

July 15, 1952

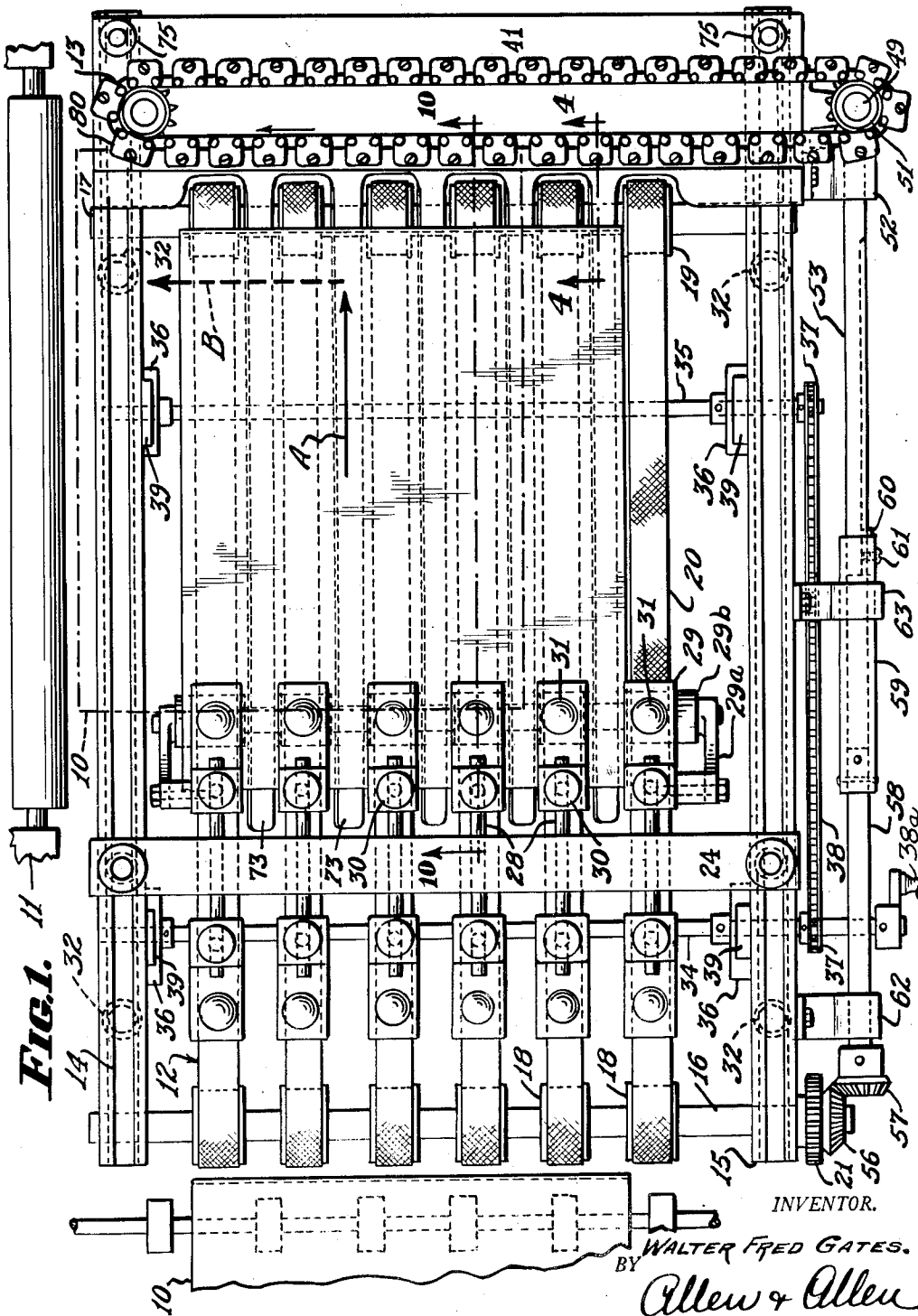
W. F. GATES

2,603,484

PAPER HANDLING MACHINE

Filed July 19, 1947

4 Sheets-Sheet 1



July 15, 1952

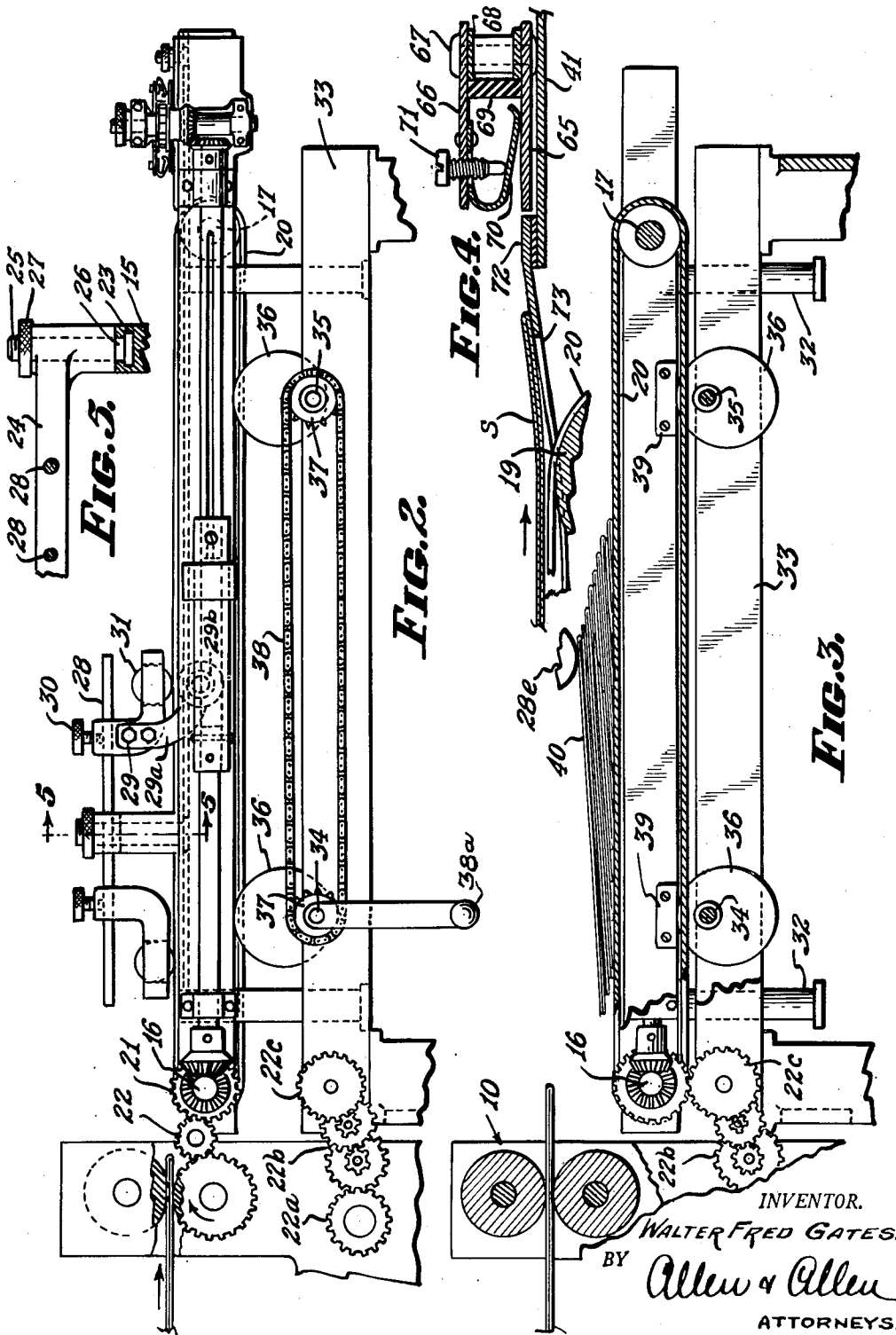
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PAPER HANDLING MACHINE

Filed July 19, 1947

4 Sheets-Sheet 2



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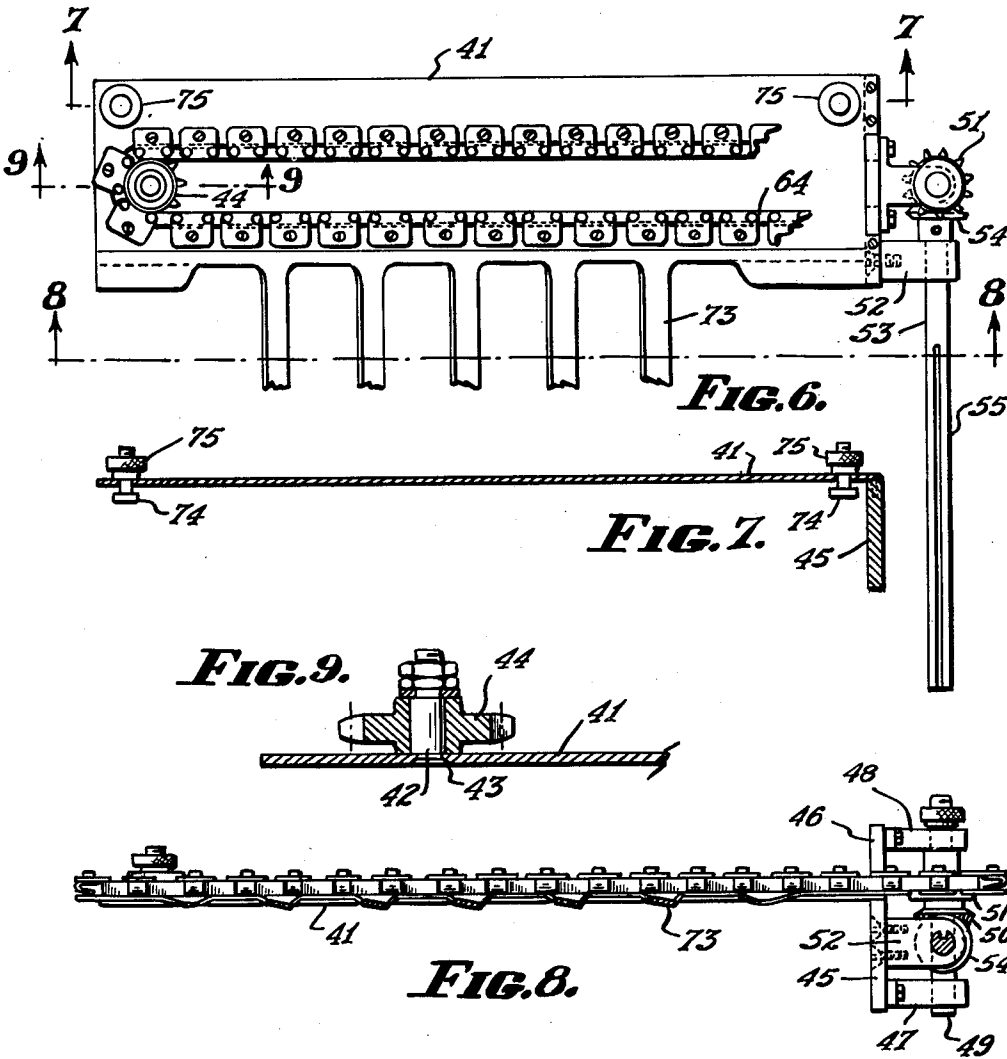
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2,603,484

PAPER HANDLING MACHINE

Filed July 19, 1947

4 Sheets-Sheet 3



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July 15, 1952

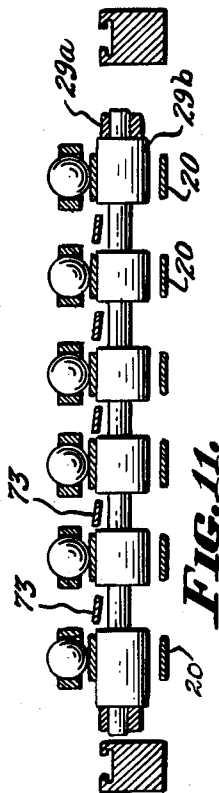
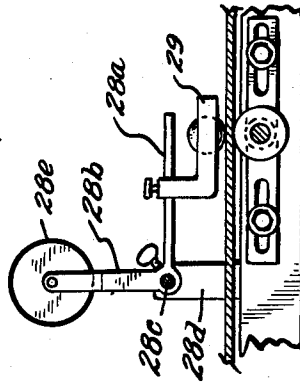
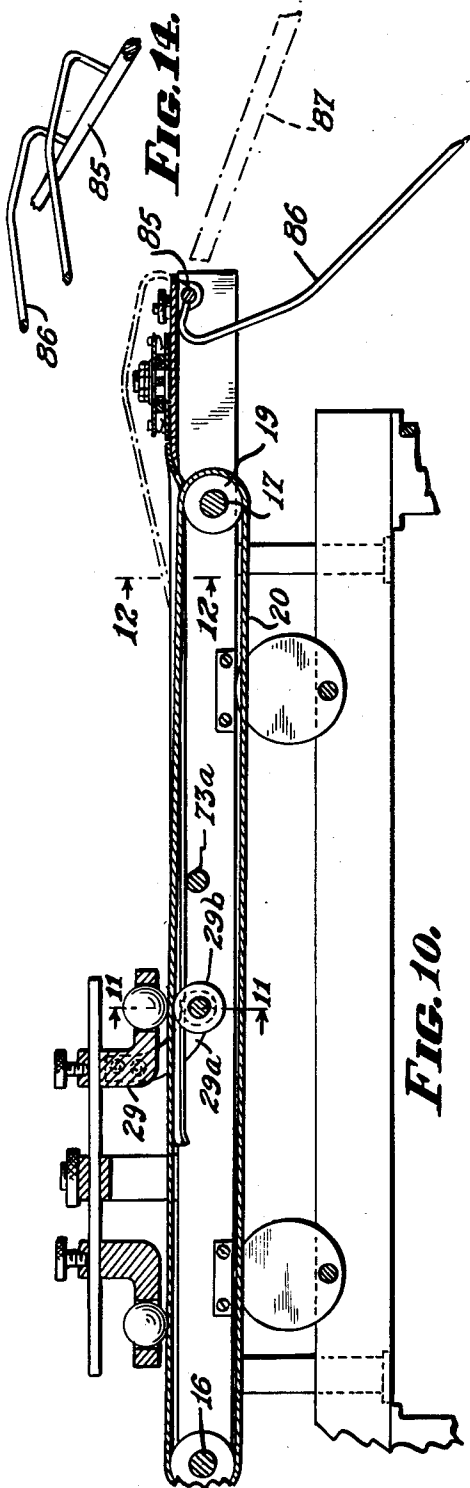
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PAPER HANDLING MACHINE

Filed July 19, 1947

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,603,484

PAPER HANDLING MACHINE

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Application July 19, 1947, Serial No. 762,090

21 Claims. (Cl. 271—76)

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This invention relates to paper handling machines and more particularly to machines of the type in which the sheet is not turned during successive operations, but is moved in a series of paths at right angles to each other.

In the processing of printed sheets of paper or other material, it is often necessary that the sheets be folded, perforated, ruled, scored or similarly treated. While my invention is adapted to be used in connection with any of such operations, I have herein described it particularly in connection with a folding machine.

In some cases there may be a single fold and in other cases there may be a number of successive folds. Therefore, in order to have a machine which shall be universal, there must initially be a set-up of, say, four or five folding stations. The initial folding station must be large enough to accommodate the largest size of unfolded sheet which will be encountered. However, the succeeding folding stations may become smaller and smaller, since successive folds reduce the size of the sheet passing through a succeeding section of the machine.

After the required number of folds have been made in the sheets, it is desirable that stacking means be provided, and one such means is known as a creeping stacker, which generally comprises a conveyor belt moving at a relatively slow speed, so that as succeeding sheets are fed onto the creeping stacker, they are stacked thereon shinglewise. In order to use a creeping stacker with a paper folding machine as outlined above, the operator has his choice of two alternatives: he must either provide a creeping stacker of appropriate size for each folding station, or he must provide a single creeping stacker of sufficient size to be capable of stacking sheets which have had only a single fold. Such a stacker would, of course, be larger than necessary for use in succeeding folding stations. Neither of the above alternatives is economically sound.

In the light of the above mentioned problems, it is an object of my invention to provide a universal machine of the general type outlined above having a plurality of operating stations and having conveyors to advance sheets from one operating station to a cross-feed conveyor, which will advance them to a succeeding operating station, and to provide means whereby said conveyor is capable of occupying two positions, in one of which it functions as a creeping stacker for that particular operating station.

It is another object of my invention to provide means whereby when said conveyor is shifted from its conveying position to its stacking position, it is driven through a different train of gearing, including speed reducing means so that while in its upper or conveying position, it will run at normal speed, and in its lower or stacking

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position, it will run at a greatly reduced speed. Further objects along these lines include the provision of the arrangement as outlined, which is simple in operation and relatively inexpensive in construction, so that it will not add very substantially to the cost of the machine.

In machines of the type outlined there has been difficulty in changing the direction of movement of the sheets as they are fed to successive operating stations, and in this connection, it is an object of my invention to provide a novel cross-feed conveyor by means of which the sheets may be accurately fed at right angles to the direction in which they approach the cross-feed conveyors.

Another object of my invention involves the provision of a cross-feed conveyor which will grip the leading edges of the sheets of paper in moving them at right angles to their original path.

The use of ball carriages containing balls which ride on the conveyor tapes to insure feeding of the paper sheets is well known. In connection with my novel cross-feed conveyor however, I make certain provisions for longitudinal adjustability, not only of the cross-feed conveyor itself, but of the ball carriages, and I provide for a relative spacing of the two whereby any tendency of the sheets to become skewed will be automatically and instantaneously corrected.

These and other objects of my invention, which will be pointed out in more detail hereinafter or which will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall now describe an exemplary embodiment.

Reference is made to the drawings forming a part hereof and in which:

Figure 1 is a plan view of a first conveyor and a cross-feed conveyor disposed between two succeeding folding stations at right angles to each other.

Figure 2 is a side elevational view of the same showing the first conveyor in its upper or conveying position.

Figure 3 is a view similar to Figure 2 with parts broken away to show the construction and showing the first conveyor in its lower or stacking position.

Figure 4 is a detailed partial cross-sectional view taken on the line 4—4 of Figure 1 on an enlarged scale.

Figure 5 is a partial sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a plan view of the cross-feed conveyor unit with part of the chain broken away to show the construction.

Figure 7 is a cross-sectional view taken on the line 7—7 of Figure 6.

Figure 8 is an elevational view of the cross-

feed conveyor as seen from the bottom of Figure 6.

Figure 9 is a cross-sectional view on an enlarged scale taken on the line 9—9 of Figure 6.

Figure 10 is a fragmentary cross-sectional view taken on the line 10—10 of Figure 1.

Figure 11 is a cross-sectional view taken on the line 11—11 of Figure 10.

Figure 12 is a cross-sectional view taken on the line 12—12 of Figure 10.

Figure 13 is a fragmentary view of a ball carriage of modified construction, corresponding to Figure 2, and

Figure 14 is a fragmentary perspective view of the guide finger assembly.

Briefly in the practice of my invention, I provide between each pair of succeeding folding stations, a pair of conveyors. The first conveyor receives sheets from the preceding folding station and advances them to the cross-feed conveyor, and the cross-feed conveyor advances them at right angles to their then direction of travel to the succeeding folding station. Both of these conveyors are mounted on the same framework and the cross feed conveyor is adjustable longitudinally of the first conveyor and may if desired be entirely removed therefrom. The entire conveyor assembly is mounted for vertical sliding movement in relation to a subframe and means are provided for shifting said first conveyor to an upper or conveying position on the one hand, or a lower or stacking position on the other hand. The machine has a source of motive power and two driving connections are provided for the two positions of the conveyor. The driving connection for the lower position includes speed reducing means so that when the conveyor is in its lower position it moves at a relatively slow speed.

The cross feed conveyor is provided with means for gripping the folded leading edge of a sheet of paper so as to advance it at right angles to its direction of travel. A series of balls mounted in ball carriages ride on the first conveyor to insure proper feeding of the sheets and both the cross conveyor and the ball carriages are adjustable longitudinally of the first conveyor. In practice the adjustment will be such that taking into consideration the length of the folded sheets in their original direction of travel, they will be advanced to the succeeding folding station substantially centrally thereof, and the ball carriages are adjusted in relation to the cross feed conveyors, so that the balls just clear the trailing edges of the sheets when they are properly gripped, by their leading edges in the cross feed conveyor. In this way if there should be for any reason a tendency for a sheet to become misaligned, the coaction between the balls and the first conveyor will immediately tend to realign the sheet.

Referring now in more detail to the drawings, I have shown in Fig. 1, more or less diagrammatically at 10, the exist end of a folding station, and at 11 the entrance end of a succeeding folding station disposed at right angles thereto. Between the folding stations 10 and 11, I provide a first conveyor, indicated generally at 12, and a cross feed conveyor, indicated generally at 13. Folded sheets from the station 10, advancing folded edge first, are fed in the direction of the arrow A by means of the conveyor 12 to the cross feed conveyor 13, by which they are moved in the direction of the arrow B to the succeeding folding station 11.

The first conveyor

The first conveyor comprises a pair of spaced

rails 14 and 15. These rails support the shafts 16 and 17, the shaft 16 carrying a number of pulleys 18 and the shaft 17 carrying a roll 19 of substantially the same diameter as the pulleys 18. A number of tapes 20 pass around the pulleys 18 and the roll 19 and constitute the conveying elements. The shaft 16 carries a gear 21, which as seen in Fig. 2 is driven by gearing generally indicated at 22 from a source of motive power not shown. It will be clear that motive power applied through the gearing 22 to the gear 21 will cause the belts or tapes 20 to move in the direction of the arrow A.

The rails 14 and 15 are provided with T-slots 23. A bridge 24 for the mounting of the ball carriages is mounted for longitudinal adjustment, as best seen in Figure 5, by means of bolts 25 having the heads 26 which ride freely in the T-slots 23. A knurled thumb nut 27 is provided to lock the bridge 24 in any desired position. It will be clear that the construction of Figure 5 is repeated at the other end of the bridge 24.

Pins 28 are carried in holes in the bridge 24 and ball carriages 29 are adjustably mounted on the pins 28, as best seen in Figure 2. The ball carriages may be L-shaped, having an aperture through one leg to accept the pin 28 and the ball carriage may be fastened in position by means of the thumb screw 30. A ball is retained in any suitable manner in the other leg of the L-shaped carriage 29. A ball is indicated at 31. It will be understood that the structure just described and shown in Figure 2 is repeated transversely of the conveyor with a pair of ball carriers 29 for each of the webs or tapes 20. The end ones of the carriages 29 have secured thereto the brackets 29a, which provide bearings for a supporting roller 29b. It will be noted that the roller 29b is slightly higher than the rollers 19, so as to cause the tapes 20 to slope downwardly toward the latter. The purpose of this construction will be explained in connection with the cross-feed conveyor hereinafter. The function of these balls is to ride on the papers as they pass over the tapes 20, backed up by the roller 29b, so that sufficient traction will be exerted by the tapes to advance the sheets. The purpose and advantages of longitudinal adjustability of these ball carriages will be discussed hereinafter in connection with the description of the cross-feed conveyor.

Vertical rods 32 are secured to the rails 14 and 15 and have a sliding bearing in a subframe 33, best seen in Figure 2. By this construction the entire structure carried by the rails 14 and 15 can be moved up and down in relation to the subframe 33. The rails 14 and 15 are supported in the following manner: The subframe 33 carries a pair of shafts 34 and 35 and each of these shafts carries a pair of cams or eccentrics 36. Each of the shafts 34 and 35 also carries a sprocket 37, which sprockets are connected by a sprocket chain 38. The shaft 34 is provided with a crank 38a and it will now be clear that if the crank 38a is rotated through 180°, the cams or eccentrics 36 will come to the position shown in Figure 3. The rails 14 and 15 carry bearing plates 39 on which the entire conveyor framework is supported on the cams or eccentrics 36.

A second driving connection, indicated generally at 22a and including the speed reducing gear, indicated generally at 22b terminates in a gear 22c journaled in a subframe 33 in such a position that when the conveyor assembly is shifted from the position of Figure 2 to that of Figure 3, the gear 21 is disengaged from the drive 22 and

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meshes instead with the gear 22c, which receives its power through the speed reducing gearing 22b.

In its lower position then, the tapes 20 will be driven at a very much slower rate of speed so that the folded sheets leaving the folding station 10 will be stacked shinglewise on the conveyor 12, as indicated generally at 40. Thus, the conveyor 12 in its upper position serves to convey sheets from the folding station 10 to the cross-feed conveyor, and in its lower position it serves as a creeping stacker. The change over is accomplished by a simple 180° throw of the crank 38a.

The cross-feed conveyor

The cross-feed conveyor comprises a bed plate 41 which is of a length to extend between the rails 14 and 15. At one end a stud 42 is fixed thereon as by welding at 43 to provide a bearing for a sprocket 44. At its other end the plate 41 has fixed to it a side plate 45. The plate 45 extends below the plate 41 and also has an upward extension 46. The plate 45 carries a bearing bracket 47 and the extension 46 carries a bearing bracket 48 and a shaft 49 is journaled in bearings in the brackets 47 and 48. The shaft 49 carries a bevel gear 50 and a sprocket 51.

The plate 45 also carries a bearing bracket 52 which forms a bearing for the shaft 53 which carries a bevel gear 54 arranged to mesh with the bevel gear 50. The shaft 53 is provided with a spline or keyway 55 and is the driving shaft for the cross conveyor.

Referring back to Figures 1 and 2, the shaft 16 also carries a bevel gear 56 which meshes with a bevel gear 57, mounted on a shaft 58 to which is fixed a sleeve 59, provided with a key 60. The key 60 may be secured in place as by a screw 61. The shaft 58 is journaled in a bearing bracket 62 secured to the rail 15, and the sleeve 59 is journaled in a bearing bracket 63 also secured to the rail 15. The spline shaft 53 engages in the sleeve 59 with the key 60 riding in the keyway 55.

From the foregoing description, it will be clear that the cross-feed conveyor is driven concurrently with the first conveyor through the gearing 56, 57, shaft 58, sleeve 59, spline shaft 53 and the bevel gears 54, 50 of the shaft 49. A sprocket chain 64 passes around the sprockets 44 and 51 and the gripping means for the leading folded edges of the sheets are provided in connection with the sprocket chain 64. Referring now more particularly to Figure 4, in connection with each link there is provided a floor plate 65 and an upper bracket 66. These are secured to the pins 67 which connect the links 68 of the same. The chain is also provided with an exterior abutment surface constituted by a band of rubber or the like 69. The bracket 66 carries a spring element 70 which bears against the floor plate 65 adjacent the abutment surface 69. The tension in the spring 70 may be adjusted by means of the screw 71 as will be clear. Figure 4 being a sectional view on the line 4-4 of Figure 1, it will be clear that each link of the sprocket chain reproduces the same structure just now described, so that I provide in effect a whole series of gripping elements along the entire length of the chain. Since the floor plate 65 is spaced somewhat above the bed plate 41, I provide at the front of the bed plate 41 a guide plate 72 having a series of tongues 73 which extend between the tapes 20. These tongues preferably extend more than halfway along the conveyor, and as best seen in Figures 11 and 12, they are tilted slightly in the direction shown. It will be noted that their edges

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are substantially horizontal, and since the belts 20 slope downwardly somewhat, as described above, the higher edges of the tongues 73 will be below the plane of the belts in the region of the ball riders (see Figure 11), and above the plane of the belts in the vicinity of the cross-conveyor (see Figure 12). The tongues slope upwardly in the direction of the cross-feed. The purpose of this construction is gradually to transfer the weight of the sheets of paper from the belts 20 to the tongues 73, so that when the leading edges thereof are gripped in the cross-conveyor, the sheets are resting substantially on the tongues only and the belts are hardly engaging them.

Besides, there is no danger of the sheets becoming fouled in the belts during cross-feed by virtue of the slopes of the tongues. In machines of considerable size, it may be desirable to provide additional support for the tongues 73, as by means of a supporting rod 73a suitably mounted on the framework.

As clearly shown in Figure 4, a folded sheet S moving on the tapes 20 in the direction of the arrow slides up over the tongues 73 and is fed into the space between the floor plate 65 and the spring member 70, until it abuts the abutment strip 69.

Adjustment

The entire cross-feed conveyor mechanism is adjustable longitudinally of the rails 14 and 15 by means of the T-bolts 74 (Figure 7) which ride in the slots 23, described above. The conveyor may be fixed in any desired longitudinal position by means of the knurled thumb nuts 75.

Knowing the length in the direction of the arrow A of the folded sheets, the cross-feed conveyor is adjusted as above described, longitudinally of the rails 14 and 15, so that when the folded sheet is moved off at right angles toward the folding station 11, it will be presented thereto substantially centrally. The ball carriage structure heretofore described is then adjusted longitudinally of the rails 14 and 15, so that the balls engage the paper sheets up to the point where their leading folded edges are abutted against the abutment strip 69. Just at that point the balls clear the trailing edges of the sheets. It will thus be seen that the sheets are positively fed into gripping engagement between the members 69 and 70, until the leading edges abut the strip 69. The folded sheets then, engaged along the leading edges only, and with nothing but the weight of the sheets resting on the webs 20, are moved off in the direction of the arrow B. If for some reason or another a sheet should become slightly misaligned as by having one or the other end pulled out of engagement with the abutment strip 69, the trailing edge of the sheet opposite the misaligned portion will immediately come under one of the balls 31 and will thus be again fed into abutment with the strip 69.

The screws 71 are adjusted to the point where they will together firmly hold the sheet along its leading edge and yet so that a single pair of members 65, 70 can be pulled out of engagement with the sheet when their particular link of the chain starts to move around the sprocket to the point indicated at 80 in Figure 1. This adjustment is not difficult to make because it will be seen that the sheet is gripped by perhaps 10 or 12 pairs of members 65, 70 and that when the leading link starts to move around the sprocket, the remaining links which still engage the sheet can hold it while the leading link is stripped off. Of course, by the time that there are only a few

links still in engagement with the sheet, its leading edge will be engaged in the succeeding folding station 11, so that no further difficulties will be encountered.

In Figure 13 I have shown a modified ball carriage assembly, in which the ball carriages 29 are again mounted upon a rod 28a, but here the rod 28a constitutes one leg of a bell crank, having another arm 28b extending, for example, at a right angle thereto. Each of the bell cranks 28a-28b is mounted upon a rod 28c which extends between the uprights 28d, the rod 28c and uprights 28d together corresponding to the bridge 24. Rollers 28e are mounted on the ends of the arms 28b, and when the first conveyor is to operate as a creeping stacker, the rod 28c is rotated counterclockwise so that the rollers 28e ride on tapes and then on the sheets being stacked, with the conveyor in its lower position, as indicated in Figure 3. The advantage of this modification is that the rollers 28e and tapes 20, or preceding stacked sheets, coact to form stops for the leading edges of sheets fed from the station 10. These sheets may come fast, and the above described arrangement causes the sheets to be arrested and evenly stacked.

When the cross-feed conveyor is not being used, as in a stacking operation, I provide means for carrying the sheets over the cross-conveyor assembly. In Figure 10 I have shown a rod 85 pivoted on the cross-conveyor frame. The rod 85 is provided with a series of fingers 86 equal in number and spacing to the tongues 73. During a stacking operation, the rod 85 may be rotated counterclockwise to cause the fingers 86 to occupy the broken line position of Figure 10, in which their ends will rest on the tongues 73. Stacked sheets are thus pushed up over the cross-conveyor and may then be caught in a suitable pan diagrammatically indicated at 87.

It will be clear from the foregoing description that my machine is capable of handling multiple work. Where small sheets are to be operated upon, two or more such sheets may be fed along the first conveyor 12 side by side, and they will be fed laterally by the cross-conveyor 13 in single file. It will also be noted that the cross-conveyor accepts the sheets while both it and the sheets are in motion.

It will be clear that numerous modifications may be made without departing from the spirit of my invention and that many minor modifications will suggest themselves to anyone skilled in the art. For these reasons, I do not intend to limit myself to the specific structure or mechanism described except as pointed out in the claims which follow.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame; said cross-feed conveyor comprising an endless belt traveling about two vertical axes mounted on said cross-feed conveyor base and presenting in its feeding flight a vertical

abutment surface for the leading edges of said sheet material, and gripping means for the leading edge of said sheet material associated with said belt, said belt being mounted on a chain, said vertical axes carrying sprockets engaging said chain, and said chain carrying for each link thereof, a floor plate upon which the leading edge of said sheet material is supported.

2. A sheet material handling machine according to claim 1, in which said chain carries also, for each link and floor plate, a spring element disposed to bear against said floor plate adjacent said belt to grip the leading edge of said sheet material.

3. A sheet material handling machine according to claim 2, in which said spring elements are adjustable to vary the pressure with which the leading edge of said sheet material is gripped against said floor plates.

4. A sheet material handling machine according to claim 3, in which said cross-feed conveyor base is adjustable longitudinally of said first mentioned conveyor, so that delivery to said second operating station may be central with respect thereto regardless of the width of said sheet material.

5. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame; said cross-feed conveyor comprising an endless chain traveling about two vertical axes mounted on said cross-feed conveyor base at right angles to the line of travel of sheet material advanced by said first mentioned conveyor, and an endless friction faced abutment strip mounted on said chain so as to present in its feeding flight a vertical abutment surface for the leading edges of said sheet material; and registering means located adjacent the trailing edge of said sheet material when the leading edge is engaged with said abutment strip.

6. A machine according to claim 5 in which said chain carries for each link thereof, guide means for the leading edge of said sheet material, said guide means comprising a floor plate upon which said leading edge is supported and a spring element adjacent said floor plate and spaced therefrom sufficiently to permit said leading edge to abut against said strip when said trailing edge clears said registering means.

7. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; a source of motive power for said machine and a disengageable driving connection from said source to said first mentioned conveyor, and in which said conveyor as a unit

may be disengaged from said connection and moved to a lower position, there being a second driving connection from said source including speed reducing means, said conveyor in its lower position engaging said second driving connection whereby sheet material delivered to said conveyor from the first of said operating stations is stacked thereon shinglewise as in a creeping stacker; said cross-feed conveyor base being removable from said frame and said first mentioned conveyor when the latter is to be used as a creeping stacker.

8. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; a source of motive power for said machine and a disengageable driving connection from said source to said first mentioned conveyor, and in which said conveyor as a unit may be disengaged from said connection and moved to a lower position, there being a second driving connection from said source including speed reducing means, said conveyor in its lower position engaging said second driving connection whereby sheet material delivered to said conveyor from the first of said operating stations is stacked thereon shinglewise as in a creeping stacker; and deflector means provided in connection with said cross-feed conveyor, said deflector means having an out-of-the-way position, and being movable to a position extending over said cross-feed conveyor, to deflect sheets thereover when said first mentioned conveyor is in its lower position.

9. A device according to claim 8, in which said deflector means comprises a rod pivoted on said cross-feed conveyor base and having a series of curved fingers.

10. A sheet material handling machine comprising a pair of spaced operating stations disposed at right angles to each other, a conveyor disposed after one operating station of said pair to receive sheet material therefrom and to advance it to a position for delivery at right angles to the other operating station of said pair, a cross conveyor disposed to receive sheet material from said first mentioned conveyor and advance it at right angles to its then direction of travel to said other operating station, a source of motive power for said machine and a disengageable driving connection between said source of power and said first mentioned conveyor, a second driving connection with said source of power through a speed reducing means for said first mentioned conveyor, and means for shifting said first mentioned conveyor to a lower position in which said first driving connection is disengaged and said second driving connection is engaged to drive said first mentioned conveyor at a relatively slow speed, whereby sheet material delivered from said one operating station to said first mentioned conveyor is stacked thereon shinglewise.

11. A sheet material handling machine according to claim 10, in which said first mentioned conveyor is driven by a gear forming part of the

conveyor unit and shiftable with said conveyor, and in which said driving connection terminates in a gear which will mesh with said first mentioned gear, said first mentioned gear in the upper position of said conveyor meshing with the terminal gear of said first mentioned driving connection, and in the lower position of said conveyor meshing with the terminal gear of said driving connection which includes the speed reducing means.

12. A sheet material handling machine according to claim 10, in which said first mentioned conveyor unit is vertically slidable on a sub-frame, cam means on said subframe, said conveyor unit resting on said cam means, and means for actuating said cam means selectively to shift said conveyor unit to its upper or lower position.

13. A sheet material handling machine according to claim 12, in which there are at least two pairs of cam means, each pair being on a common shaft, and an operative connection between said shafts whereby said cam means are caused to operate in synchronism.

14. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; and deflector means provided in connection with said cross-feed conveyor, said deflector means having an out-of-the-way position, and being movable to a position extending over said cross-feed conveyor, to deflect sheets thereover, said deflector means comprising a rod pivoted on said cross-feed conveyor base and having a series of curved fingers.

15. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; a plurality of balls arranged to bear against said first mentioned conveyor, said balls being mounted in ball carriages with said balls aligned transversely of said conveyor, said balls cooperating with said conveyor to advance said sheet material; a common mounting for said ball carriages, said mounting being adjustable longitudinally of said conveyor whereby said transverse line of balls may be set at any desired position longitudinally thereof; and a roller supported by said mounting, said roller being positioned to underlie said line of balls beneath said conveyor.

16. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other,

said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; a plurality of balls arranged to bear against said first mentioned conveyor, said balls being mounted in ball carriages with said balls aligned transversely of said conveyor, said balls cooperating with said conveyor to advance said sheet material, said ball carriages having a common mounting which is adjustable longitudinally of said conveyor; said mounting being positioned with respect to said conveyor so that when the leading edge of said sheet material is gripped by said cross conveyor, said transverse line of balls just clears the trailing edge of said sheet material, whereby any tendency of said sheet material to become misaligned with respect to said cross conveyor will be continuously corrected.

17. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; a source of motive power for said machine and a disengageable driving connection from said source to said first mentioned conveyor, and in which said conveyor as a unit may be disengaged from said connection and moved to a lower position, there being a second driving connection from said source including speed reducing means, said conveyor in its lower position engaging said second driving connection whereby sheet material delivered to said conveyor from the first of said operating stations is stacked thereon shinglewise as in a creeping stacker; and a plurality of balls arranged to bear against said first mentioned conveyor, said balls being mounted in ball carriages with said balls aligned transversely of said conveyor, said balls cooperating with said conveyor to advance said sheet material, said ball carriages being mounted on bell cranks on the other arms of which rollers are mounted, said bell cranks being fixed on a rod pivoted on said machine frame, whereby upon rotation of said rod, said ball carriages may be disengaged from said conveyor, and said rollers engaged therewith, so that when said conveyor is moved to its lower position said rollers cooperate with said conveyor to arrest said delivered sheet material and thus control the stacking of said sheet material upon said conveyor.

18. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material

from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; said first mentioned conveyor comprising a plurality of relatively narrow belts and in which a plurality of tongues extend between said belts from said cross-feed conveyor base.

19. A device according to claim 18, in which said belts and tongues are not parallel in the vertical plane, and in which said belts slope downwardly with respect to said tongues in the direction of movement of said belts, whereby the highest parts of said tongues are below the plane of said belts at the ends of said tongues, and the highest parts of said tongues are above the plane of said belts adjacent said cross-feed conveyor.

20. A device according to claim 18, in which said tongues are slightly canted upward in the direction of travel of said cross-feed conveyor, whereby the lower edges of said tongues are below the plane of said belts throughout their length, and the upper edges thereof are below the plane of said belts adjacent the ends of the tongues, and above the plane of said belts adjacent said cross-feed conveyor.

21. In a sheet material handling machine having at least two spaced operating stations disposed at right angles to each other, a conveyor to receive sheet material from one of said operating stations and to advance it toward the other, said conveyor being mounted on a frame; a cross-feed conveyor to receive said sheet material from said first mentioned conveyor and to advance it at right angles to its original direction of travel to said second operating station, said cross-feed conveyor being mounted on a base positioned on said frame, said cross-feed conveyor having means for gripping said sheet material along its leading edge only; said first mentioned conveyor comprising a plurality of relatively narrow belts and in which a plurality of tongues extend between said belts from said cross-feed conveyor base; and a number of curved fingers equal to the number of said tongues, said fingers being pivoted at the rear of said cross-feed conveyor base, said fingers thus having an out-of-the-way position, and being capable of being swung over said cross-feed conveyor to a point where their ends rest on said tongues, whereby said sheet material may be diverted over said cross-feed conveyor.

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