

Sept. 1, 1964

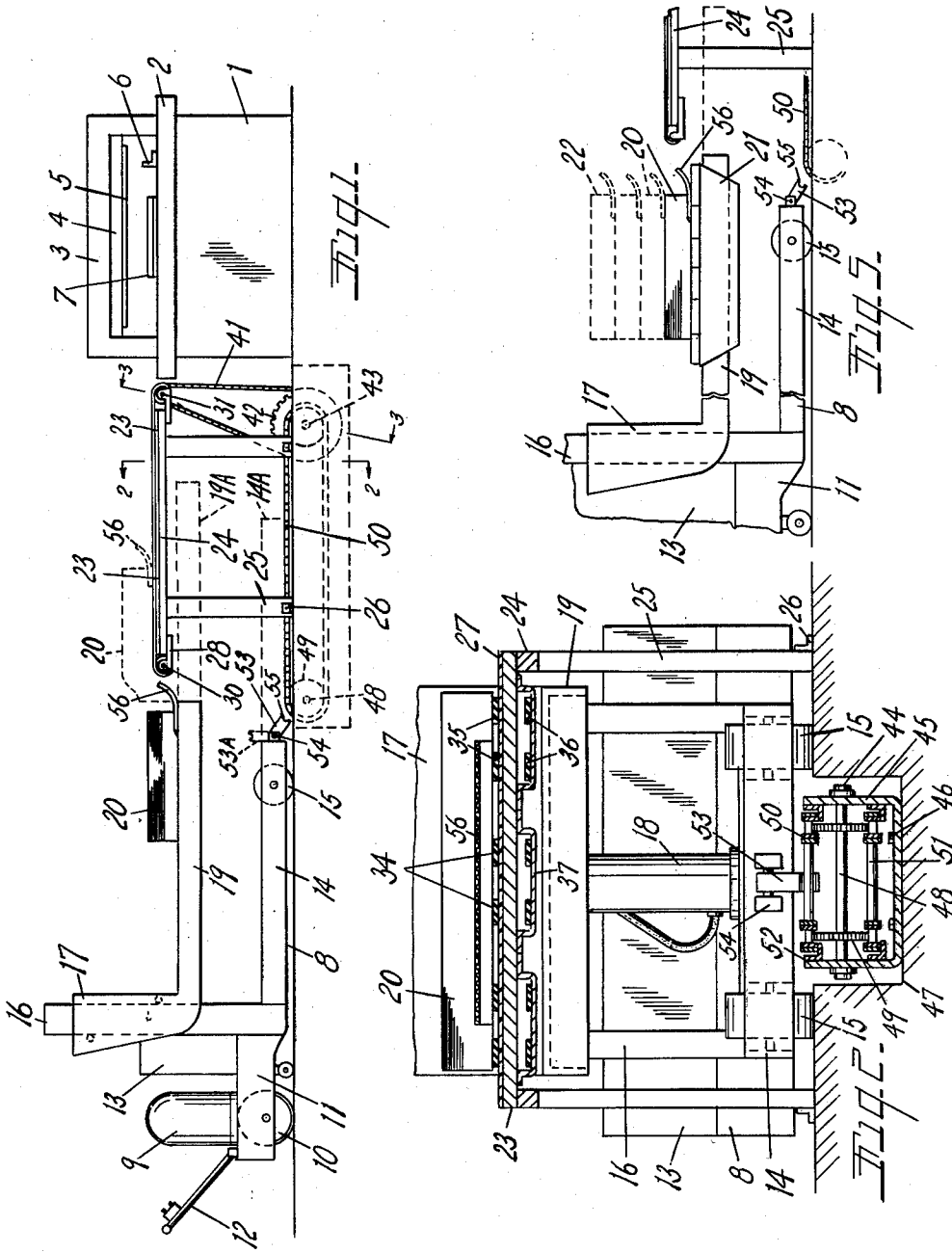
F. B. CURTENIUS ET AL

3,146,897

PAPER PILE SEPARATING AND STACKING TRANSFER APPARATUS

Filed Jan. 11, 1962

3 Sheets-Sheet 1.



INVENTORS
Frederick B. Curtenius
Robert W. Polderman

BY: *Wm. A. Earl*
ATTORNEY.

Sept. 1, 1964

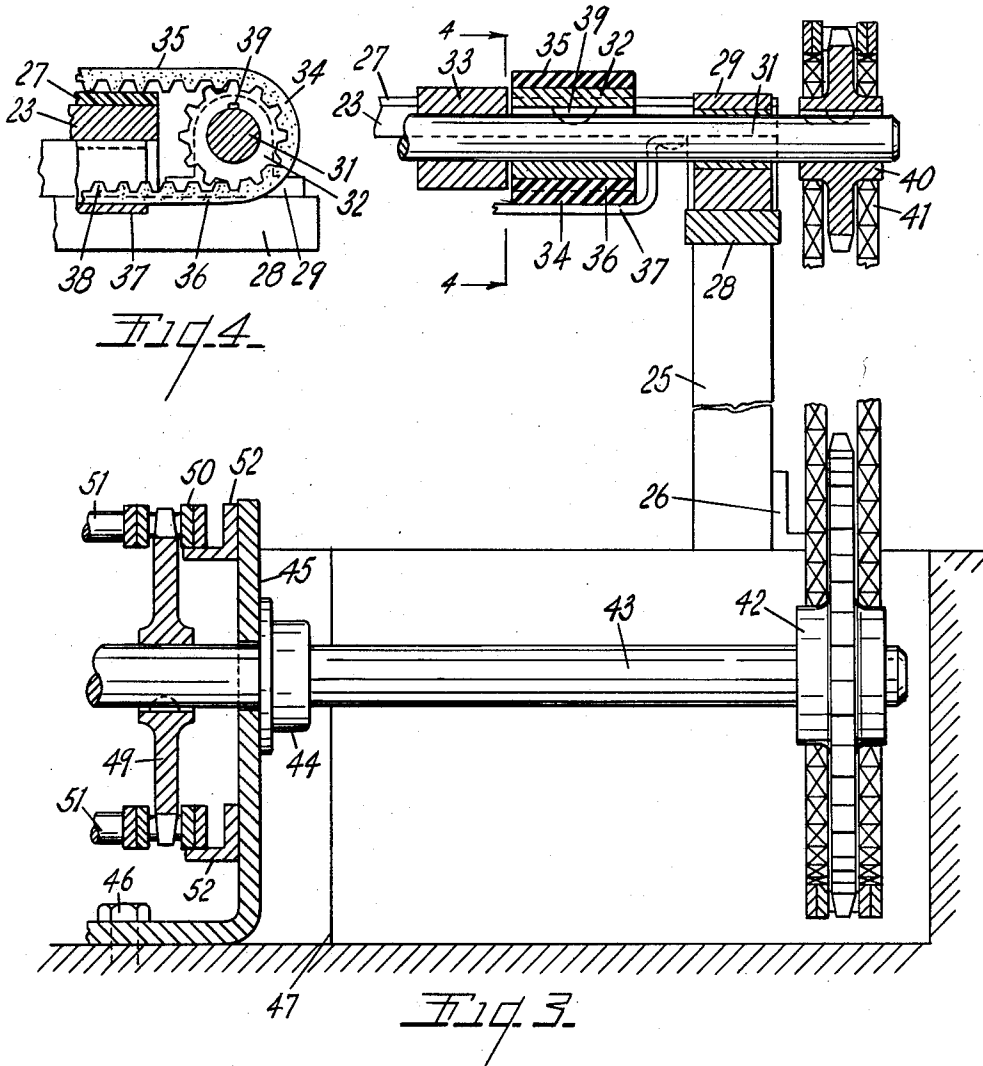
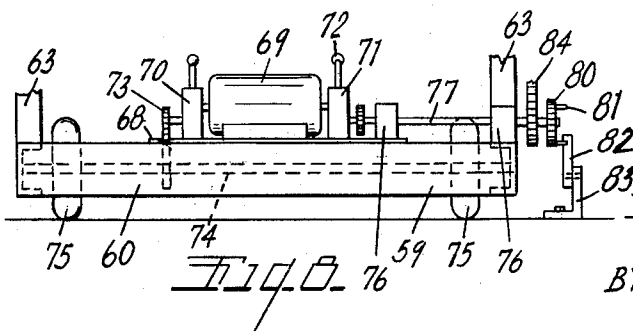
F. B. CURTENIUS ET AL

3,146,897

PAPER FILE SEPARATING AND STACKING TRANSFER APPARATUS

Filed Jan. 11, 1962

3 Sheets-Sheet 2



INVENTOR.
 Frederick B. Curtenius
 Robert W. Polderman
 BY *Charles*
 ATTORNEY

Sept. 1, 1964

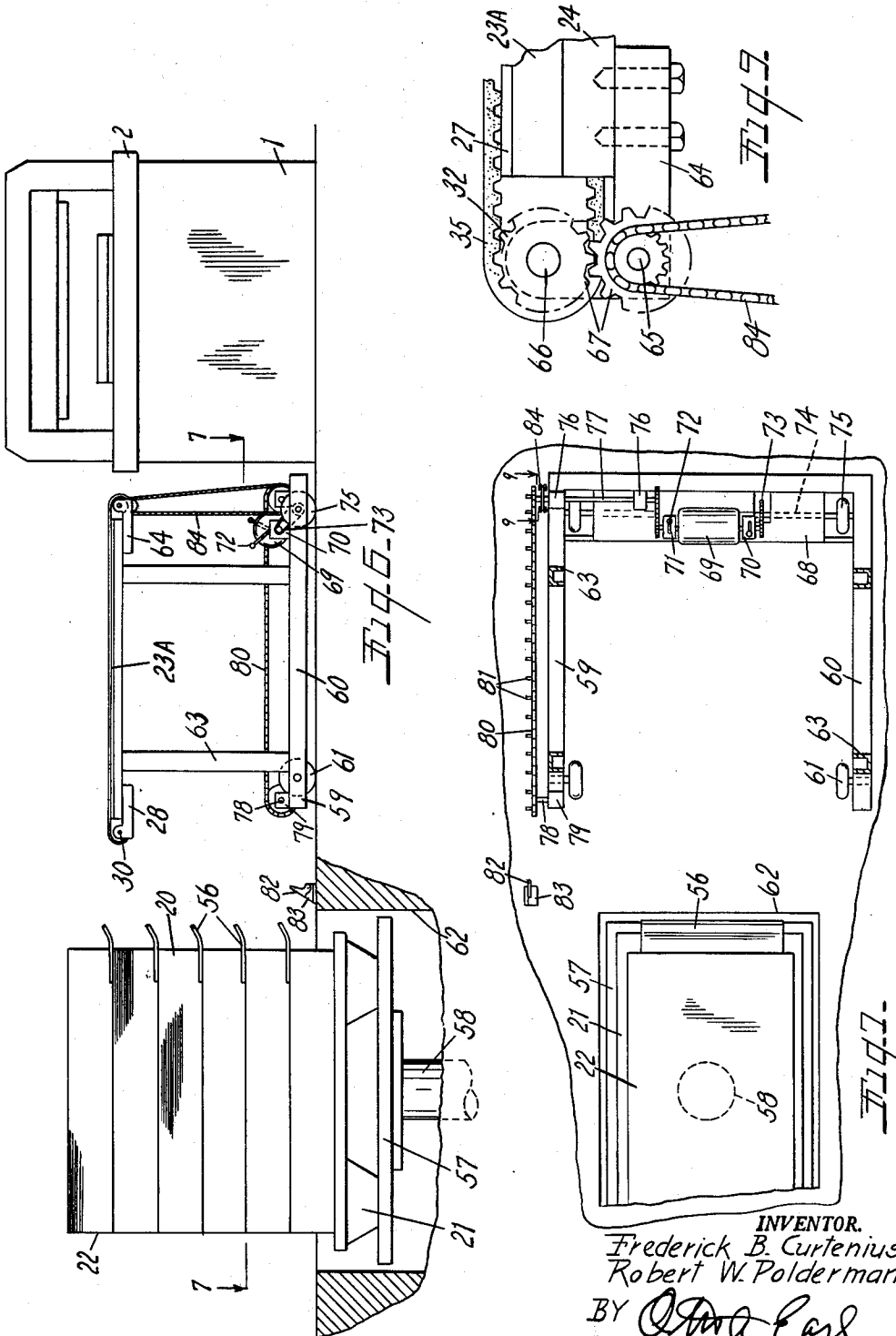
F. B. CURTENIUS ETAL

3,146,897

PAPER PILE SEPARATING AND STACKING TRANSFER APPARATUS

Filed Jan. 11, 1962

3 Sheets-Sheet 3



INVENTOR.
Frederick B. Curtenius
Robert W. Polderman
BY *Orin Earl*
ATTORNEY.

1

2

3,146,897 PAPER PILE SEPARATING AND STACKING TRANSFER APPARATUS

Frederick B. Curtenius and Robert W. Polderman, Kalamazoo, Mich., assignors to Kalamazoo Paper Company, Kalamazoo, Mich.

Filed Jan. 11, 1962, Ser. No. 165,587
16 Claims. (Cl. 214-8.5)

This invention relates to improvements in paper pile separating and stacking transfer apparatus. The principal objects of this invention are:

First, to provide relatively inexpensive and easily operated mechanism for separating a large pile of paper into separate smaller stacks and transferring the stacks individually for separate handling and work upon the stacks.

Second, to provide a transfer apparatus which will advance relative to a pile of paper and separate a portion of the pile into a separate stack and thereafter deliver the stack to a support spaced from the pile for further handling of the stack.

Third, to provide a relatively thin transfer table with spaced belts trained around the top and bottom of the table and connected to be driven equally and oppositely to movement of the table relative to a pile of paper so that the belts will engage and lift a portion of the pile into a separate stack without deranging the sheets of the stack or the sheets remaining in the pile.

Fourth, to provide a novel form of pile separating mechanism including a powered truck with a vertically adjustable hoist which will translate a pile of paper to a transfer table with belts trained around the table and advance the pile into lapped relation with the table while driving the belts to elevate a portion of the pile into a separate stack on top of the table, the motor of the truck providing the power for separating the stack from the pile.

Other objects and advantages of the invention will be apparent from a consideration of the following description and claims.

The drawings, of which there are three sheets, illustrate a highly practical form of the pile separating and transfer apparatus and one modified form thereof.

FIG. 1 is a side elevational view illustrating a first form of the apparatus of the invention.

FIG. 2 is a fragmentary vertical cross sectional view taken along the plane of the line 2-2 in FIG. 1.

FIG. 3 is a fragmentary vertical cross sectional view taken along the plane of the line 3-3 in FIG. 1.

FIG. 4 is a fragmentary longitudinal cross sectional view through the belt drive and supporting table of the transfer mechanism taken along the plane of the line 4-4 in FIG. 3.

FIG. 5 is a fragmentary side elevational view illustrating a modified use of the apparatus shown in FIG. 1.

FIG. 6 is a fragmentary side elevational view partially broken away and in section of a modified form of the separating and transfer apparatus.

FIG. 7 is a fragmentary horizontal cross sectional view taken along the plane of the line 7-7 in FIG. 6.

FIG. 8 is an enlarged fragmentary end elevational view of the lower portion of the transfer carriage in FIGS. 6 and 7.

FIG. 9 is an enlarged fragmentary end elevational view of the upper portion of the transfer carriage viewed from the plane of the line 9-9 in FIG. 7.

In the manufacture of many types of paper continuous webs of the paper stock are cut into roughly sized sheets which are accumulated in small stacks and further accumulated in large piles for further handling such as inspection, trimming and shipping. As used herein the

term "stack" implies a relatively small stack of sheets of from five to ten inches in thickness, while the term "pile" implies a much higher pile composed of several stacks of sheets. Since the sheets are often relatively large, a stack is that quantity of paper which can be handled manually by one or two men and which can be operated upon by trimming machines to simultaneously trim the edges of the sheets in the stack. The separating and transfer apparatus of the invention is especially useful for delivering stacks of paper to a paper trimmer, but may be used in conjunction with other operations in the handling of paper.

FIG. 1 illustrates conventionally a paper trimmer having a base 1, a back table 2 adapted to receive a stack of rough sized sheets and a yoke or cross beam 3 supporting a clamp 4 and knife 5. The back table 2 commonly supports a side guide 6 and an adjustable back guide 7 for locating the edges of a stack of paper in desired relationship to the clamp and knife. The construction and operation of paper trimmers is well known so the structure is not disclosed in greater detail.

The reference numeral 8 indicates generally an industrial truck which is also of commercially available form and which includes a power unit 9 operating a driving wheel 10 mounted on a carriage 11. The power unit and drive wheel are steerable by means of the handle 12 and a battery for furnishing power to the power unit is indicated at 13. The carriage 11 includes a forwardly projecting support beam 14 with laterally spaced rollers 15 mounted thereon and an upwardly projecting framework 16 forming a guide for the vertically adjustable carriage slide 17. The carriage slide 17 is vertically adjustable by means of an upright cylinder and piston 18 and carries a forwardly projecting platform hoist 19 which may be lowered over the support beam 14 and rollers 15 to project under skids and other loads to be lifted. As stated, the truck and hoist is commercially available and is therefore not described in greater detail. The truck or a similar truck having a vertically adjustable hoist may be used to move about a paper mill to pick up a single stack of paper 20 or as is shown in FIG. 5 a pallet 21 supporting a pile 22 of paper consisting of several stacks 20.

The apparatus for transferring the stacks 20 separately and individually to the trimmer bed 2 consists of a transfer table 23 supported upon side rails 24 and legs 25 which are secured to the floor as by means of clips 26. The table 23 is a relatively heavy metal plate of sufficient strength to support the stack of paper without underbracing so that the space underneath the table is unobstructed to receive the hoist 19 as indicated by the dotted lines at 19A and the support beam 14 as indicated at 14A in FIG. 1. Desirably the top of the table 3 is provided with a thin antifriction surface such as the layer 27 of synthetic resin board.

Projecting from each end of the side rails 24 is a short bearing bracket 28 supporting a bearing 29 for a front cross shaft 30 and a back cross shaft 31. The shafts 30 and 31 support elongated gears 32 of relatively small diameter at laterally spaced positions across the width of the table 23. Spacing sleeves 33 may be provided between the gears. The gears 32 serve to rotatably support belt loops 34 with upper reaches 35 supported along the top of the table and with the lower reaches 36 extending closely along the underside of the table. Desirably U-shaped hanger troughs 37 secured to the bottom of the table support the lower reaches of the belts so that the hoist platform 19 may advance in closely spaced relationship below the table and the bottoms of the belts. The belts 34 have teeth 38 on their inner sides which drivingly engage the gears 32 and which are desirably made of material having a low coefficient of friction with the table

top 27. Timing belts having nylon teeth are particularly adapted for this use.

Specifically the gears 32 on the rear cross shaft 31 are drivingly keyed to the shaft as at 39 and the end of the shaft 31 is provided with a sprocket 40 engaged with a chain 41 for driving the shaft and the belts. The chain 41 extends downwardly to a large sprocket 42 mounted on a shaft 43 located in a pit below the floor level. The shaft 43 is rotatably supported by bearings 44 in the side walls 45 of an elongated channel shaped drive frame secured to the bottom of the pit as by the screws 46 and extending longitudinally below the table for the full length of the table. With reference to FIG. 2, it will be noted that the pit 47 is located centrally of the table leaving roll space for the supporting rollers 15 on the support beam of the truck carriage. In addition to the shaft 43 at the rear end of the drive frame the frame supports a forward shaft 48 and the shafts 43 and 48 support laterally spaced sprockets 49. Chain loops 50 are trained around the sprockets 49 with transversely extending drive bars 51 connected between the chain loops at spaced intervals. Specifically the upper reaches of the chain loops 50 are supported by angle rails 52 slightly above the level of the floor.

The forward end of the support beam 14 on the powered truck carries a drive pawl 53 which is pivotally supported at 54 to hang downwardly below the level of the beam 14 but above the level of the floor. The forward end of the pawl is notched as at 55 to engage the first drive bar 51 on the chain loops as the truck advances toward the drive frame. When not in use for transfer operations, the pawl 53 may be swung upwardly as indicated by the dotted lines at 53A so the truck may be used for other purposes.

The operation of the transfer mechanism is as follows. The single or plural stacks 20 of paper are placed on the hoist 14 near the forward edge thereof and a strip of relatively stiff but flexible fiber board 56 such as corrugated box board is placed underneath the leading edge of the stack and bent upwardly. These strips 56 may be put in place as the hoist or pallet is loaded or may be put in place successively as each stack 20 is uncovered as the stack is of a thickness which can be easily lifted up at one edge for insertion of the separator strip.

With the separator strip 56 in place, the hoist 19 is raised to just below the level of the supporting troughs 37 and the drive pawl 55 is lowered and the truck is advanced under its own power toward the front end of the table 23 and the front cross shaft 30. The notch 55 of the drive pawl engages one of the drive rods 51 and starts to rotate the chain loops 50 and the shaft 43 at the rear of the drive frame. Simultaneously or shortly after engagement of the drive pawl 53, the flexible separator sheet 56 contacts the leading end of the belt loops 34. The driving engagement of the chain 41 between the shaft 43 and shaft 31 is arranged and proportioned so that the belts 34 are driven upwardly and rearwardly at their front end around the front shaft 30 at the same speed as the advancing motion of the truck and the pawl 53. As a result the belts engage and lift the separator board 56 and the rear or meeting edge of the stack 20 without imparting any longitudinal force to the stack or the sheets thereof. As successive portions of the stack are elevated to the upper reaches of the belts 34, the belts advance with the supported portion of the stack at the same speed that the hoist 19 advances the rear portion of the stack. The stack is thus progressively and completely separated from the subadjacent platform or stack of a pile and the truck can then be retracted from underneath the table. During retracting motion of the truck the drive pawl 53 slides or ratchets over the drive rods 51 so the belts 34 and the separated stack remain stationary on the table. A second advancing motion of the truck and the drive pawl 53 will further rotate the drive chains 50 and the belts 34 to feed the first stack 20

off of the table and onto the back table 2 of the trimmer. If a second stack 20 is in position on the hoist 19 it will simultaneously be separated from the hoist and transferred onto the table behind the first stack.

FIGS. 6 through 9 illustrate a modified form of the pile separator and stack transfer apparatus. A skid 21 bearing the pile 22 of separate stacks of paper 20 is conveyed by any suitable means such as a fork lift truck to the platform 57 of a hoist 58 mounted in the floor in spaced relation to the receiving device such as the trimmer 1. The separate stacks 20 may be partially separated by prelocated separator strips 56 or the strips may be inserted below each stack as the stacks are successively separated and transferred. A wheeled carriage 59 is positioned to roll between the pile and the trimmer successively separating and transferring individual stacks from the pile as will be described.

The carriage 59 consists of a horizontally U-shaped base 60 with supporting wheels 61 spaced apart to straddle and roll alongside the pit 62 in which the hoist is located. Four upright legs 63 on the frame support a table 23A which is essentially the same as the first form of the table 23 slightly above the level of the bed 2 of the trimmer. The table 23A includes the same rigid load supporting plate and smooth antifriction surface 27 carried on side rails 24. The ends of the side rails carry bearing brackets 28 at their rear end which support a cross shaft 30 the same as in FIG. 1. At the front end of the table modified brackets 64 support a lower cross shaft 65 and a vertically spaced upper cross shaft 66 (See FIG. 9). The shafts 65 and 66 are drivingly connected by meshing gears 67 and the upper shaft 66 carries the same laterally spaced belt driving gears 32 as in the first form of the invention. Belts 35 are trained around the shafts 66 and 30 to separate and transfer the stacks of paper.

At the closed front end of the U-shaped base 60 there is provided a platform 68 supporting a motor 69 drivingly connected to two selectively engageable and disengageable gear boxes or transmissions 70 and 71 having regulating levers or controls 72. The gear box 70 selectively drives a chain 73 connected to an axle 74 on which the front wheels 75 of the carriage are mounted to retract the carriage over the pit 62 or advance it to the side of the trimmer.

Mounted on one end of the base 60 by means of bearing blocks 76 is a drive shaft 77 projecting to the outer side of the base 60. A stub shaft 78 mounted on the rear end of the carriage in the bearing block 79 supports a sprocket cooperating with a sprocket on the shaft 77 to rotatably support the chain loop 80. The chain 80 has a plurality of driving lugs 81 projecting therefrom and as the carriage 59 retracts toward the pile 22 one of the lugs 81 is engaged by a pawl 82 pivotally mounted on the bracket 83. The bracket 83 is fixed to the floor alongside of the pit 62 and engagement of the pawl 82 with a lug 81 causes the chain loop 80 to rotate on the carriage as the carriage is retracted over the hoist. Rotation of the chain loop 80 is transmitted through a sprocket on the shaft 77 to the upwardly extending chain 84 to drive the meshed gears 67 and the belt loops 35. The chain loop 80 and the driving connections to the shaft 66 are proportioned to produce forward translation of the belts 35 on the table equal and opposite to the rearward lineal motion of the carriage so that the belts function as in the first form of the invention to engage and lift one of the separator plates 56 and the top stack of paper from the pile without displacement of the stack or the subadjacent pile transversely of the skid 21.

When it is desired to off-load or transfer the stack from the table 23A the control 72 of the gear box 71 is actuated to drive the shaft 77 from the motor 69 and thereby rotate the chain 84 and the connected belt loops 35. Normally the belt loops 35 will be rotated forwardly to translate the stack onto the trimmer, but with the revers-

able gear box 71 it is possible to discharge the stack rearwardly off of the same end of the table over which the stack was received.

With either form of the transfer apparatus the individual stacks of paper are effectively separated from subadjacent stacks in a pile or from a supporting platform without deranging either the stack or the pile. The stack is uniformly and solidly supported on the transfer table and can be moved thereacross without the necessity of providing an air film surface on the table such as is necessary with other transfer devices. The same structure which separates and picks up the stack of paper functions to discharge or transfer the stack to the desired receiving platform.

What is claimed as new is:

1. Paper pile separating and stack transfer apparatus comprising,
 - a powered truck having a flat hoist projecting therefrom and adapted to support a plurality of stacks of paper arranged in a pile and at vertically adjustable levels,
 - a push pawl pivotally mounted on the end of said truck approximately under the edge of said hoist and having a forwardly facing notched end yieldably supported between the level of the bottom of the truck and the floor,
 - a transfer table having supporting legs secured to the floor in spaced apart relation to receive said hoist and the forward end of said truck therebetween,
 - a thin low friction plate supported upon said table, transverse shafts mounted along the front and rear edges of said table,
 - gears on said shafts having a diameter approximately equal to the thickness of said table and plate,
 - a plurality of belts trained around said shafts with reaches extending along the top and bottom of the table,
 - low friction nylon teeth on the inner sides of said belts and meshed with said gears,
 - thin supporting troughs secured to the bottom of said table supporting the lower reaches of said belts,
 - an elongated drive frame mounted in a pit provided therefor between said legs and longitudinally of said table,
 - shafts supported at the ends of said drive frame and having spaced sprocket thereon,
 - chain loops trained around said sprockets with an upper reach disposed above the level of the floor,
 - a plurality of drive bars connected to said chains and extending therebetween in the path of said pawl to be engaged and advanced by the pawl as said truck advances over said frame and chains,
 - and chain and sprocket means connecting one of said shafts on said frame to the rear one of said shafts on said table,
 - said chain and sprocket means being proportioned to drive said belts from said table mounted shaft at the same lineal speed as the speed of said chain loops and drive bars,
 - and a smooth anti-friction air filmed surface having an edge positioned adjacent and a little below the rear end of said table and said belts to receive stacks of paper advanced off of said table by said belts.
2. Paper pile separating and stack transfer apparatus comprising,
 - a powered truck having a flat hoist projecting therefrom and adapted to support a plurality of stacks of paper arranged in a pile and at vertically adjustable levels,
 - a push pawl pivotally mounted on the end of said truck and having a forwardly facing end yieldably supported between the level of the bottom of the truck and the floor,
 - a transfer table having supporting legs secured to the floor in spaced apart relation to receive said hoist and the forward end of said truck therebetween,

- transverse shafts mounted along the front and rear edges of said table,
- gears on said shafts having a diameter approximately equal to the thickness of said table,
- a plurality of belts trained around said shafts with reaches extending along the top and bottom of the table,
- teeth on the inner sides of said belts and meshed with said gears,
- an elongated drive frame mounted in a pit provided therefor between said legs and longitudinally of said table,
- shafts supported at the ends of said drive frame and having spaced sprockets thereon,
- chain loops trained around said sprockets with an upper reach disposed above the level of the floor,
- a plurality of drive bars connected to said chains and extending therebetween in the path of said pawl to be engaged and advanced by the pawl as said truck advances over said frame and chains,
- and chain and sprocket means connecting one of said shafts on said frame to one of said shafts on said table,
- said chain and sprocket means being proportioned to drive said belts from said table mounted shaft at the same lineal speed as the speed of said chain loops and drive bars,
- and a smooth antifriction surface having an edge positioned adjacent the rear end of said table and said belts to receive stacks of paper advanced off of said table by said belts.
3. Paper pile separating and stack transfer apparatus comprising,
 - a powered truck having a hoist projecting therefrom and adapted to support a plurality of stacks of paper arranged in a pile and at vertically adjustable levels,
 - a push pawl mounted on the end of said truck and having a forwardly facing end supported between the level of the bottom of the truck and the floor,
 - a transfer table having supporting legs secured to the floor in spaced apart relation to receive said hoist and the forward end of said truck therebetween,
 - transverse shafts mounted along the front and rear edges of said table,
 - gears on said shafts having a diameter approximately equal to the thickness of said table,
 - a plurality of belts trained around said shafts with reaches extending along the top and bottom of the table,
 - teeth on the inner sides of said belts and meshed with said gears,
 - an elongated drive frame mounted in a pit provided therefor between said legs and longitudinally of said table,
 - shafts supported at the ends of said drive frame and having sprockets thereon,
 - a chain loop trained around said sprockets with an upper reach disposed above the level of the floor,
 - a plurality of drive bars connected to said chain and extending therefrom in the path of said pawl to be engaged and advanced by the pawl as said truck advances over said frame and chain,
 - and a drive connection connecting one of said shafts on said frame to one of said shafts on said table, said drive connection being proportioned to drive said belts from said table mounted shaft at the same lineal speed as the speed of said chain loop and drive bars.
4. Paper pile separating and stack transfer apparatus comprising,
 - a powered truck having a hoist projecting therefrom and adapted to support a plurality of stacks of paper arranged in a pile and at vertically adjustable levels,
 - a push pawl mounted on the end of said truck and having a forwardly facing end supported between the level of the bottom of the truck and the floor,

a transfer table having supporting legs secured to the floor in spaced apart relation to receive said hoist therebetween,
 transverse shafts mounted along the front and rear edges of said table,
 gears on said shafts,
 a plurality of belts trained around said shafts with reaches extending along the top and bottom of the table,
 teeth on the inner sides of said belts and meshed with said gears,
 an elongated drive frame mounted in a pit provided therefor between said legs and longitudinally of said table,
 shafts supported at the ends of said drive frame and having sprockets thereon,
 a chain loop trained around said sprockets with an upper reach disposed above the level of the floor,
 a plurality of drive bars connected to said chain and extending therefrom in the path of said pawl to be engaged and advanced by the pawl as said truck advances over said frame and chain,
 and a drive connection connecting one of said shafts on said frame to one of said shafts on said table, said drive connection being proportioned to drive said belts from said table mounted shaft at the same lineal speed as the speed of said chain loop and drive bars.

5. Paper stack transfer apparatus comprising,
 a powered truck having a hoist projecting therefrom and adapted to support a stack of paper at vertically adjustable levels,
 a push pawl pivotally mounted on the end of said truck and having a forwardly facing end yieldably supported between the level of the bottom of the truck and the floor,
 a transfer table having supporting legs secured to the floor in spaced apart relation to receive said hoist and the forward end of said truck therebetween,
 transverse shafts mounted along the front and rear edges of said table,
 gears on said shafts having a diameter approximately equal to the thickness of said table,
 a plurality of belts trained around said shafts with reaches extending along the top and bottom of the table,
 teeth on the inner sides of said belts and meshed with said gears,
 an elongated drive frame mounted in a pit provided therefor between said legs and longitudinally of said table,
 shafts supported at the ends of said drive frame and having spaced sprockets thereon,
 chain loops trained around said sprockets with an upper reach disposed above the level of the floor,
 a plurality of drive bars connected to said chains and extending therebetween in the path of said pawl to be engaged and advanced by the pawl as said truck advances over said frame and chains,
 and a drive connection connecting one of said shafts on said frame to one of said shafts on said table, said drive connection being proportioned and arranged to drive said belts from said table mounted shaft at the same lineal speed as the speed and same direction as said chain loops and drive bars.

6. Paper stack transfer apparatus comprising,
 a powered truck having a hoist projecting therefrom and adapted to support a stack of paper at vertically adjustable levels,
 a push pawl mounted on the end of said truck and having a forwardly facing end supported above the floor,
 a transfer table having supporting legs arranged in spaced apart relation to receive said hoist therebetween,

transverse shafts mounted along the front and rear edges of said table,
 gears on said shafts,
 a plurality of belts trained around said shafts with reaches extending along the top and bottom of the table,
 teeth on the inner sides of said belts and meshed with said gears,
 an elongated drive frame mounted between said legs and longitudinally of said table,
 shafts supported at the ends of said drive frame and having sprockets thereon,
 a chain loop trained around said sprockets,
 a plurality of drive bars connected to said chain and extending into the path of said pawl to be engaged and advanced by the pawl as said truck advances over said frame and chain,
 and a drive connection connecting one of said shafts on said frame to one of said shafts on said table, said drive connection being proportioned and arranged to drive said belts from said table mounted shaft at the same lineal speed as the speed and same direction as said chain loop and drive bars.

7. Apparatus for dividing a pile of paper into separate stacks and successively advancing the individual stacks comprising,
 a vertically adjustable platform for supporting said pile,
 a table having a support adapted to straddle said platform and support the table over the platform,
 means for moving said platform and said support longitudinally relative to each other between overlapping and non-overlapping relation of said table to said platform,
 shafts rotatably supported adjacent the ends of said table and having small diameter gears thereon approximately as thick as said table,
 a plurality of belts trained over said gears with an upper reach supported on the top of the table and a lower reach extending below the table,
 teeth on the inner sides of said belts meshed with said gears,
 a chain rotatably supported in a loop fixed relative to said support for said table and having lugs thereon,
 a pawl fixed longitudinally relative to said platform and engageable with the lugs on said chain upon relative converging movement of said platform and said support for said table to rotate said chain loop at a lineal rate and distance equal to the relative movement,
 and drive means connected between said chain loop and one of said shafts on said table to drive the belts on the table equally to said converging relative movement with the upper reaches of the belts moving on said table in the same direction as the movement of the platform relative to the table.

8. Apparatus for dividing a pile of paper into separate stacks and successively advancing the individual stacks comprising,
 a vertically adjustable platform for supporting said pile,
 a table having a support adapted to support the table over the platform,
 means for moving said platform and said support longitudinally relative to each other between overlapping and non-overlapping relation of said table to said platform,
 shafts rotatably supported adjacent the ends of said table and having small diameter gears thereon approximately as thick as said table,
 a plurality of belts trained over said gears with an upper reach supported on the top of the table and a lower reach extending below the table,
 teeth on the inner sides of the said belts meshed with said gears,

9

a chain rotatably supported in a loop fixed relative to said support for said table and having lugs thereon, a pawl fixed longitudinally relative to said platform and engageable with the lugs on said chain upon relative converging movement of said platform and said support for said table to rotate said chain loop at a lineal rate equal to the relative movement, and drive means connected between said chain loop and one of said shafts on said table to drive the belts on the table equally to said converging relative movement with the upper reaches of the belts moving on said table in the same direction as the movement of the platform relative to the table.

9. Apparatus for dividing a pile of paper into separate stacks and successively advancing the individual stacks comprising,

- a vertically adjustable platform for supporting said pile,
- a table having a support adapted to support the table over the platform,
- means for moving said platform and said support longitudinally relative to each other between overlapping and non-overlapping relation of said table to said platform,
- shafts rotatably supported adjacent the ends of said table and having gears thereon,
- a plurality of belts trained over said gears with an upper reach supported on the top of the table and a lower reach extending below the table,
- teeth on the inner sides of said belts meshed with said gears,
- a chain rotatably supported in a loop fixed relative to said support for said table and having lugs thereon,
- a pawl fixed longitudinally relative to said platform and engageable with the lugs on said chain upon relative converging movement of said platform and said support for said table to rotate said chain loop at a lineal rate equal to the relative movement.
- and a drive connection connected between said chain loop and one of said shafts on said table to drive the belts on the table equally to said relative converging movement with the upper reaches of the belts moving on said table in the same direction as the relative movement of the platform with respect to the table, whereby said belts will engage and lift and advance a separator sheet inclined upwardly from the under the front edge of a stack on said platform and progressively lift the stack from its front edge onto the table.

10. Apparatus for transferring a stack of paper comprising,

- a vertically adjustable platform for supporting said stack,
- a table having a support adapted to support the table over the platform,
- means for moving said platform and said support longitudinally relative to each other between overlapping and non-overlapping relation of said table to said platform,
- shafts rotatably supported adjacent the ends of said table and having gears thereon,
- a plurality of belts trained over said gears with an upper reach supported on the top of the table and a lower reach extending below the table,
- teeth on the inner sides of said belts meshed with said gears,
- a chain rotatably supported in a loop fixed relative to said support for said table and having lugs thereon,
- a pawl fixed longitudinally relative to said platform and engageable with the lugs on said chain upon relative converging movement of said platform and said support for said table to rotate said chain loop at a lineal rate equal to the relative movement,
- and a drive connection connected between said chain loop and one of said shafts on said table to drive the

10

belts on the table equally to said relative converging movement with the upper reaches of the belts moving on said table in the same direction as the relative movement of the platform with respect to the table, whereby said belts will engage and lift and advance a separator sheet inclined upwardly from under the front edge of a stack on said platform and progressively lift the stack from its front edge onto the table.

11. Apparatus for transferring a stack of paper comprising,

- a vertically adjustable platform for supporting said stack,
- a table having a support adapted to straddle said platform and support the table over the platform,
- means for moving said platform and said support longitudinally relative to each other between overlapping and non-overlapping relation of said table to said platform,
- shafts rotatably supported adjacent the ends of said table,
- one of said shafts having gears thereon,
- a plurality of belts trained over said shafts with an upper reach supported on the top of the table and a lower reach extending below the table,
- teeth on the inner sides of said belts meshed with said gears,
- a driven member having a support fixed relative to said table and being movable on said support relative to the table,
- a lug on said driven member.
- a pawl fixed longitudinally relative to said platform and engageable with the lug on said driven member upon relative converging movement of said platform and said support for said table to move said driven member in proportion to the relative movement,
- and a driving connection connected between said driven member and said one of said shafts on said table to drive the belts on the table equally and oppositely to said relative converging movement.

12. A paper stack transfer device comprising,

- a vertically adjustable support for the stack to be transferred,
- a table to receive the stack,
- a series of belts trained over the top and returning along the bottom of said table from end to end,
- a drive shaft mounted on said table and having a non-slip driving engagement with said belts at the front thereof,
- a mobile support for said table leaving the underside of the table and the leading end of said belt unobstructed,
- a motor on said mobile support connectable to advance the front edge of the table into overlapping relation with said vertically adjustable support,
- a driven chain member rotatably mounted on said mobile support and having lugs projecting therefrom,
- a stop fixedly mounted adjacent said vertically adjustable support and engageable with one of said lugs upon advancing motion of said mobile support,
- a driving connection connected between said driven chain member and said shaft to move said belts rearwardly on the top of said table at the same speed as the advancing motion of said carriage,
- and a selectively engageable drive connection between said motor and said shaft to drive said belts independently of movement of said mobile support.

13. A paper stack transfer device comprising, a vertically adjustable support for the stack to be transferred,

- a table to receive the stack,
- a belt trained over the top and returning along the bottom of said table from end to end,
- a drive shaft mounted on said table and having a non-slip driving engagement with said belt,

11

a mobile support for said table leaving the underside of the table and the leading end of said belt unobstructed,

a motor on said mobile support connectable to advance the front edge of the table into overlapping relation with said vertically adjustable support,

a driven member rotatably mounted on said mobile support and having a lug projecting therefrom,

a stop fixedly mounted adjacent said vertically adjustable support and engageable with said lug upon advancing motion of said mobile support,

a driving connection connected between said driven member and said shaft to move said belt rearwardly on the top of said table at the same speed as the advancing motion of said carriage,

and a selectively engageable drive connection between said motor and said shaft to drive said belt independently of movement of said mobile support.

14. Paper stack transfer apparatus comprising a table having a smooth top surface,

means supporting said table with an unobstructed area extending to the floor below the major part of the length of the table,

shafts rotatably supported along the front and back edges of said table,

belt means trained around said shafts with a top reach supported on top of said table across a substantial portion of the width thereof,

a vertically adjustable platform adapted to support a stack of paper with the bottom of the stack just below the level of the bottom reach of said belt means with a flexible guide board projecting outwardly and upwardly therefrom,

means for moving said platform and said table relatively longitudinally between spaced apart position and overlapping position,

means drivingly connecting said belt means to one of said shafts,

means forming a one way driving connection to said one shaft responsive to relative movement of said platform and said table to rotate said one shaft and move said belt means at a speed equal to the converging speed of said platform and said table,

and means connectable to said one shaft to rotate the shaft and move the belt means independently of relative movement of said platform and table.

15. Paper stack transfer apparatus comprising a table,

means supporting said table with an unobstructed area extending to the floor below the major part of the length of the table,

shafts rotatably supported along the front and back edges of said table,

belt means trained around said shafts with a top reach supported on top of said table across a substantial portion of the width thereof,

12

a vertically adjustable platform adapted to support a stack of paper with the bottom of the stack just below the level of the bottom reach of said belt means,

means for moving said platform and said table relatively longitudinally between spaced apart position and overlapping position,

means drivingly connecting said belt means to one of said shafts,

and means forming a one way driving connection to said one shaft responsive to relative movement of said platform and said table to rotate said one shaft and move said belt means at a speed equal to the converging speed of said platform and said table.

16. Apparatus for transferring a stack of paper to the bed of a trimmer in separate successive piles comprising, a table,

means arranged to support said table with an unobstructed area extending to the floor below a major portion of the table and with one end of the table in pile transferring relation to the bed of a trimmer, shafts rotatably supported along the front and back end edges of the table,

belt means trained around said shafts and in driving engagement with one of the shafts with the top reach of the belt means supported on the table across a substantial portion of the width thereof,

a vertically adjustable platform adapted to support said stack of paper,

an angled guide board insertable in said stack below an individual pile on top of the stack with an upturned outer edge,

means for moving said platform and said table relatively longitudinally between spaced apart position and overlapping position,

means for forming a one way driving connection to said one shaft responsive to relative movement of said platform and said table toward overlapping position to drive said one shaft and the upper reach of said belt means at a speed approximately equal to the converging speed of the table and platform and in the same direction as the movement of the platform relative to the table,

and means connectable to one of said shafts to drive the shaft and said belt means independently of relative movement of the platform and table.

References Cited in the file of this patent

UNITED STATES PATENTS

1,410,466	Gantvoort	Mar. 21, 1922
1,801,822	Sutherland	Apr. 21, 1931
1,894,778	Mason	Jan. 17, 1933
2,468,055	Gibler	Apr. 26, 1949
3,017,041	Hawkes	Jan. 16, 1962