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Kluge et al.

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[54] **STACKING DEVICE, PARTICULARLY FOR NEWSPAPERS**

[76] Inventors: **Willi Kluge; Reinhard Kluge,** both of D-63 Giessen, Kugelberg 55, Germany

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July 8, 1972 Germany 2233750

[52] **U.S. Cl.** ..... **214/6.5,** 93/93 DP, 214/6 DK, 271/64

[51] **Int. Cl.** **B65g 57/08**

[58] **Field of Search** ..... 214/6 C, 6 DK, 6.5; 93/93 DP; 53/142, 143, 144; 198/32; 271/64, 80

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Primary Examiner—Robert J. Spar
Assistant Examiner—Leslie J. Paperner
Attorney, Agent, or Firm—Woodhams, Blanchard & Flynn

[57] **ABSTRACT**

Stacker especially for items having greater thickness on one side than on the other, such as newspapers. The device receives such materials with same so aligned that the thicker sides are all on the same side with respect to each other, forms partial stacks of such materials, restacks same with the partial stacks alternately reversed and then discharges the materials in a stacked form wherein the stacks are of uniformly vertical height and alignment. The stacker has a pair of operatively rotatable compartmented platens. Means are provided for alternately filling compartments of first one platen and then the other platen, effecting partial rotation of each platen as a compartment of same is filled, emptying said filled compartments while subsequent compartments thereof are being filled and carrying away and further stacking the materials discharged from said platen. The oppositely directed rotation and alternate discharging of said platens onto a single conveyor effects alternately opposite positioning of stacks formed in said platens whereby the greater thickness on one side of the components being stacked will be compensated and a straight rectangular final stack will be built.

12 Claims, 5 Drawing Figures

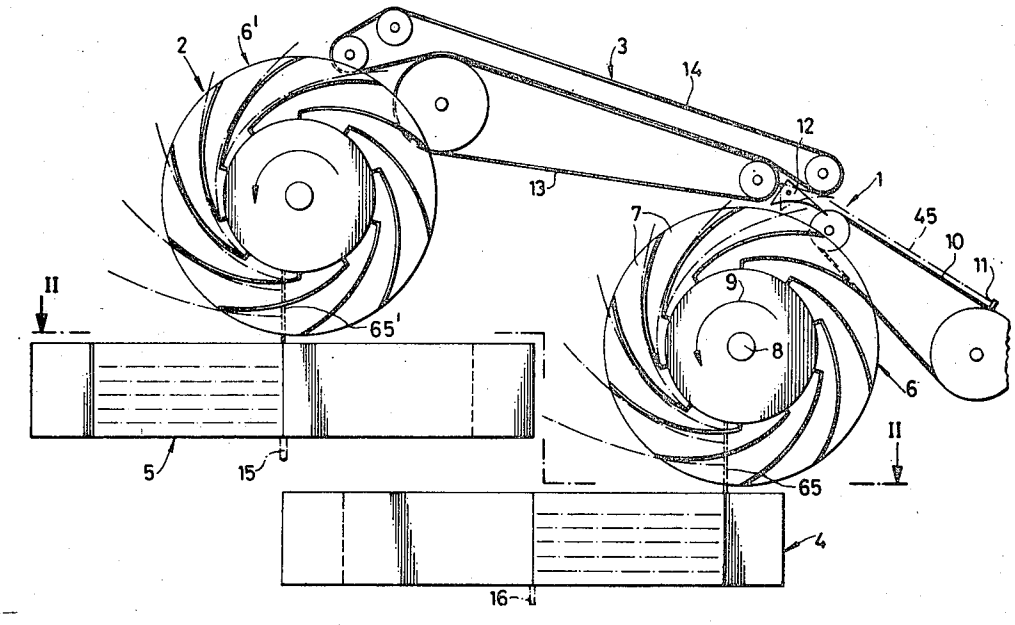


FIG. 1

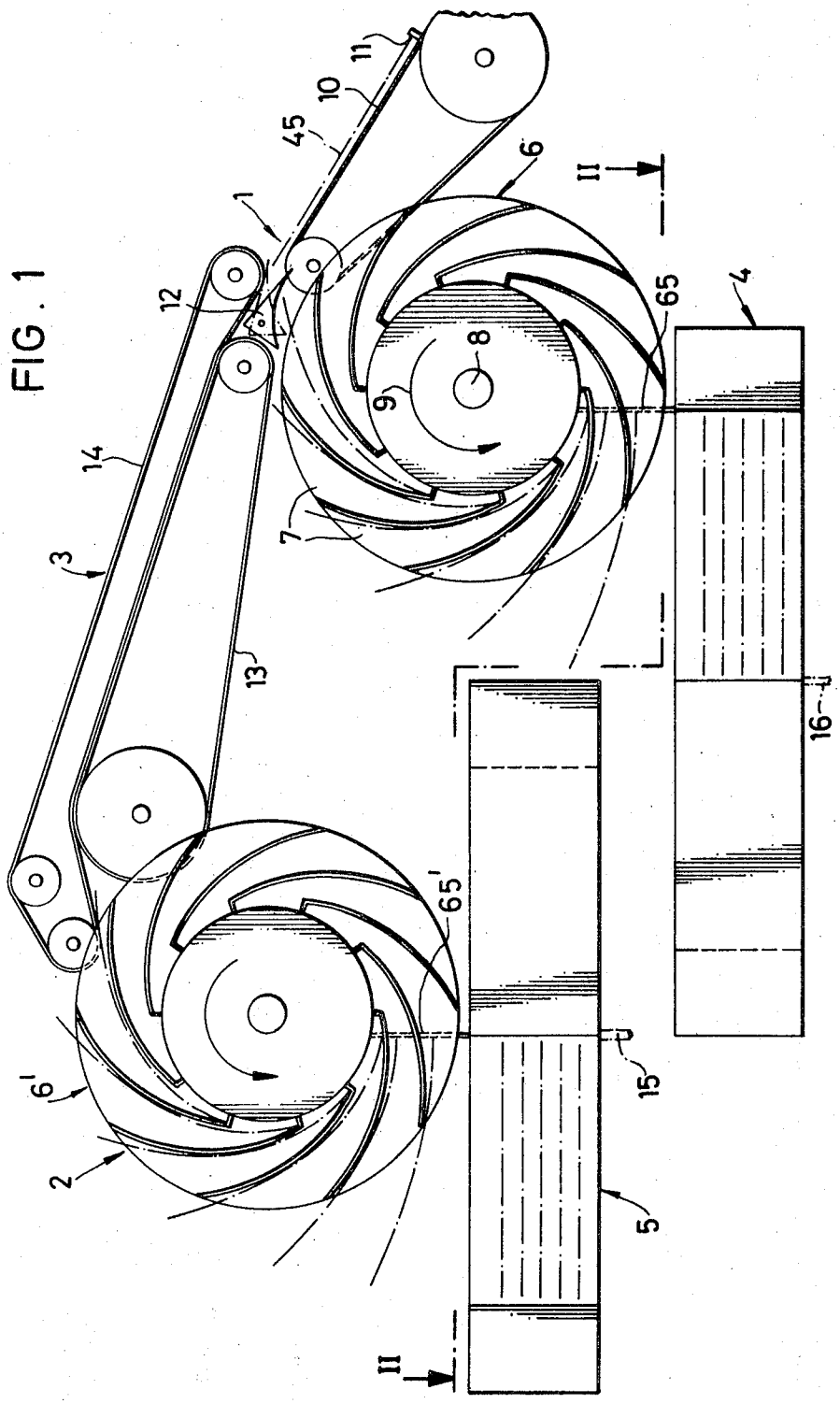
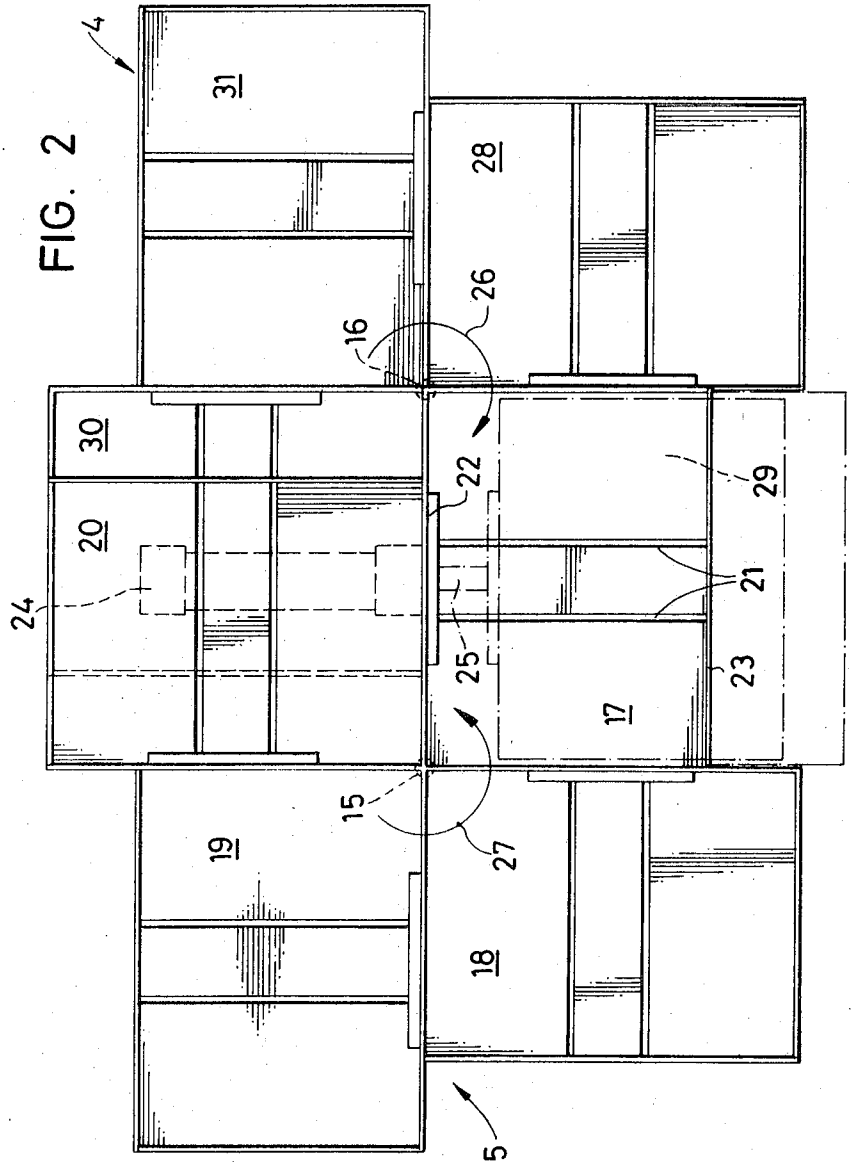


FIG. 2



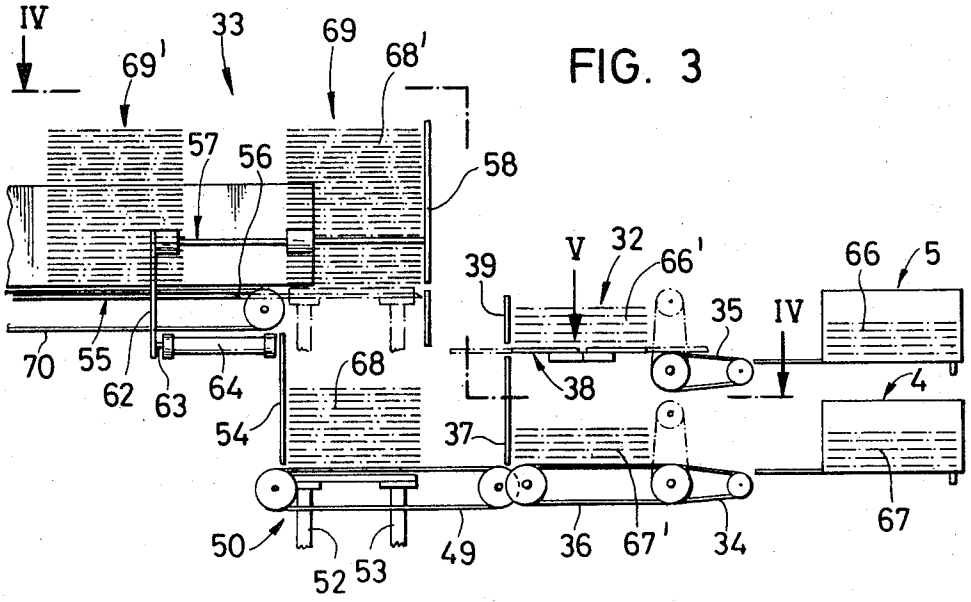

IV
33
69
69'
68'
57
56
58
39
V
32
66'
66
5
35
IV
70
55
62
63
64
68
38
4
54
37
67
50
52
53
49
36
67'
34

FIG. 3

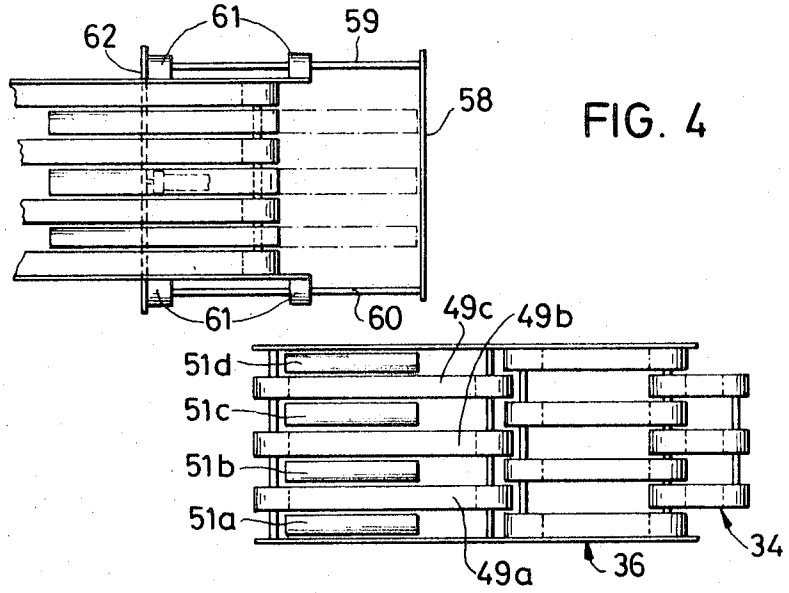
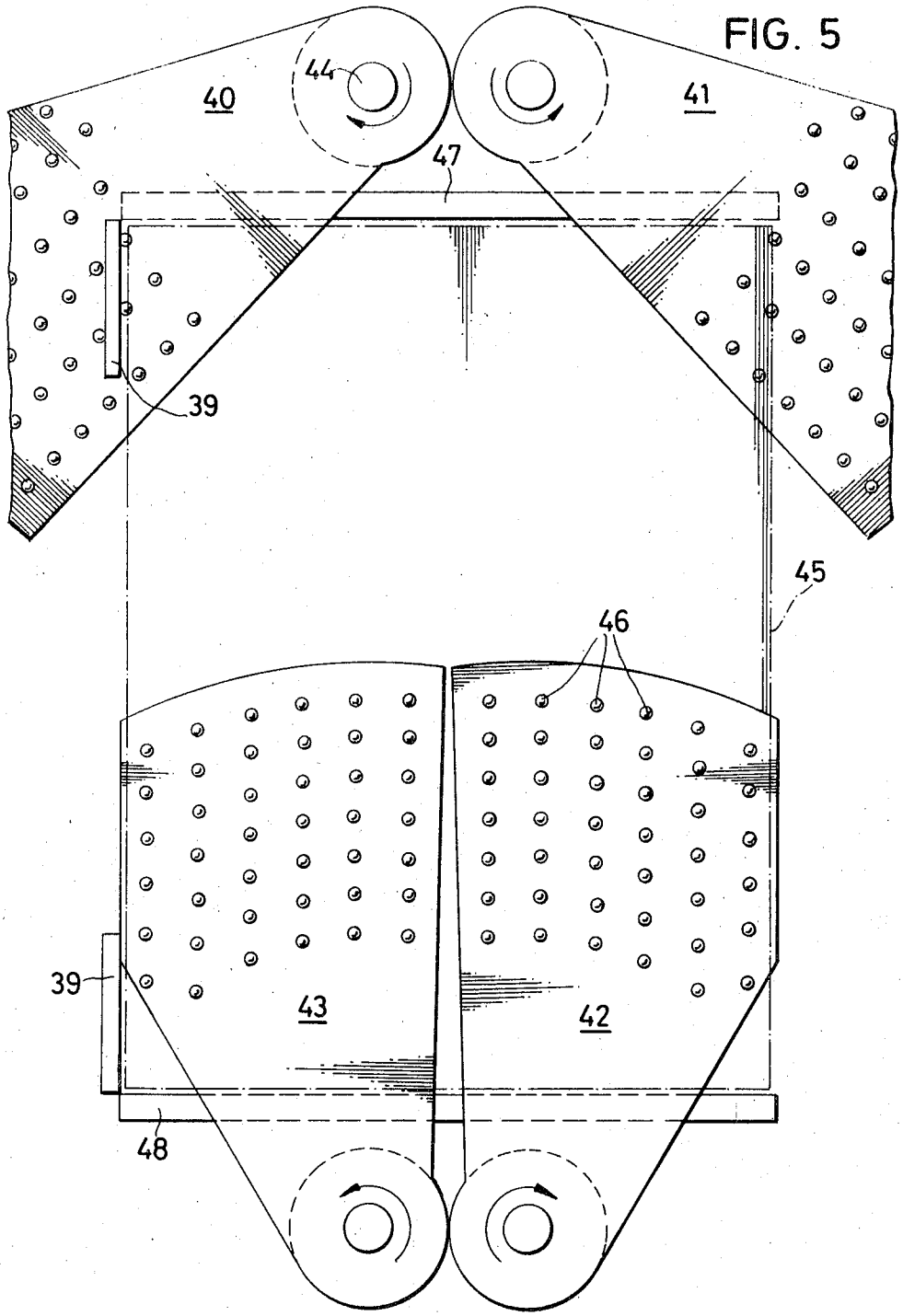

62
61
59
58
61
60
49c
49b
51d
51c
51b
51a
49a
36
34

FIG. 4

FIG. 5



STACKING DEVICE, PARTICULARLY FOR NEWSPAPERS

The invention relates to a stacking device for stacking of articles, particularly newspapers, which are of different thicknesses on the opposite sides, comprising a receiving mechanism for receiving partial stacks and a rotating mechanism for rotating such partial stacks.

Newspapers having a longitudinal and a transverse fold which are of different thicknesses in a newspaper package so that the paper stack which forms the package does not stand rectangularly but is more or less inclined. This makes packaging more difficult. The thicker the individual papers, the thicker is particularly the main fold. In an eight page edition for example 25 papers can be stacked in such a manner that within this partial stack all main folds lie one on top of the other. In building a larger stack from such partial stacks the superposed partial stacks are rotated at 180° with respect to one another. However, in the case of a 96 page edition a partial stack may consist of only five paper units.

Devices of the type mentioned above are known which interrupt the stream of papers so that the individual papers are caught in a support mechanism which can be swung away and consists of a pair of forks. When 25 papers are accumulated, the forks swing to the side after which the partial stack falls into some kind of a receiver. After the partial stack has fallen into the receiver, same is rotated 180°, while at the same time a further 25 papers are collected. These further papers are now also permitted to drop into the receiver, after which same again carries out a 180° rotation. After a sufficiently large stack has been formed, same is ejected by means of an ejecting mechanism. The minimum number of individual papers of a partial stack in which the folds of the individual papers are superposed depends on the one hand on the number of papers supplied per time unit and on the other hand on the time period which is required for dropping the partial stack and the 180° rotation of the receiver. At the delivery speeds existing in practice the minimum number of papers in a partial stack is approximately 25 pieces. This number of pieces is undesirably high inasmuch as for thick papers packaging to an orderly newspaper package is at this point no longer practicable.

The above problem which has been discussed in connection with the stacking of newpapers can also occur in packaging other particles, for example during the packaging of empty file folders or the packaging of stapled printed materials. The problem occurs, however, particularly often during packaging of newspapers because the requirements of rapid delivery make it essential that large numbers of newspapers be packaged in a short period of time.

The basic purpose of the invention is to produce a device of the type mentioned above in which, in spite of a high delivery speed of the individual articles, the partial stacks can be maintained relatively small.

The stacking device of the invention, being of the type mentioned above, is characterized by a rotating mechanism which has two rotary platens arranged at different heights and rotatable stepwise in opposite directions. Each of said rotary platens has at least two pockets for receiving partial stacks, the axes of rotation of which are arranged vertically and which, viewed in ground plan, are spaced from one another in such a manner that each pocket of the upper rotary platen can be made to coincide with one pocket of the lower rotary platen in a delivery position. The apparatus further comprises stationary feed mechanisms for filling the pockets of the rotary platens, which feed mechanisms are arranged above the rotary platens, a deflector device for the alternate feeding of a continuous stream of papers to only one of the feed mechanisms at a time, discharge mechanisms for removing the partial stacks which are provided in the pockets, a lowering mechanism for lowering the upper partial stack onto the lower partial stack and a collecting mechanism for stacking the stack units one on top of the other, which stack units consist of the two aforementioned partial stacks.

In a stacking device so constructed the continuously arriving stream of papers can be processed without interruption because the changing of the deflector device is possible within a very short time period so that upon accumulation of the desired number of papers in one feed mechanism a deflection can take place without interruption to the other feed mechanism. While one feed mechanism is supplied with papers and places same into one pocket of a rotary platen, the other rotary platen rotates with a filled pocket into the delivery position and simultaneously an empty pocket of this rotary platen reaches the filling position. In the meantime a pocket of another rotary platen has been filled, after which the deflector device is quickly switched over the stream of papers is led to the feed mechanism associated with the first-mentioned rotary platen. Since the rotary platens rotate oppositely, the fold sides of the partial stacks are on opposite sides. After ejecting the partial stacks from the rotary platen pockets, the upper partial stack is lowered onto the lower partial stack by means of the lowering mechanism, through which a stack unit is created, and same consists of two partial stacks with oppositely positioned folds. In a collecting mechanism, it is then possible to combine several of such stack units of two partial stacks to one entire stack.

The stacking device of the invention permits therefore the formation of partial stacks with a small number of pieces because it is not here necessary, as in the known devices, to delay one accumulation of papers until an earlier formed partial stack has been removed and the support mechanism has been closed again. At the very high delivery speed which exists in most cases, the time period alone which is needed for merely the opening and closing of the support mechanism is sufficient to cause an accumulation of papers which is greater than desired for many cases.

In an advantageous embodiment of the invention each rotary platen has four pockets which can be moved by 90° rotations thereof successively into the delivery position. The arrangement of four pockets in one rotary platen is possible because the pockets are naturally rectangular and can be joined together conveniently when four pockets are used in one rotary platen. Thus a rotating movement into the delivery position requires only a rotary step of 90°. However, it is also conceivable that the rotary platens may have a different number of pockets, for example two pockets, in which case there will be required a 180° rotation.

The feed mechanisms consist advantageously of compartmented wheels. However, other feed mechanisms

are also conceivable which are suitable to combine successively fed papers to one partial stack.

Further details are defined in the subclaims. One exemplary embodiment of the invention is illustrated in a highly schematized manner in the drawings, in which:

FIG. 1 is a side view of the feed mechanisms and the rotary platens associated therewith,

FIG. 2 is a top view of the rotary platen along the line II—II of FIG. 1,

FIG. 3 is a side view of the lowering mechanism and the collecting mechanism,

FIG. 4 is a top view along the line IV—IV of FIG. 3 and

FIG. 5 is a top view of the lowering mechanism taken in the direction of the arrow V in FIG. 3 in an enlarged scale as compared with FIG. 3.

FIG. 1 illustrates two feed mechanisms 1 and 2, a connecting conveyor 3 between these feed mechanisms and two rotary platens 4 and 5, all so arranged that the rotary platen 4 is associated with the feed mechanism 1 and the rotary platen 5 is associated with the feed mechanism 2.

Each feed mechanism has a compartmented wheel 6 which contains a plurality of compartments 7. The compartmented wheel can be rotated about an axis 8 in the direction of the arrow 9. The feed mechanism 6 is operatively associated with a conveyor belt 10 which is provided with lugs 11. A deflector 12 is positioned adjacent the discharge end of the conveyor belt 10, which deflector can be swung from the position illustrated in full lines into the position illustrated in dash-dotted lines. Following the deflector 12 there is provided the transfer mechanism 3 which consists of a lower belt 13 and an upper belt 14, between which the papers which are to be transported are received and fed to the compartmented wheel 6' of the feed mechanism 2.

The rotary platens 4, 5 are positioned at different heights, the rotary platen 5 being positioned higher than the rotary platen 6 and in the top view (seen in FIG. 2) partly overlaps the rotary platen 4. The rotary platens are rotatable about axes 15 and 16, respectively.

The rotary platens are constructed alike. FIG. 2 illustrates a complete top view of the rotary platen 5 while the rotary platen 4 is partially covered. The rotary platen 5 has a total of four pockets 17, 18, 19, 20 and each of these pockets is of rectangular plan form. All pockets meet at one corner at the axis of rotation 15. Each pocket has two bottom slots 21 and one slide 22 which is guided in the bottom slots 21 and has a stop which projects downwardly through the bottom of the pocket. Each pocket has a tiltable wall 23 which is opposite the wall against which the slide 22 is in the rest position. Below the rotary platen there is provided a hydraulic or pneumatic cylinder 24, the piston rod 25 of which cooperates with the slides 22. The pressure cylinder 24 is mounted stationarily and thus does not rotate with the rotary platen. A corresponding cylinder is also associated with the rotary platen 4.

The rotary platens 15 and 16 are rotated in opposite directions of rotation, namely the rotary platen 4 is rotated in the direction of the arrow 26, here in clockwise direction, and the rotary platen 5 is rotated in the direction of the arrow 27, here in counterclockwise direction. The rotary platen 4 is constructed the same as the rotary platen 5. Its pockets are identified with reference numerals 28 to 31. In FIG. 2 the pocket 29 is completely covered by the pocket 17 of the rotary platen 5.

FIG. 3 only partially illustrates the rotary platens 4 and 5. It shows that a station which as a whole is identified with reference numeral 32 is connected following the rotary platens and that a station identified as a whole with reference numeral 33 is connected following said station 32.

The station 32 has two short conveyor belts 34 and 35 which are arranged one above the other, and the upper sides of which are positioned approximately at the height of the bottoms of the pockets of the rotary platens 4 and 5. A belt 36 is arranged to follow the belt 34, at the left end of which belt 36 there are provided stops 37 which are movable at a right angle to the plane of drawing. A platform which can be swung away and which is identified as a whole with reference numeral 38 is arranged to follow the belt 35, which platform is illustrated in more detail in FIG. 5. A stationary stop 59 is provided at the left end of the platform 38. The belts 34 and 35 can be swung through 90° from the positions illustrated in full lines into the positions illustrated in dash-dotted lines.

From the ground plan as shown in FIG. 4 it can be seen that the belts 34 and 36 each consist of several narrow individual belts. This conveyor belt construction is also utilized for all other belts used in the device, including also the conveyor belts illustrated in side view in FIG. 1.

The platform 38 in FIG. 3 may now be examined more in detail in connection with FIG. 5. The platform is composed of four segments 40 to 43. Each of these segments can be pivoted about a vertical axis which is illustrated by arrows 44 in the drawing. The pivot bearings are provided beyond the storage surface. The storage surface is defined on the left by the stationary stops 39. It is of sufficient size to accommodate the articles, such as for example newspapers 45, which are to be stacked. In each segment there is supported a large number of steel balls 46 which in turn support the articles 45 and which facilitate the segments moving out from under such articles when the segments are swung to the side. Such swinging movement effects the lateral swinging of the platform and corresponds with the arrows 44. The segments 40 to 43 thus move in such a manner that the corners of the articles 45 are supported until the end of the swinging movement.

Guide walls 47 and 48 are arranged in the zone between the underside of the platform 38 and the upper side of the belt 36.

In the station 33 there is provided a lower belt 49, the upper side of which lies in the same horizontal plane as the upper side of the platform 36. Below the belt 49 is arranged a lifting mechanism which is identified as a whole with reference numeral 50. This lifting mechanism has a support surface which comprises the several elements 51*a* to 51*d*. These elements are arranged in the spaces between the narrow individual belts 49*a*, 49*b*, 49*c* which together form the conveyor belt 49. The elements can be lifted upwardly through these spaces. They are supported by columns 52, 53 which can be lifted and lowered by means of a suitable lifting mechanism (not illustrated). A stationary stop 54 is provided at the left end of the belt 49.

A support mechanism **55** is arranged above the belt **49**, which support mechanism consists of several parallel rods with a front sloped surface **56**. The rods have such a width and are arranged in such a manner that they can penetrate between the elements **51**a and **51**d of the lifting mechanism **50**.

An expelling mechanism **57** is arranged above the support mechanism **55**. This expelling mechanism has a wall **58** which serves as a slide and the ends of which are connected to rods **59** and **60**. The rods **59, 60** are guided in bearings **61** and are connected through a cross bar **62**. The cross bar **62** is connected to a piston rod **63** which projects from a stationarily arranged pressure cylinder **64**.

The device operates as follows:

The articles **45**, for example newspapers, are supplied by means of the belt **10** (FIG. 1). At the position of the deflector **12**, which position is illustrated in full lines in FIG. **1**, the newpapers **45** are guided over the mechanism **1** and led by means of the belts **13, 14** to the mechanism **2**. When for example five papers **45** are fed by the deflector **12** to the feed mechanism **2**, the deflector quickly swings over into the position illustrated in dash-dotted lines, which directs the papers into the feed mechanism **1**, that is the compartmented wheel **6**.

The compartmented wheels **6, 6'** place the papers into pockets of the rotary platens **4, 5**. This is achieved by stops **65, 65'** on which the edges of the papers abut so that they are during a further rotation of the continuously rotating compartmented wheels **6, 6'** moved out of the compartments **7**. As soon as one pocket has been filled, the full pocket rotates into the delivery position illustrated in FIG. **2** by the pockets **17** and **29**. The wall **23** of a pocket to be emptied is now tilted and by means of the slide **22** the contents thereof, for example five superposed newspapers, are expelled from the pocket and transferred to the belts **34** and **35**. This emptying does not take place simultaneously, but instead occurs successively, namely first the pocket of one rotary platen is emptied, while the other rotary platen with a full pocket moves into the delivery position after which the full pocket of the last-mentioned rotary platen is emptied. The lower partial stack **67** then reaches on the belt **36** the position **67'** and the upper partial stack **66** on the platform **38** reaches the position **66'**. The rear stops **37, 39** provides for alignment and also cause the belts **34, 35** to swing upwardly into the position illustrated in dash-dotted lines.

Now the segments **40** to **43** (see FIG. **5**) of the platform **38** swing outwardly which causes the upper partial stack **66'** to fall downwardly onto the partial stack **67'**. The folds of the partial stack **66'** lie opposite the folds of the partial stack **67'** because of the opposite rotation of the rotary platens **4** and **5**. Now the conveyor belt, same having stood still during the lowering of the partial stack **66'**, moves in such a manner that the stack unit **68** consisting of the partial stacks **67'** and **66'** is moved to the left after the stop **37** has moved to the side so that the stack unit **68** comes to lie above the lifting mechanism **50**.

At this point the lifting mechanism **50** is started and the support mechanism **55** is located in its retracted position as illustrated in full lines in FIG. **3**. When the lifting mechanism **50** is lifted sufficiently that it is in the position illustrated in dash-dotted lines, the support arms **55** move forwardly and support the stack unit **68** which is in the position **68'**. The lifting mechanism **50** is again lowered into its initial position. When the next stack unit is lifted, same is lifted unit it abuts the underside of the support mechanism **55**. Thereafter the support mechanism **55** retracts which causes the partial stack held thereby to be lowered a small distance and is placed on the lower stack unit. One can thus form stacks of any desired height, wherein the stacking is such that for example after there is formed one partial stack of five newspapers whose folds all lie one on top of the other, there is next formed another partial stack whose superposed folds are located on the opposite side of the stack. Thus, all together a rectangularly vertical stack is obtained. When the stack has reached the desired height, the moving mechanism **57** starts and moves the stack **69** into the position **69'** in which the stack rests on a conveyor belt **70** which transports the stack to the tying mechanism.

We claim:

1. A stacking device for stacking of articles, particularly papers, which are of different thicknesses on opposite sides, comprising a catching mechanism for partial stacks and a rotating mechanism for rotating the partial stacks, said rotating mechanism having two rotary platens which are arranged at different heights and which can be oppositely rotated in a stepwise manner, said rotary platens each having at least two pockets for receiving partial stacks, the axes of rotation of which are both arranged vertically and which viewed in ground view are spaced from one another in such a manner that each one pocket of the upper rotary platen can be caused to coincide with one pocket of the lower rotary platen in a delivery position, stationary feed mechanisms for filling the pockets of the rotary platens, said feed mechanisms being arranged above the rotary platens, a deflector device for the alternate feeding of a continuous stream of articles to one of the feed mechanisms, discharge mechanisms for removing the partial stacks which are provided in the pockets, a lowering mechanism for lowering the upper partial stack onto the lower partial stack and a collecting mechanism for stacking the stack units one on top of the other, said stack units comprising the two aforementioned partial stacks.

2. A stacking device according to claim **1**, wherein each rotary platen has four pockets which can be moved by 90° rotations of the rotary platen successively into the delivery position.

3. A stacking mechanism according to claim **1**, wherein the feed mechanisms have compartmented wheels.

4. A stacking device according to claim **1**, wherein the lowering mechanism has a removable platform which is arranged approximately at the level of the bottoms of the pockets of the upper rotary platen.

5. A stacking device according to claim **4**, wherein the removable platform consists of four swingable components which are formed such, and the swivel points of which are arranged such, that during the removal of the platform the corners of the partial stack rest on the bottom components until shortly before the complete removal of the platform.

6. A stacking device according to claim **4**, wherein the removable platform is provided with balls which project above the supporting surface.

7. A stacking device according to claim 1, including vertical stops for guiding the partial stacks are arranged in the lowering mechanism.

8. A stacking device according to claim 1, wherein between the delivery points of the rotary platens and the lowering mechanism there are arranged conveyor belts.

9. A stacking device according to claim 8, wherein the conveyor belts can be swung upwardly for aligning the partial stacks.

10. A stacking device according to claim 1, wherein the collecting mechanism has a lifting mechanism for the stack units and a support mechanism for the entire stack which is to be formed, which support mechanism is arranged above said lifting mechanism.

11. A stacking device according to claim 10, wherein the lifting mechanism has spaced apart parallel support elements and wherein the retractable support mechanism consists of parallel rods which can be moved between the said support elements.

12. A stacking device according to claim 11, wherein the lifting mechanism is arranged below one conveyor belt which consists of several parallel narrow individual belts and wherein the support elements can be guided through the spaces between the individual belts.

* * * * *