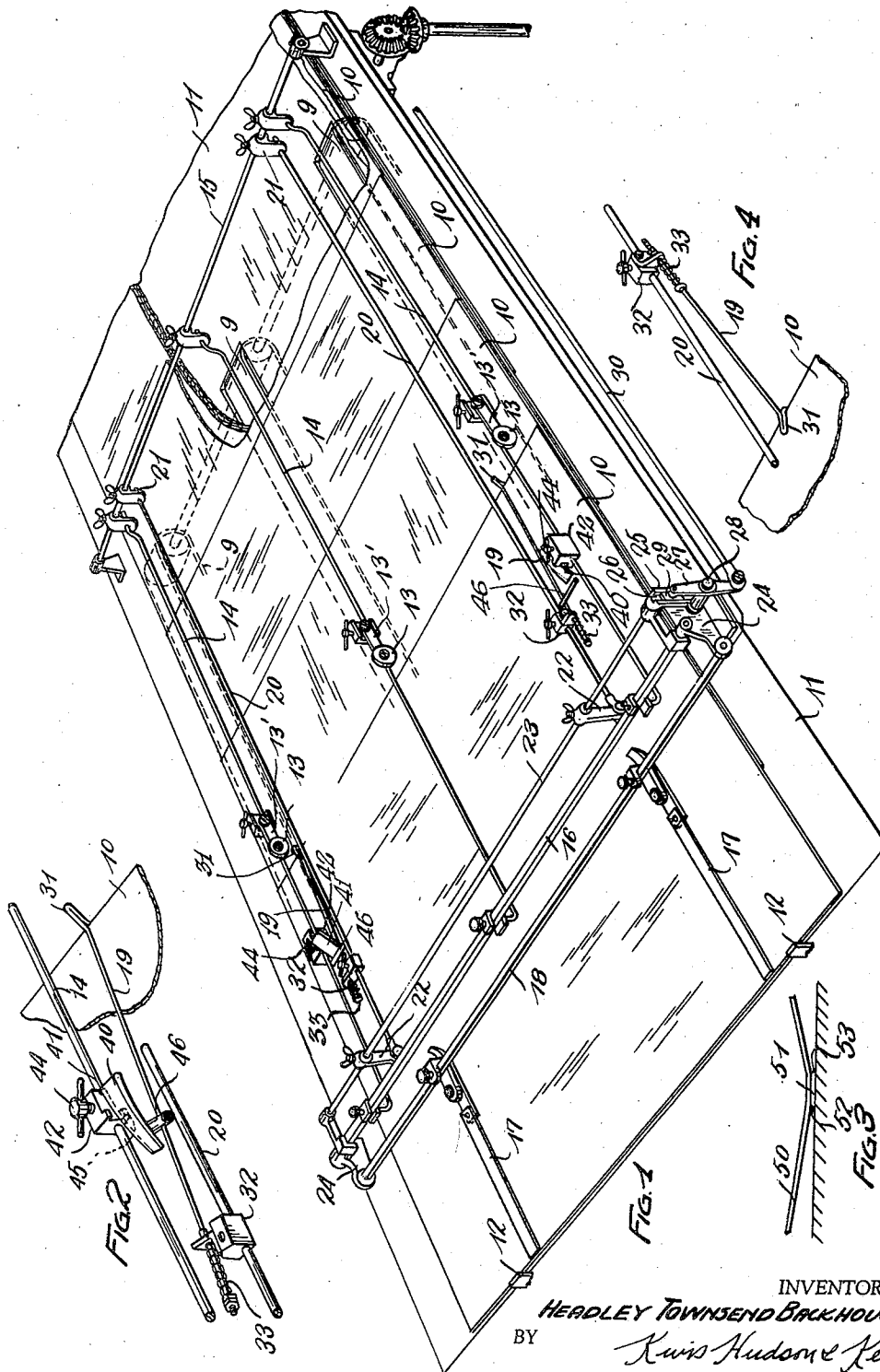


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SHEET FEEDING MECHANISM

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SHEET FEEDING MECHANISM

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This invention deals with sheet feeding apparatus of the kind generally known as stream feeders in which the sheets, i. e., of paper, card or the like, are fed in overlapping or underlapping relationship as a continuous stream towards a printing or other machine.

This invention relates to a stream feeder of the type (hereinafter referred to as the type described) in which the sheets are advanced in overlapping formation with the rear portion of each sheet overlying the front portion of the succeeding sheet, and in which the stream is fed over a layboard or its equivalent by means of endless bands or other feeding devices (hereinafter referred to as the normal feeding means) up to a position at which registration of each sheet may be effected, for example by the usual front and side lays.

The present invention is particularly, but not exclusively, concerned with the feeding of sheets of card by a stream feeder of the type described. Sheets of card often have a wavy formation and it is usual in dealing with such material to provide smoothers, e. g. in the form of flat springy strips, mounted above the layboard and arranged to bear on the upper surface of the advancing sheets. This, however, introduces a difficulty in that frictional resistance offered by the smoothers may so impede the approach of the sheets, or certain of the sheets, to the front lays as to upset the even spacing between successive sheets as they arrive at the registration position. One object of the present invention is to overcome this difficulty.

The invention provides, in sheet feeding apparatus comprising a stream feeder of the type described, the combination with the layboard or its equivalent of a supplementary sheet impelling device operable to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches the front lays and to impart to the sheet a thrust in the feeding direction additional to that of the normal feeding means. The supplementary impelling device is arranged to operate on a sheet during the last fraction of its travel, say when the front edge is within an inch or less of the lays, and the function of the device is to ensure with certainty that each sheet in succession will be moved up to the front lays and the regularity of the feed maintained.

Conveniently the supplementary sheet impelling device comprises a plurality of push or pull rods mounted above the layboard for reciprocation in the feeding direction of the sheets. Preferably the apparatus includes a "switch," or

switches, arranged to lift each push or pull rod out of contact with the sheets during its idle stroke.

An example according to the invention will now be described with reference to the accompanying drawing which is to some extent diagrammatic and in which—

Fig. 1 is a perspective view of the layboard end of the feeder.

Fig. 2 is a perspective view of one form of 10 switch for lifting a pull rod on its idle stroke.

Fig. 3 is an elevation of the end of a rod arranged for either pushing or pulling the sheets, and

Fig. 4 is a perspective view showing an arrangement of push rod suitable for working with small sheets.

Like reference numerals indicate like parts throughout the figures.

In this example the sheets 10 are fed down an inclined layboard 11 towards the front lays 12 by means of endless tapes 9 suitably driven at the desired speed in synchronism with the other moving parts of the feeder. The usual running-in wheels 13 mounted on pivoted arms 13' cooperate with these tapes. As shown in Fig. 1 the sheets are fed as a stream in lapped relationship, with the rear portion of each sheet overlying the next succeeding sheet in the stream. The arms 13' of the running-in wheels 13 are carried on longitudinally extending bars 14 secured at their ends to crossbars 15, 16. The longitudinal bars 14 are cranked downwardly and act to some extent as smoothers. In addition the feeder may embody two or more front smoothers 17 in the form of springy metal strips anchored at their rear ends to a fixed cross-bar 18.

In the arrangement shown in Fig. 1, the supplementary sheet propelling device provided by the invention, comprises two pull rods 19 mounted on endwise-movable longitudinal bars 20 which at their rear ends are guided in brackets 21 secured to the fixed cross-bar 15, and at their forward ends are pivotally connected to rock levers 22 carried on a transverse rock shaft 23. The shaft 23 is journaled in side brackets 24 and at one end is formed with a cranked extension 25 which is slotted at 26. A lever 27, mounted intermediate of its length for rocking movement about a pivot 28, carries at one end a slide block 29 engaging the slot 26 of the cranked extension 25, and at the other end is coupled to a connecting rod 30 which is cam-operated from a continuously running shaft, not shown, forming part of the driving mechanism of the sheet feeding ap-

paratus. Each of the pull rods 19 slopes downwardly towards its rear end where it is formed with a claw 31 adapted to engage the rear edge of a sheet. At its forward end each pull rod 19 is supported by a block 32 which may be adjusted along the endwise movable bar 20 and clamped thereto in any desired position of adjustment. Each pull rod is controlled by a spring 33 which ensures that the pull exerted on the rear edge of the sheet is of a resilient character. In the operation of the machine, the supplementary sheet impelling device comes into play when the forward edge of each sheet is within an inch or less of the front lays 12. Coincident with the arrival of the sheet at that position, the pull rods 19 are at the limit of their rearward stroke with the claws 31 in a position to engage the rear edge of the sheet. The lever 27 is now rocked, by means of the cam operated connecting rod 30, imparting a partial rotational movement to the rock shaft 23 and consequent forward movement of the endwise movable bars 20 with which are carried the push rods on their operative stroke. The cam actuating mechanism then rocks the shaft 23 in the opposite direction to return the push rods 19 to a position ready for engagement with the rear edge of the next succeeding sheet in the stream.

The switch device, illustrated in Fig. 2, comprises a ramp 40 which at one end is pivoted at 41 to a block 42 adjustable along the fixed longitudinal bar 14. By means of a screw 44 the block 42 may be clamped to the bar 14 in any desired position of adjustment. Movement of the pivoted ramp 40 in the downward direction is limited by a stop 45 formed on the block 42, the arrangement being such that in its limited position the free end of the ramp 40 will be just clear of the upper surface of the sheets. The pull rod 19 carries a transversely projecting pin 46 so arranged that on the forward operative stroke of the pull rod, the pin 46 will ride under the ramp 40 lifting it about its pivot, while on the return idle stroke the pin 46 rides onto the upper surface of the ramp 40, being thereby lifted into a position in which the claw 31 is clear of the sheets. At the end of the idle stroke of the pull rod, the pin 46 falls off the rear end of the ramp 40 and the claw 31 is again brought into a position such as to engage the rear edge of the next sheet on the next operative stroke of the pull rod.

In the arrangement shown in Fig. 3 a rod 50 carries on its under side a plate 51 formed with two operating edges 52, 53. The rod 50 may be arranged either as a pull rod, with the edge 52 adapted to engage the sheet, or as a push rod with the edge 53 constituting the operative edge.

In the arrangement shown in Fig. 4 the push rod 19 of the device described with reference to Fig. 1 has been reversed, with the position of the control spring 33 likewise reversed, so that the rod is adapted to operate by pushing on the rear edge of the sheets. This device is particularly suitable for working with small sheets.

Having thus described my invention, I claim:

1. In a sheet feeder, the combination with a layboard and front lays of means for moving a stream of sheets over the layboard with the rear edge of each sheet overlapping the next succeeding sheet, supplementary sheet impelling means operable to engage the rear edge only of each leading sheet in turn as the front edge of that sheet approaches the front lays and to impart

to the sheet a thrust in the feeding direction additional to that of the stream moving means.

2. In a sheet feeder, the combination with a layboard and front lays of means for imparting continuous movement to a stream of sheets on the layboard with the rear edge of each sheet overlapping the next succeeding sheet, supplementary sheet impelling means operable intermittently to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches the front lays and to impart to the sheet a thrust in the feeding direction additional to that of the stream moving means of such extent as to insure the engagement of the front edge of the sheet with said front lays.

3. In a sheet feeder, the combination with a layboard of means for imparting continuous movement to a stream of sheets thereon with the rear edge of each sheet overlapping the next succeeding sheet, smoothers cooperating with said sheet moving means, supplemental sheet impelling means operable intermittently to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches the forward end of said layboard and to impart to the sheet a thrust in the feeding direction additional to that of the stream moving means.

4. In a sheet feeder, the combination with a layboard and front lays of means for moving a stream of sheets over the layboard with the rear edge of each sheet overlapping the next succeeding sheet, reciprocating elements adapted and arranged to engage the rear edge only of each leading sheet in turn as the front edge of that sheet approaches the front lays and to impart to the sheet a thrust in the forward direction additional to that of the stream moving means.

5. In a sheet feeder, the combination with a layboard and front lays for registering the sheets fed, of means for moving a stream of sheets thereover with the rear edge of each sheet overlapping the next succeeding sheet, smoothers cooperating with said sheet moving means, and reciprocating elements adapted and arranged to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches said front lays and to impart to the sheet a thrust in addition to the stream moving means of such extent as to cause the front edge of the sheet to engage said front lays.

6. In a sheet feeder, the combination with a layboard and front lays of means for moving a stream of sheets over the layboard with the rear edge of each sheet overlapping the next succeeding sheet, reciprocating elements adapted and arranged to engage the rear edge only of each leading sheet in turn as the front edge of that sheet approaches the front lays and to impart to the sheet a thrust in the forward direction additional to that of the stream moving means, and means for raising said reciprocating elements out of contact with the stream during the rearward stroke of the reciprocating elements.

7. In a sheet feeder, the combination with a layboard of means for moving a stream of sheets thereover with the rear edge of each sheet overlapping the next succeeding sheet, reciprocating elements adapted and arranged to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches the forward end of said layboard and to impart to the sheet a thrust in the forward direction additional to that of the stream moving means, and means for raising said reciprocating elements out of contact with the stream during the rearward

stroke of the reciprocating elements, said last named means comprising a pivotally mounted cam, and said reciprocating elements being adapted to swing said cam upwardly out of the way on the forward active stroke of the reciprocating elements.

8. In a sheet feeder, the combination of a layboard and means for moving a stream of sheets thereover with the rear edge of each sheet overlapping the next succeeding sheet, yieldable fingers adapted to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches the forward end of said layboard, and means for imparting to said fingers reciprocations lengthwise of the direction of feed

for assisting the front registration of the sheets.

9. In a sheet feeder, the combination of a layboard, front lays at the forward end of said layboard, and means for moving a stream of sheets over said layboard with the rear edge of each sheet overlapping the next succeeding sheet, yieldable fingers adapted to engage the rear edge of each leading sheet in turn as the front edge of that sheet approaches the forward end of said layboard, and means for imparting to said fingers reciprocations lengthwise of the direction of feed for assisting the movement of the leading sheet into engagement with said front lays.

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