

Jan. 8, 1935.

L. R. TUFTS

1,987,352

PAPER HANDLING MACHINE

Filed Jan. 23, 1930

5 Sheets-Sheet 1

FIG. 12.

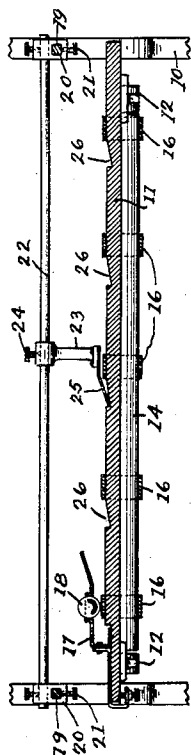
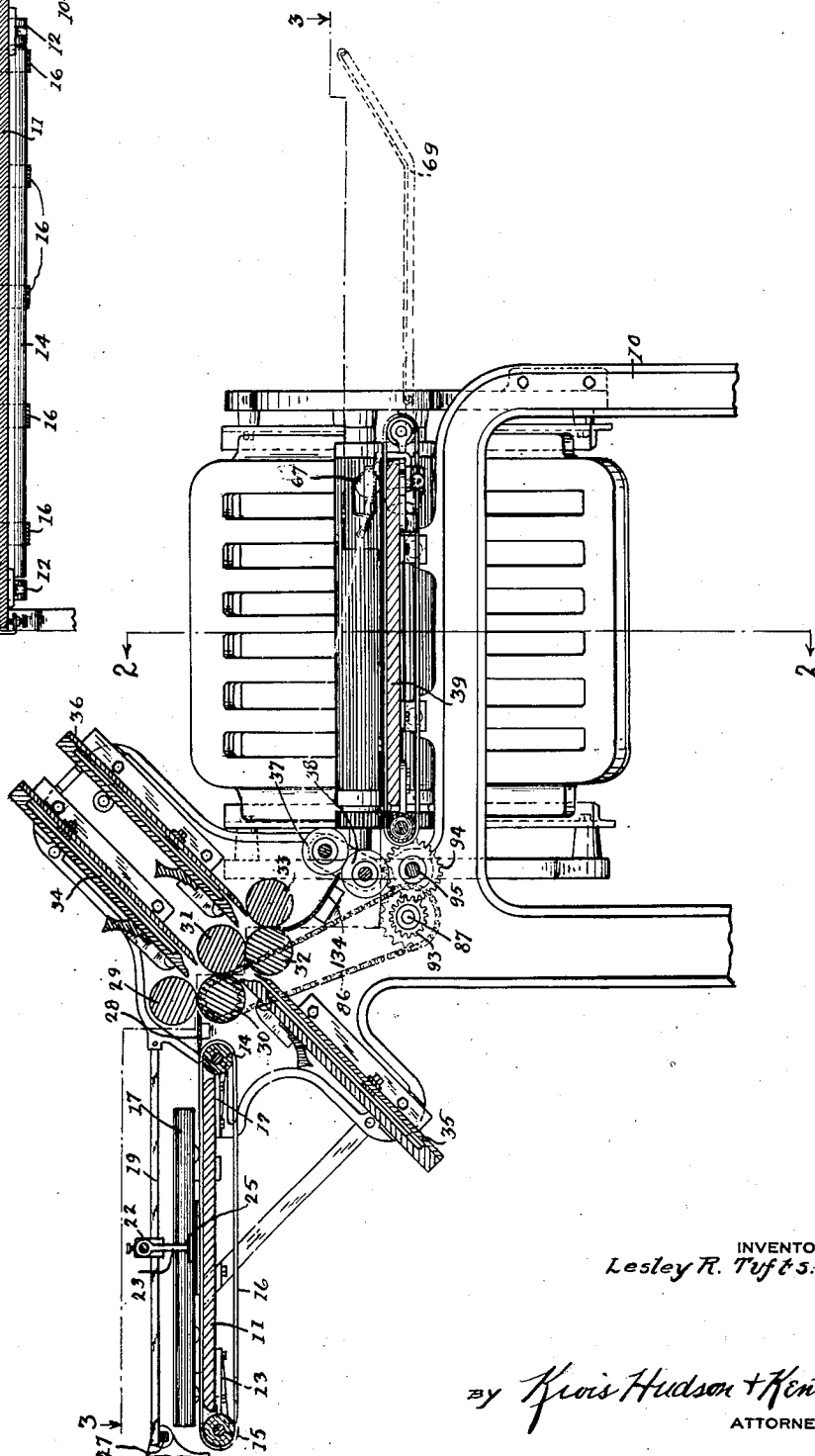


FIG. 1.



INVENTOR
Lesley R. Tufts.

By *Kreis Hudson & Kent*
ATTORNEYS.

Jan. 8, 1935.

L. R. TUFTS

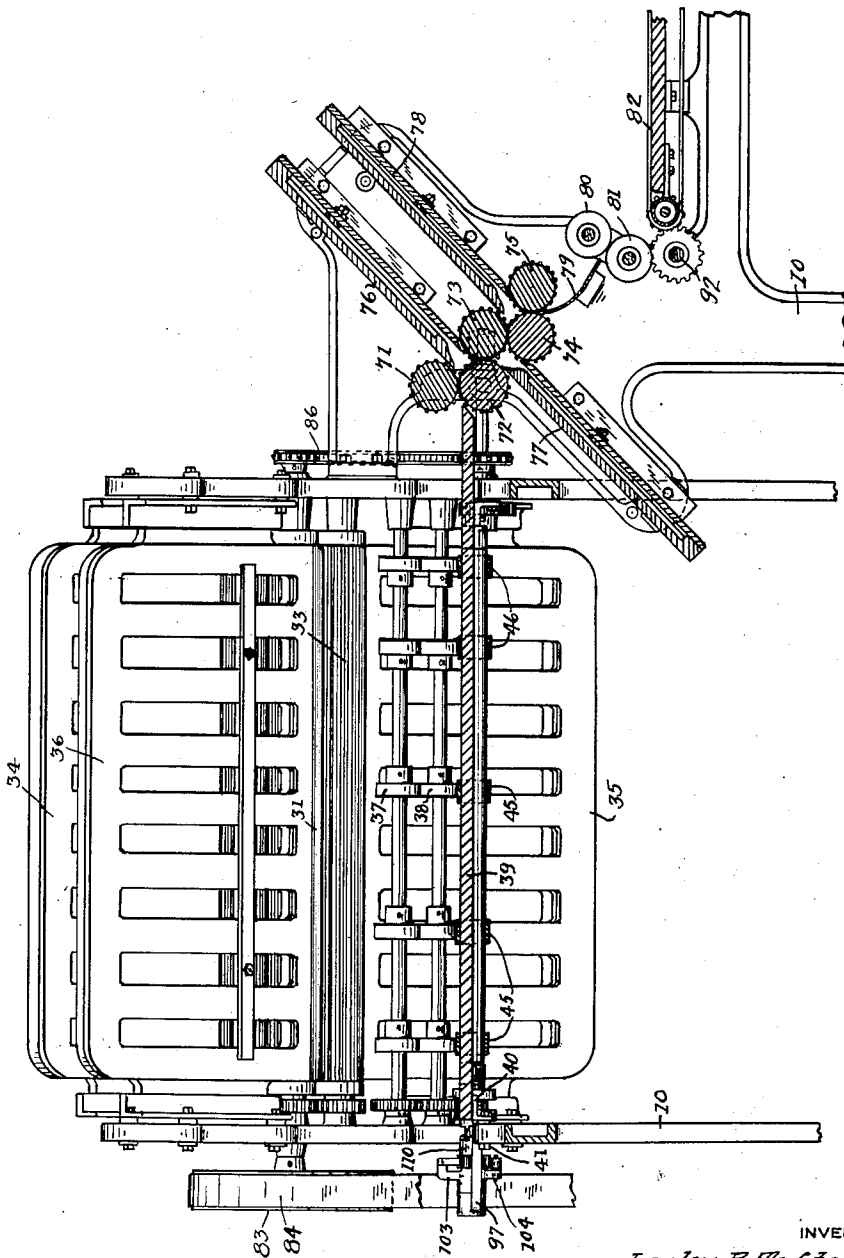
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5 Sheets-Sheet 2

FIG. 2.



INVENTOR.

Lesley R. Tufts.

By *Kewis Hudson & Kent*

ATTORNEYS.

Jan. 8, 1935.

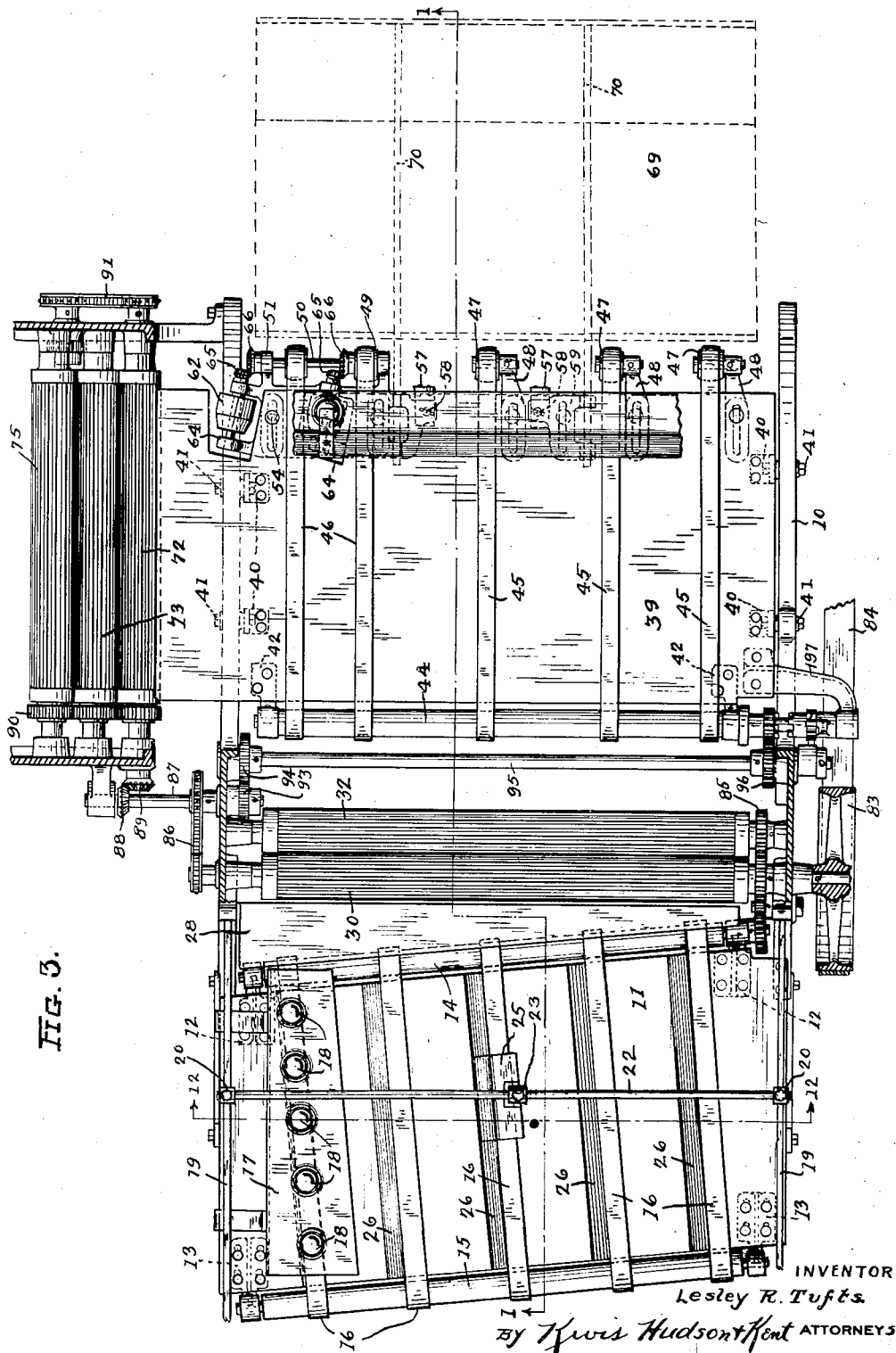
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5 Sheets-Sheet 3



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5 Sheets-Sheet 4

FIG. 5.

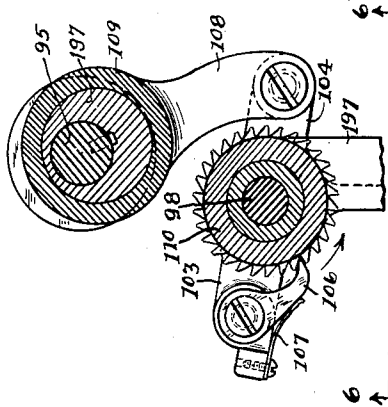


FIG. 6.

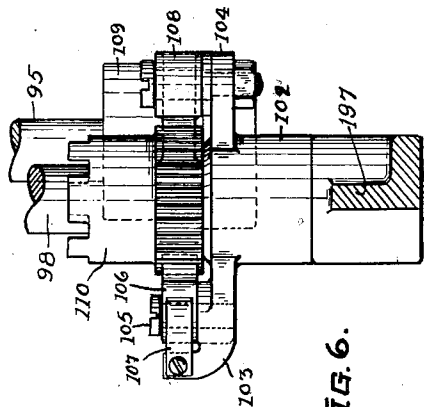
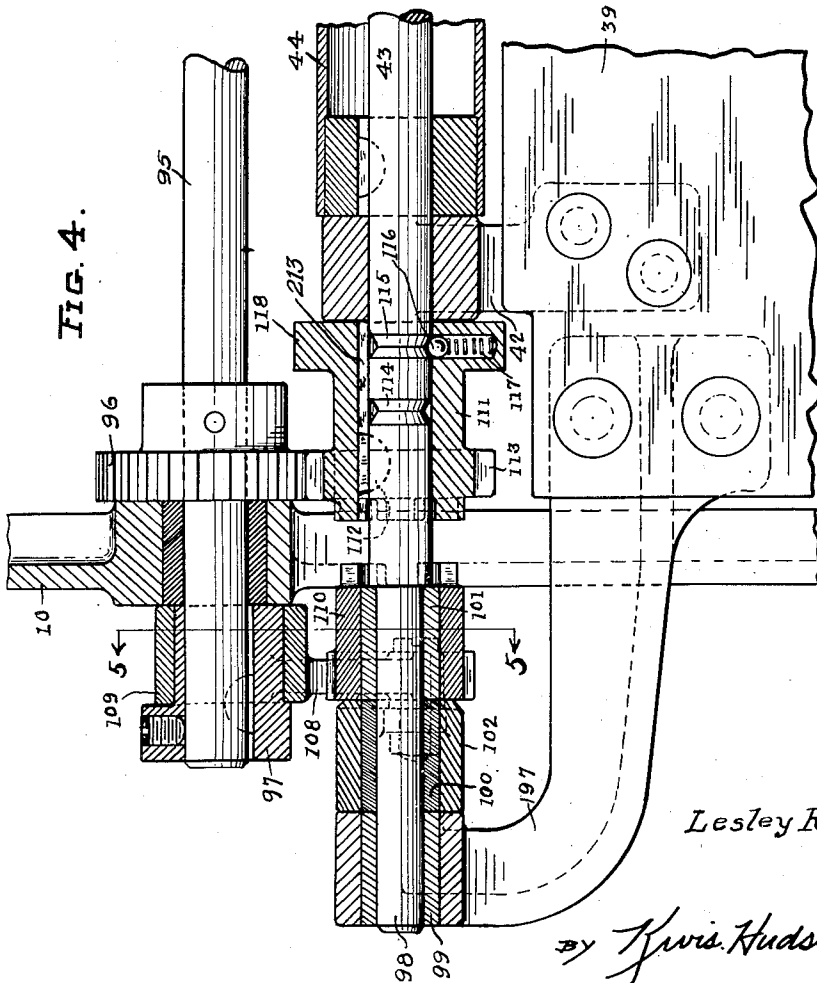


FIG. 4.



INVENTOR.
Lesley R. Tufts

By *Wm. Hudson & Kent*
ATTORNEYS

Jan. 8, 1935.

L. R. TUFTS

1,987,352

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5 Sheets-Sheet 5

FIG. 7.

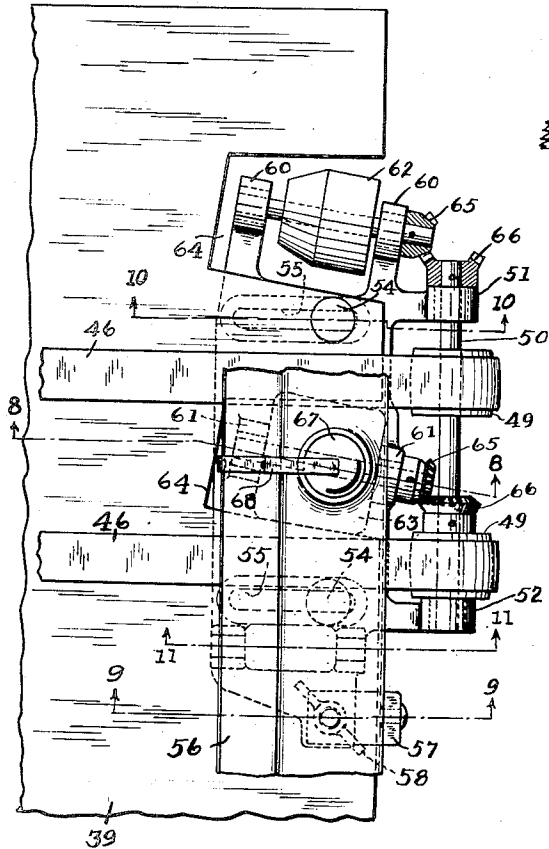


FIG. 10.

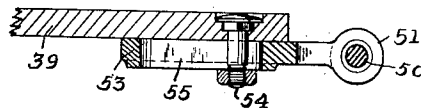


FIG. 9.

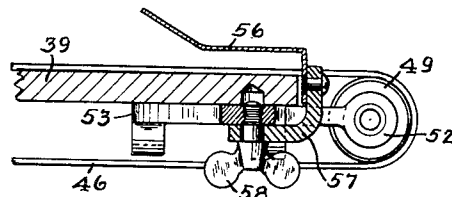


FIG. 11.

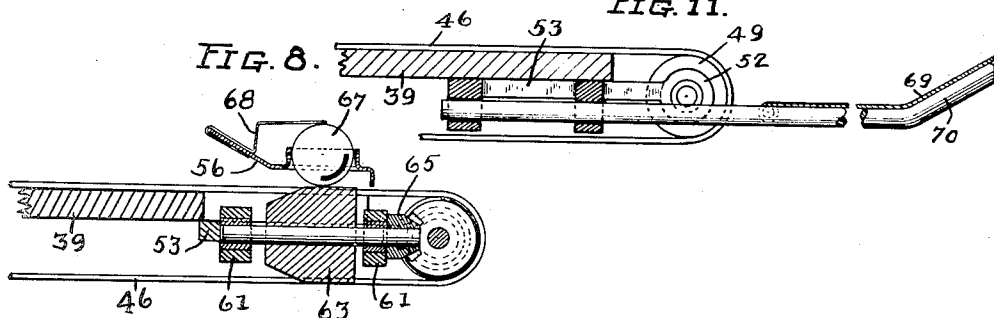
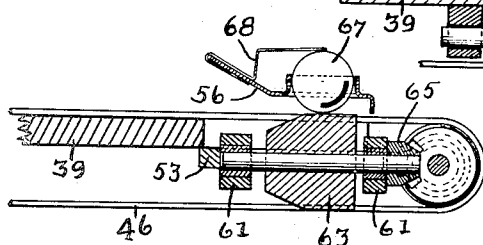


FIG. 8.



INVENTOR
Lesley R. Tufts.

By *Kewis Hudson & Kent*
ATTORNEYS.

UNITED STATES PATENT OFFICE

1,987,352

PAPER HANDLING MACHINE

Lesley R. Tufts, East Cleveland, Ohio, assignor, by mesne assignments, to The Cleveland Folding Machine Company, Mentor Township, Ohio, a corporation of Ohio.

Application January 23, 1930, Serial No. 422,718

28 Claims. (Cl. 271—49)

This invention relates to improvements in paper handling machines, and has to do primarily with a combination cross-feed table and sheet stacker. It is now common practice, for instance in folding machines of the buckle fold type, to make cross-feed tables removable, in order that a sheet stacker may be inserted in place thereof. By this means it is possible to bring a stacker into such position that it is adapted to receive and handle the sheets immediately following the last operation performed upon them, in other words, to eliminate travel of the sheets through such portions of the machine as are not in actual operation at the time.

The removal of a feed table and the substitution of a stacker therefor calls for a complete separate stacker structure, at a considerable extra expense. Furthermore, the substitution of one part for the other also requires some little time, attention and effort each time the change is made, and when one or the other of these parts is out of the machine and being handled or stored in the shop, it is more subject to damage than when mounted in the machine.

One of the objects of the invention, therefore, is a reduction in cost and a saving in time and effort by the provision of apparatus permanently mounted in the machine, which shall serve either as a cross-feed table or as a stacker.

Another object is the provision of means of this character, adapted to permit the quick and easy conversion from feed table to stacker, and vice versa.

Still another object is the provision, in a paper handling machine, of a feed table comprising a series of belts or tapes set at an angle to the side guide, together with means for preventing the forward corners of the sheets, remote from the side guide, from engaging against the edge or beneath the surface of the adjacent belt or tape.

A further object of the invention is the provision of means for driving a belt conveyor selectively at either high or low speed, so as to enable the conveyor to function as an ordinary feed table or as a stacker.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Figure 1 is a vertical longitudinal sectional view of a buckle type folding machine embodying the invention, the section being taken substantially on the line 1—1 of Fig. 3.

Figure 2 is a vertical transverse sectional view of the same, taken substantially on the line 2—2 of Fig. 1.

Figure 3 is a plan view of the machine with certain parts in section, substantially on the line 3—3 of Fig. 1.

Figure 4 is a fragmental horizontal sectional view on a larger scale, illustrating the driving mechanism for the belts of the combined feed table and stacker, and the means for selectively connecting the belts to either the high speed gearing or the low speed ratchet mechanism.

Figure 5 is a vertical cross section taken substantially on the line 5—5 of Fig. 4.

Figure 6 is a bottom plan view, looking substantially in the direction of the arrows 6—6 of Fig. 5.

Figure 7 is a fragmental plan view on a larger scale, showing one corner of the combination cross-feed table and stacker, certain parts being removed and others shown in section, in order to more fully illustrate the invention.

Figures 8, 9, 10 and 11 are vertical sectional views taken substantially on the lines 8—8, 9—9, 10—10 and 11—11 respectively of Fig. 7.

Figure 12 is a transverse vertical sectional view taken substantially on the line 12—12 of Fig. 3.

Similar reference characters refer to like parts throughout the views.

In the drawings I have illustrated the invention in connection with a buckle type folding machine, comprising a frame 10 of any suitable or desirable construction. Upon this frame is mounted a primary feed table. Insofar as certain aspects of the invention are concerned, this table may be of any known construction, but I prefer to form it as herein illustrated, wherein I employ a substantially flat rigid element or slab 11, constructed preferably of wood and set into the frame of the machine at a slight angle, as shown in Fig. 3. Near the corners of the slab 11 I mount brackets 12 and 13, which carry bearings for the shafts of rollers 14 and 15, respectively. Upon these rollers are mounted a series of belts or tapes 16, which run upon or in close proximity to the flat upper surface of the slab 11. As shown in Fig. 3 the brackets 13 may be adjustably supported, whereby the tension of the belts or tapes 16 can be conveniently regulated.

At one side of the primary feed table I mount a side guide 17, comprising a vertical wall along which the sheets travel, and an overhanging, substantially horizontal portion, having openings therethrough adapted to receive balls 18 or other

forms of rollers, constituting yieldable means for holding the sheets of paper in contact with the belt 16 directly therebeneath.

In some cases the sheets fed into the machine will not be wide enough to contact the second belt or tape 16, and in other cases the width will be such as to overlap completely the second or some succeeding belt, while not contacting at all with the belt next beyond.

Where the width of the sheets fed, however, is such that their forward outer corners will first contact with the top of the slab 11 and will later run into a belt 16, as they travel over the table, I have discovered that trouble will result unless provision is made to take care of this condition, as the outer corners of the sheets will not uniformly rise above such belt, but will engage either beneath the belt or against the edge thereof.

In order to overcome this difficulty, however, I have devised a deflector constructed to extend below the principal surface of the slab 11, whereby the outer edges of the sheets must necessarily ride up onto the deflector, the latter being arranged to overhang the adjacent belt, so that the side edges, thus deflected upwardly, will be guided safely onto the upper surface of the belt. I preferably employ but a single deflector plate of this character, and mount it in such manner that it may be positioned adjacent the second or any succeeding belt of the table and at the required position along the length of the belt. This I have found to be a desirable arrangement, because it interferes, to a minimum extent only, with the sheet conveying functions of the belt.

In the present instance the feed table is provided with side rails 19, upon which are mounted to slide, blocks 20 that may be held in adjusted position by set screws 21. In these blocks I mount a cross rail 22 that carries a depending foot 23, which may be slid upon the rail 22 and held in various positions thereupon by a set screw 24. At the bottom of this foot 23 is the deflector plate 25. In the upper surface of the slab 11, parallel and adjacent to the various belts 16, I form grooves 26, into any one of which the free edge of the plate 25 is adapted to extend, in order that the latter may lie beneath the principal surface of the slab, and hence beneath a sheet of paper travelling over the slab. The rear ends of the rails 19 may be supported by merely resting upon a rail 27 of a sheet feeder, employed in connection with the folding or other paper handling machine in which the present invention is embodied.

The primary feed table includes a plate 28, over which the sheets are fed in their travel into the first fold section of the machine. This fold section may comprise fold rollers 29, 30, 31, 32 and 33 and fold plates 34, 35 and 36, all of conventional form and construction. From the rolls 32-33 the sheets travel over a curved guide plate 134, into feed rolls 37 and 38, by means of which the sheets are delivered onto my combined cross-feed table and sheet stacker. The latter comprises a wooden or other slab 39, supported in the side members of the frame 10 by suitable means, as by the brackets and bolts 40 and 41, this slab extending laterally beyond the main frame of the machine, in order to direct sheets into the second fold section, as will later appear.

In brackets 42, secured to the bottom of the slab 39, I mount rotatably a shaft 43, to which is keyed a roller 44. Belts or tapes 45 and 46 run over this roller and the slab 39. The belts 45 on the

opposite side of the slab run over short rollers 47, which are rotatably mounted in brackets 48, the latter being adjustably secured to the bottom surface of the slab by bolt and slot connections, which permit proper tensioning of the belts.

The two belts 46 run upon short rollers 49 that are fixed upon a shaft 50, which is rotatably mounted in bearings 51 and 52, carried by a special bracket 53, the latter being secured by bolt and slot connections 54-55 against the lower surface of the slab 39. The belts 46 may thus also be tensioned. A transverse guide rail 56 is removably supported at the outer edge of the slab 39, by means of two brackets 57 which are secured to the guide and extend beneath the table, where they are provided with perforations for the reception of winged studs 58 that are threaded into the bracket 53 in one case, and into a separate bracket 59 in the other.

The bracket 53 also carries bearings 60 and 61, in which are rotatably mounted the shafts of short rollers 62 and 63, respectively, that protrude through openings 64 provided therefor in the outer edge of the slab 39. These rollers extend upwardly slightly above the surface of the slab 39, and are beveled on their inner ends, in order to guide the sheets into position upon the upper surfaces of the rollers. The shafts upon which these rollers are mounted carry bevel gears 65 on their outer extremities, which mesh with bevel gears 66 that are pinned to the shaft 50. In this manner the rollers 62 and 63 receive their driving force from the belts 46. The guide rail 56 is provided with openings directly above the rollers 62 and 63, within which openings balls 67, or other forms of rollers, are mounted, so as to bear yieldingly upon sheets passing over the rollers, and thereby to hold them in good frictional engagement with the rollers. If desired, spring fingers 68 may be detachably mounted upon the guide rail 56 for engagement with the balls 67 to increase the pressure of the same upon the rollers. Only one of these balls is illustrated in the drawings, that for the roller 62 being omitted, together with the end of the guide rail, in order to more clearly disclose the roller.

When the combined table and stacker is to be used to perform the functions of a stacker, the guide rail 56, with its balls 67, is removed and a pan 69 is mounted on the machine in position to receive sheets from the stacker. This pan comprises a pair of rods 70, which serve as reinforcements, and protrude far enough to enter holes provided therefor in the bracket 53 and 59, thereby removably supporting the pan.

When the work in hand requires cross folding, the sheets are delivered by the cross-feed table into a second fold section, comprising fold rolls 71, 72, 73, 74 and 75, and fold plates 76, 77 and 78. From this fold section the sheets may be delivered over a curved guide plate 79 and through feed rolls 80 and 81 onto a second combined feed table and stacker 82, or any other desired sheet handling apparatus.

The machine may comprise a pulley 83, driven from any convenient source of power with a belt 84, the pulley 83 being attached to an extension of the roll 30. The rolls of the first fold section are intergeared, by means of a gear train 85, which also transmits power to the roller 14 of the primary feed table. To the end of the roll 30, on the opposite side of the machine, is secured a sprocket wheel, over which runs a chain 86 that also extends around a sprocket attached to a short shaft 87. This shaft operates through bevel gears 88

and 89 to drive a train of gears 90 for rotating the rolls of the second fold section, while a chain 91 driven by one of these rolls transmits rotation to a shaft 92, and thence to the feed rolls 80 and 81 and the combined feed table and stacker 82.

On the shaft 87, inside the machine frame, I mount a gear 93, which meshes with a gear 94 on a shaft 95. The latter shaft at its opposite end, but inside the machine frame, carries a gear 96. Outside the machine frame an eccentric 97 is keyed to the shaft. In addition to the bearings in the brackets 42, shaft 43 is provided with a further bearing in an extension arm 197, which is also secured to the bottom of slab 39. The corresponding end of the shaft 43 has a reduced portion surrounded by three bushings, 99, 100 and 101. The bushing 99 provides a bearing for the shaft. Bushing 100 is mounted within a collar 102, from which extend arms 103 and 104. Into the arm 103 is threaded a pivot stud 105, upon which is mounted a pawl 106, that is pressed inwardly toward the center of the collar by a leaf spring 107. To the outer end of arm 104 is pivoted an arm 108, which is integral with an eccentric sleeve 109 surrounding the eccentric 97.

Upon the bushing 101 there is mounted a collar 110, carrying a circular ratchet that is engaged by the pawl 106, and adapted to be rotated thereby intermittently in the direction of the arrow in Fig. 5. On the inner end of this collar is formed one part of a dog clutch, the other part of which is formed upon the end of a sleeve 111 that is slidable upon the shaft 43, but is prevented from turning with respect thereto by a key 112 working in a key-way 113 formed in the sleeve. Hence, when the sleeve 111 is moved toward the left from its position in Fig. 4, to cause the two parts of the dog clutch to engage, the collar 110 and its ratchet are locked through the sleeve 111 to the shaft 43. The sleeve 111 also carries a gear 213, which is adapted to mesh with a gear 96, as illustrated in Fig. 4, whereby continuous rotation is transmitted from shaft 95 to shaft 43 through the sleeve 111. In order to releasably hold the sleeve 111, in either of its two operative positions, I form annular grooves 114 and 115 in the shaft 43, one of which grooves is engaged by a ball detent 116 under pressure from a coil spring 117 whenever the sleeve is moved into one of its operative positions. The ball and spring 116—117 are located in an annular enlargement 118 of the sleeve, by means of which it may be conveniently grasped by the operator when it is to be moved along the shaft.

Assuming that it is desired to impart one or more cross folds to the sheets to be handled, the operator then places the sleeve 111 in the position illustrated in Figs. 3 and 4. He also mounts the guide rail 56 upon the slab 39. Hence, sheets delivered by the primary feed table will pass through the first fold section and be delivered onto the tapes or belts 44 and 46, the latter running substantially at the speed of the travel of the sheets up to that point. Each sheet, therefore, moves rapidly across the slab 39 and passes between the balls 67 and the short rollers 62 and 63 up against the vertical part of the guide rail 56. The rollers 62 and 63, being set at an angle, insure contact of the sheets with the guide rail 56, and as the sheet is gripped between these rollers and the balls 67 it is fed rapidly over the table, along the guide rail 56, and into the second fold section.

Now, should the job in hand call for parallel folds only, the operator shifts the sleeve 111 to the left from the position illustrated in Fig. 4, disengaging the gears 96 and 213, and causing the

two parts of the dog clutch to engage each other. He also removes the guide rail 56 and pushes the pan 69 into operative position, as illustrated in dotted lines in Figs. 1 and 3.

The shaft 43 will now be driven intermittently a small portion of a revolution at a time, resulting in a slow travel of the belts 45 and 46, such as is customarily provided in stackers. The rollers 62 and 63, being operatively connected with the belts 46, also rotate intermittently through small angles, and since the balls 67 were removed with the guide rail 56, the rotation of the rollers 62 and 63 is not positively communicated to the sheets, and the surfaces which the rollers present to the sheets being much less than those presented by belts 46 and 45, practically no tendency toward movement of the sheets transversely is present. Hence they are fed slowly over the stacker and into the pan 69.

While in the foregoing description and in the accompanying drawings I have disclosed, more or less in detail, one particular embodiment of the invention, I desire it to be understood that such detailed disclosure has been resorted to primarily for the purpose of fully illustrating the invention, in accordance with the requirements of the statute, and is not to be construed as amounting to a limitation upon the scope of the invention.

Having thus described my invention, I claim:

1. In a feed table for paper handling machines, a side guide, a conveyor belt running over said table at an angle to the side guide, and a deflector plate extending downwardly below the principal surface of the table and upwardly over said belt for directing the forward outer corners of the sheets onto said belt.

2. In a feed table for paper handling machines, a side guide, a series of conveyor belts running over said table at an angle to the side guide, each of said belts being entirely exposed above the surface of the table and means removably positioned adjacent one of said belts on the side thereof towards said side guide for directing sheets onto the upper surface of said belt.

3. In a feed table for paper handling machines, a side guide, a series of conveyor belts running over said table at an angle to the side guide, and means adjustable upon said table both longitudinally and transversely thereof to positions adjacent any of said belts for directing the forward outer corners of the sheets onto the upper surface of the adjacent belt.

4. In a feed table for paper handling machines, a side guide, a conveyor belt running over said table at an angle to the side guide, said table having a groove therein adjacent said belt on the side thereof toward said side guide, and a deflector plate extending downwardly into said groove and upwardly over the adjacent edge of said belt, whereby the forward outer corners of the sheets are directed onto the upper surface of the belt.

5. In a paper handling machine, a table, a conveyor belt running thereover, means for operating said belt at high speed whereby it is adapted to feed sheets of paper in rapid succession, and means for driving said belt at slow speed, whereby the table is adapted to function as a stacker.

6. In a paper handling machine, a table, a conveyor belt running thereover, removable means located at the far side of the table for changing the direction of movement of said sheets, and means for driving said belt at high speed or low speed selectively, whereby said table may serve as a stacker when said first named means is re-

moved and said slow speed driving means is employed.

7. In a paper handling machine, a cross-feed table, means for delivering sheets onto said table, a conveyor belt running over said table in the direction of delivery of said sheets, removable means associated with said table for directing sheets thereover at right angles to the direction of movement of said belt, and means for driving said belt selectively at high or low speed.

8. In a paper handling machine, a cross-feed table, means for delivering sheets onto said table, a conveyor belt running over said table in the direction of delivery of said sheets, cross-feed means associated with said table for moving sheets thereover at right angles to the direction of movement of said belt, means for disabling said cross-feed means, and means for driving said belt selectively at high or low speed.

9. In a machine of the class described, a feed table, two spaced conveyor belts running over said table, a guide arranged transversely of said belts, and continuously running means located between said belts for imparting driving force to the sheets in a direction transversely of said belts, said means being adapted to force the sheets against said guide.

10. In a machine of the class described, a feed table, two spaced conveyor belts running over said table, a guide arranged transversely of said belts, means located between said belts for imparting driving force to the under surfaces of the sheets in a direction transversely of said belts, and yieldable means for holding the sheets against said driving means.

11. In a machine of the class described, a feed table, two spaced conveyor belts running over said table, a guide arranged transversely of said belts, means located between said belts for imparting driving force to the under surfaces of the sheets in a direction transversely of said belts, and yieldable means carried by said guide for holding the sheets against said driving means.

12. In a machine of the class described, a feed table, two spaced conveyor belts running over said table, a guide arranged transversely of said belts, means located between said belts for imparting driving force to the under surfaces of the sheets in a direction transversely of said belts, and rollers yieldingly mounted in said guide and adapted to run upon the sheets above said driving means.

13. In a machine of the class described, a feed table two spaced conveyor belts running over said table, a guide arranged transversely of said belts, a roller arranged between said belts at a slight angle with respect thereto, means for rotating said roller, whereby driving force may be imparted to the under surfaces of the sheets, and yielding means for holding the sheets against said roller.

14. In a machine of the class described, a feed table, two spaced conveyor belts running over said table, a guide removably mounted on the table transversely of the belts, means located between said belts for imparting driving force to the sheets in a direction transverse to said belts, yieldable means carried by said guide for holding the sheets against said driving means, and means for driving said belts selectively at either high or low speed.

15. In combination, a pair of spaced parallel rollers, a conveyor belt running over said rollers, one of said rollers having a shaft, gearing adapted to drive said shaft at high speed, ratchet mechanism adapted to drive said shaft intermittently, means for clutching said gearing or ratchet mechanism

to the shaft selectively, and a sheet guiding means adapted to be removably positioned above said belt.

16. In a machine of the class described, a cross-feed table, a belt running thereover, means for driving said belt, a cross-feed roller mounted on said table adapted to move sheets transversely to the direction of movement of said belt, and means associated with said belt for driving said roller.

17. In a feed table for paper handling machines, a side guide, a conveyor belt running over said table at an angle to the side guide, and a deflector shorter than the paper engaging portion of said belt adjustable to any one of a plurality of positions along the length of said belt, said deflector being adapted to direct the forward outer corners of the sheets upwardly over said belt.

18. In a feed table for paper handling machines, a side guide, a conveyor belt running over said table at an angle to the side guide, and a deflector shorter than the paper engaging portion of said belt adjustable to any one of a plurality of positions along the side thereof towards said side guide, said deflector being adapted to direct the forward outer corners of the sheets upwardly over said belt.

19. In a feed table for paper handling machines, a side guide, a conveyor belt running over said table at an angle to the side guide, and a deflector adjustable to any one of a plurality of positions along the side of the belt towards said side guide, said deflector extending below the principal surface of the table and upwardly at an angle to the table to direct the forward outer corners of the sheets upwardly over said belt.

20. In a feed table for paper handling machines, a side guide, a conveyor belt running over said table at an angle to the side guide, and a deflector terminating behind the forward end of the belt having an inclined surface toward said side guide and a surface overhanging said belt, whereby the forward outer corners of the sheets are directed upwardly over the edge of the belt.

21. In a paper handling machine, a table, a conveyor running thereover, mechanism for selectively operating the conveyor continuously or intermittently, cross feed means associated with the conveyor and including one or more rollers mounted on the table, and a sheet guide mounted on said table and adapted for removal therefrom to enable stacking of sheets by said conveyor when it is operated intermittently.

22. In a paper handling machine, a table, a conveyor running thereover, disconnectable mechanism for operating the conveyor continuously, cross feed means associated with the conveyor and including rollers mounted on said table, and a sheet guide mounted on the table and adapted for removal therefrom to enable stacking of sheets by said conveyor when said mechanism is disconnected.

23. In a paper handling machine, a table, a conveyor running thereover, mechanism for selectively operating said conveyor at high or low speed, cross feed means associated with the conveyor including one or more rollers mounted on said table, and a sheet guide mounted on the table and adapted for removal therefrom to enable stacking of sheets by said conveyor when it is operated at low speed.

24. In a paper handling machine, a table, a plurality of sheet handling belts or tapes running over the table, cross feed means mounted on the table and associated with the sheet handling belts

or tapes for moving the sheets over the latter and said table transversely to their direction of delivery thereon, means for disabling said cross feed means, and means for selectively impart-

5 ing sheet feeding or sheet stacking motion to said sheet handling belts or tapes.

25. In a machine of the class described, two spaced conveyor belts, a guide removably mounted on the machine above said belts transversely thereto, means mounted between said belts for imparting driving force to the sheets in a direction transverse to the belts, yieldable means carried by said guide for holding the sheets against said driving means, and means for driving said

10 belts selectively at either high or low speed.

26. In a machine of the class described, a table, a sheet conveyor running thereover, mechanism for operating said conveyor either at sheet feeding speed or at sheet stacking speed selectively, cross feeding means associated with the conveyor and mounted on the table, and cross guid-

ing means adapted to be removably positioned on said table adjacent the conveyor.

27. In a machine of the class described, a table, a sheet conveyor running thereover, mechanism for operating said conveyor either at sheet feeding speed or at sheet stacking speed selectively, means on said table for moving sheets off said conveyor in a lateral direction transverse to the direction of movement imparted thereto by the conveyor, and means for disabling said last named

means.
28. In combination, a sheet conveyor, gearing adapted to drive said conveyor continuously at high speed, ratchet mechanism adapted to drive said conveyor intermittently, means for clutching said gearing or ratchet mechanism to the conveyor selectively, and a sheet guiding means adapted to be removably positioned adjacent the conveyor transversely to the direction of movement imparted to sheets by said conveyor.

LESLEY R. TUFTS.