinafter as the description proceeds.

In the drawing:

FIG. 1 is a side elevation of a document handling track in accordance with the present invention;

FIG. 2 is a section taken substantially on line 2-2 of FIG. 1;

FIG. 3 is a fragmentary top plan to a larger scale showing one set of rollers according to the invention;

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FIG. 4 is a section taken substantially on line 4-4 of FIG. 2, but drawn to a larger scale;

FIG. 5 is a detail section taken substantially on line 5-5 of FIG. 3, but drawn to a larger scale and showing alternate positions of the retaining devices.

FIG. 6 is a detail section corresponding to the central portion of FIG. 4, but drawn to a larger scale.

Referring to the drawing, the document track is made up primarily of an elongate frame or casting 11 including side members 11a and 11b connected by integral transverse webs 12, which casting supports within itself a tray 13 suitably fastened to the casting 11 and along which the card or document slides as it is being fed. Beneath the tray 13 and projecting slightly through openings therein are powered rollers 15 which are integrally associated with shafts such as 17 (FIG. 2). Each of the shafts 17 is mounted on bearings 19 supported by the side members of the casting. Each shaft 17 projects through a bore 27 in the side member 11b and into a housing 31 mounted on the exterior of the said side member. The end of the shaft 17 carries a bevel gear (not shown) which meshes with another bevel gear (not shown) on a main drive shaft 61 extending lengthwise of the casting and passing through the various housings 31 as seen in FIG. 1.

Cooperating with each set of powered rollers 15 is a set of idler rollers 71, 71. These are maintained in precise parallel alignment with the corresponding rollers 15 and are so disposed that the plane joining their axis with the axis of rollers 15 is precisely perpendicular to the tray 13, i.e. to the path of the document. The idler rollers are also mounted for instant removal and replacement in a manner which does not tend to defeat the accuracy of their placement aforesaid. It is this mounting for the idler rollers 71 which is the essence of the present invention, and a preferred form of which will now be described in detail.

Formed in the upper edges of the side members 11a and 11b are rectangular notches 75. These are machined to close tolerances both as to size and location. Transverse support members 73 are provided having end portions 74 which are similarly machined to an accurate but free sliding fit in the notch 75. That is to say, the width of the end portions 74 (measured lengthwise of the casting 11) is a close fit in the width of the notches 75. Each notch 75 carries a threaded post 77 which loosely enters an opening 78, FIGS. 3 and 5 drilled in the end portion 74 associated therewith. These posts 77 preferably have a non-circular body 80 to receive a wrench facilitating their assembly, and are each provided with an annular recess 81 designed to receive portions of spring clip fasteners 79. The fasteners 79 are of a previously known design and embody a guide or track member 83 which slidably receives the fastener slide 85 having an upstanding finger piece 86. A positioning tongue 87 on the guide member projects into an opening 89 in the transverse support member 73, and a headed, shouldered rivet 91 also passes through the track member 83 so that the latter is held in alignment with the support member. The rivet 91 has its end passing through the transverse support member 73 where it is upset. The fastener slide 85 is bifurcated, and its legs pass on either side of the rivet 91. A spring washer 93 under the head of rivet 91 acts against the upper surface of the slide 85 to hold it in adjusted position. Preferably the legs of the slide 85 have slight inward projections 95 (FIG. 3) near their extremities which interfere slightly with the reduced diameter of post 77 at the recess 81 so that the resilience of the legs provide a detent action which will hold the

clips engaged with the posts when thus disposed. It can be seen from the drawing that when the finger pieces 86 are grasped and moved towards each other to the position shown in FIG. 3 and in solid lines in FIG. 5, the spring clips 79 are simultaneously released and the transverse support member 73 can be lifted from the notches 75. When the support member is replaced, the finger pieces 86 are moved outwardly until each snaps into engagement with its post 77 at the recess 81 thereof, and thereby retains the support member in position, as shown in FIG. 2 and in broken lines in FIG. 5.

The rollers 71 are yieldingly carried by the transverse support member 73 in a novel manner. As can be seen in FIGS. 4 and 6, the support has a depending web provided with a machined surface 103 which is made accurately perpendicular to the centerline of the casting 11 and hence to the direction of card motion when the end portions 74 are seated in notches 75. An L-shaped clamp 105 with a machined positioning surface 107 is attached to the web by screws 109. Between the clamp 105 and the bottom of web 101 are held the margins of two cantilevered leaf springs 111. Each leaf spring at its free margin supports a shaft 113 which is ground off flat for a portion of its length but has a cylindrical overhanging end portion receiving one of the rollers 71. A shorter L-shaped clamp 115 is applied to the opposite surface of each leaf spring margin, and the margin of each leaf spring is fastened between the flat on shaft 113 and the clamp 115 by screws 117 connecting the two. Clamps 115 also have machined positioning surfaces 119.

Each roller 71 is retained on its shaft 113 in any suitable manner, e.g. by a snap ring (not shown), and the screws 109 and 117 are preferably retained in tight clamping condition by conventional lock washers 121 and 123.

The leaf springs 111 are each fairly long in the direction transversely of the track (e.g. at least about one-half inch, and preferably about three-fourths inch) and have edges adjacent the clamps which are accurately parallel.

When the device is being assembled, one edge of leaf spring 111 and the side of shaft 113 are both firmly held against positioning surface 119 while the screws 117 are tightened. Then the other margins of both leaf springs and the ground surface 103 on the support member web 101 are held firmly against the positioning surface 107 while screws 109 are tightened. This places the axes of shafts 113 accurately perpendicular to the motion of card travel when the transverse support member 73 is in place in the notches 75. The stiffness of the springs 111 against lateral twist, due to their long transverse edges, maintains this relationship in a positive manner during use.

It will be seen that the foregoing arrangement using positioning surfaces 107 and 119 makes possible a simple but accurate assembly procedure, and also provides a ready visual check at any time as to whether the parts are still accurately aligned as intended.

The design of the parts is such that when the transverse support 73 is seated in the notches 75 and fastened, the idler rollers 71 rest directly above rollers 15 and are raised thereby to a position which slightly deflects the leaf springs 111. This provides the requisite feeding pressure, the rollers 71 being also preferably provided with a somewhat resilient surface so as to be driven continuously by rollers 15 between documents, or by the passing document.

While an arrangement has been shown in which the center lines of the notches 75 are offset from the plane of the roller axes in order to make it possible to provide greater or less spacing between certain of the transverse supports 73 to accommodate various types of equipment, it will be understood that an alternate form wherein the notch center lines coincide with the plane of the roller axes is also contemplated.

The foregoing description has proceeded primarily on the basis that the goal is to feed the document straight

along the track with minimum contact with the side guides. However, it will be readily understood that the rollers 71, 71 may, in certain situations, be skewed slightly with respect to rollers 15, 15. This will be required to move the card into contact with a side guide when some particularly accurate orientation of the card is needed, for example during punching. It is desirable to predetermine this angle of skew very accurately so that the card will be effectively guided and still not be propelled against the guide with damaging force. To this end the edges of the leaf springs 111, instead of being parallel to each other, will diverge by an angle of a few degrees, and the assembly of the parts will in other respects be the same as heretofore described.

From the foregoing description it can be seen that means have been provided whereby the upper rollers of a document feed can be instantly removed and replaced without sacrificing the necessary accuracy attendant upon high speed operation, making it possible for the first time to provide equipment from which jams can be cleared in moments, thus rendering the equipment almost entirely free from down time due to jammed documents.

While preferred embodiments of the invention have been described and illustrated, it is to be understood that these are capable of variation and modification. Accordingly, the aim in the appended claims is to cover all such variations and modifications as may fall within the true spirit of the invention.

What is claimed is:

1. Means for feeding documents comprising a frame including elongate side members extending in the direction of document travel; a powered roller rotatably supported between said side members; an idler roller in contact with said powered roller; a shaft rotatably carrying said idler roller; a rigid transverse support member, means providing a positively positioning but readily releasable connection of said support member with both side members of said frame; and means for resiliently supporting said idler roller shaft from said transverse support member in position to be pressed against said powered roller when said transverse support member is in place on said frame, said means constituting the sole means for supporting and controlling the motion of said idler roller shaft, whereby said idler roller and its shaft can be separated and bodily removed from the powered roller and the side members and readily replaced to proper position by an operator by grasping the transverse support member.

2. A device as set forth in claim 1 in which said positively positioning means comprises notches accurately milled in the exposed edges of said side members and opening away from the document face; and surfaces on said transverse support member accurately milled for co-operative engagement with the surfaces of said notches.

3. A device as set forth in claim 2 in which the resilient supporting means for the idler roller shaft comprises a cantilevered leaf spring supported at one end on the transverse support member, carrying said shaft at its free end, and having substantial breadth in a direction extending athwart the document path.

4. A device as set forth in claim 3 in which the leaf spring has accurately paralleled edges, in which the transverse support member has a surface machined to be perpendicular to the direction of document travel when the support member is in place; and in which there are provided two clamp members with straight machined surfaces, one with its straight surface in contact with both the perpendicular machined surface of the support member and with one of said parallel edges of the leaf spring, and the other with its straight surface in contact with both the idler roller shaft and the other parallel edge of said leaf spring.

5. A device as set forth in claim 2 in which the readily releasable connection comprises a pair of posts, one in each of said notches, and in which the transverse support

member has openings freely receiving said posts and carries snap catches slidable along the support member into and out of engagement with said posts.

6. A device as set forth in claim 1 in which the means for resiliently supporting the idler roller shaft from the transverse support member comprises a cantilevered leaf spring fastened at one end to the transverse support member and carrying said shaft at its free end, and having substantial breadth in a direction extending athwart the document path.

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M. HENSON WOOD, JR., *Primary Examiner.*

10 R. A. SCHACHER, *Assistant Examiner.*