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ASSEMBLING AND BANDING MECHANISM.
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Patented Nov. 19, 1918.
2 SHEETS—SHEET 1.

Fig. 1.

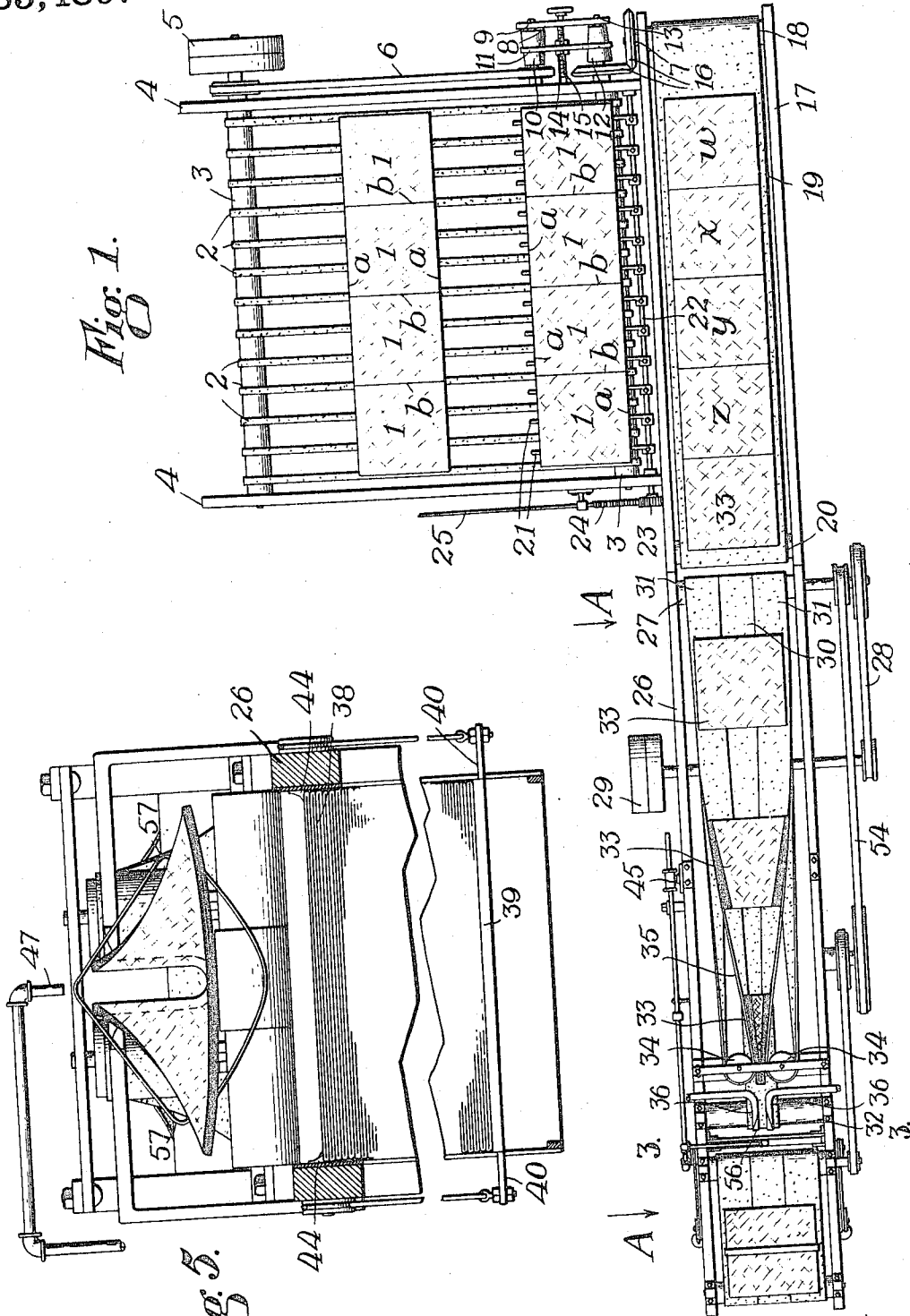


Fig. 5.

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2 SHEETS—SHEET 2.



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ASSEMBLING AND BANDING MECHANISM.

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To all whom it may concern:

Be it known that I, GEORGE I. WALKER, a citizen of the United States, residing at Orange, in the county of Franklin and Commonwealth of Massachusetts, have invented a new and useful Improvement in an Assembling and Banding Mechanism, of which the following, together with the accompanying drawing, is a specification.

The present invention relates to a mechanism for assembling articles in bunches or stacks, and for applying a retaining band to each stack so assembled. More particularly, the invention is concerned with the treatment of flat flexible articles of sheet form, such as sheets of paper, tissue, or the like, and I have shown, for purposes of illustration such a mechanism as applied to the assembling and banding of paper napkins, or paper towels, which are ordinarily quite flexible and have presented heretofore numerous obstacles to their efficient and rapid assembling and banding.

The invention resides in the provision of mechanism designed for continuous and rapid operation on the sheets as they emerge from the cutting devices, to assemble them in stacks or bundles containing the desired number of sheets, and to apply a retaining band to each stack or bundle thus formed, without any stoppage in the progress of said sheets through the machine. The above and other objects as will appear hereinafter are attained by the mechanism which is set forth in the following description, reference being had in this connection to the accompanying drawings, in which—

Figure 1 is a plan view of the mechanism.

Figure 2 is a side view of a portion of the same viewed in the direction of the arrows A, A, Fig. 1.

Fig. 3 is a transverse sectional view on the line 3—3, Fig. 1.

Figs. 4 and 5 are views similar to Fig. 3, illustrating different periods in the operation of the banding devices.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, there is shown at the right hand end thereof a sheet conveying mechanism of ordinary construction which is employed for advancing the sheets, as they come from the cutting devices, to the assembling and banding instrumentalities of the machine. In this connection it is to be un-

derstood that in the manufacture of articles, such as paper napkins and towels, it is customary to employ multiple cutting devices which sever transversely along lines *a*, *a*, a plurality of superposed supply webs, and other devices which sever such webs longitudinally along lines *b*, *b*, so that the product of the cutting operation is a plurality of piles of sheets arranged in rows, such as shown at 1, 1, Fig. 1, each pile containing, for example, twenty-five sheets, that is, the number of supply webs cut at one time. The piles 1, 1, are advanced, after the cutting operation on conveying tapes 2, 2, which pass around rolls 3, 3, and form an endless traveling conveyer on which the rows of piles 1, 1, may be spaced approximately a distance equal to the width of one of said rows, as shown in Fig. 1. The endless traveling conveyer so constituted is supported in a framework 4 and driven from a belt pulley 5 on the shaft of one of the rolls 3, the latter having a belt connection 6 adapted to transmit power to a shaft 7 of the assembling mechanism hereinafter described, through a variable speed drive mechanism designated as a whole by the numeral 8.

To this end, the belt 6 drives a shaft 9 having a frusto-conical pulley 10 thereon which drives through a belt 11 a corresponding frusto-conical pulley 12 on shaft 13. The belt 11 is movable axially of said pulleys 10 and 12 by means of a fork 14 carried on adjusting screws 15 and thus the speed of shaft 7, which is connected by bevel gears 16 to shaft 13 is variable at will.

The shaft 7 of the assembling mechanism is carried in a framework 17 and has a roll 18 thereon around which passes an endless traveling belt 19 operating at right angles to the tapes 2 of the conveying mechanism and passing at its other end around a roll 20 supported in the framework 17. The top of the belt 19 is adapted to receive the piles of sheets 1, 1, from the conveying mechanism, and to this end a plurality of swinging arms 21 are carried on a rock shaft 22, the latter supported transversely of the framework 4 adjacent to framework 17 and having a pinion 23 thereon which is in mesh with a sliding rack 24. The reciprocation of rack 24 which is connected by rod 25 to suitably timed operating mechanism, not shown, causes the arms 21 to swing upwardly and forwardly after a row of piles 1, 1, have

arrived at the end of the conveying mechanism, to deposit said piles face downwardly on the surface of endless traveling belt 19. The arms 21 are then returned to horizontal position between the tapes 2, 2, ready to operate in a similar fashion upon the next row of piles 1, 1, arriving thereover on said tapes.

As herein shown, each transverse row of piles 1, 1 on the conveying tapes 2, 2, is made up of four piles, which are transferred simultaneously by the arms 21 to the surface of the belt 19 which travels at right angles to said tapes. The rows of piles 1, 1, each containing, for example, twenty-five sheets, are so spaced apart on the conveying mechanism, and the speed of belt 19 is so reduced, that said belt advances a distance equal to the width of a pile 1 between each transferring operation as effected by arms 21. In other words, assuming that the operation of the mechanism has been started, and that the arms 21 are about to effect a transfer of the piles 1, 1, superposed thereon, there will be, after such transfer, one pile at the right hand end of the belt, Fig. 1, in the location *w*, two piles at *x*, three piles at *y*, and four piles at *z*. When the next row of piles 1, 1, is transferred by arms 21, the belt 19 will have moved a distance equal to the width of one pile, so that the four piles at *z* are carried beyond the conveying mechanism, the piles of three, two, and one each at *y*, *x*, and *w*, respectively, each having an additional pile superposed thereon. In this fashion, the endless belt 19 is caused to carry forward to the banding mechanism, as hereinafter described, stacks of sheets each containing four of the piles 1, 1, advanced by the conveying tapes 2, that is, each stack of sheets reaching the left hand end of belt 19 is one hundred thick, assuming that the piles 1, 1, are twenty-five thick.

A framework 26 in alinement with framework 17 supports, adjacent the roll 20 a roll 27 which is driven by belt connection 28 from the shaft of a main driving pulley 29. Passing around roll 27 are three endless belts, a center belt 30 and two side belts 31, the same constituting a traveling supporting surface in the same plane as belt 19 to receive and carry forward the stacks of four piles each advanced thereby. The center belt 30 passes at the other end of framework 26 around a horizontal roll 32, which is preferably somewhat lower than the roll 27, the upper surface of belt 30 thus constituting an inclined support for the centers of the stacks 33 advanced thereon. The side belts 31 pass around vertical rolls 34, 34, immediately in the rear of roll 32, said belts having their surfaces twisted or turned fully 90° in a complete traverse, to accomplish this result, whereby the contacting surfaces of said belts, owing to the closeness of rolls 34, 34, form gradually converging

substantially vertical guiding walls, as shown at 35, adapted to gradually bend each stack 33 into substantially U-form, as it approaches rolls 34. The center of each stack 33 is supported at all times on belt 30, as shown in Fig. 4, while the portions on each side of the center are turned upwardly, as shown at 36', the stack passing between rolls 34 in this form, and being so maintained, after passage between said rolls by a pair of angular guides 36, disposed directly over roll 32.

The speed of belts 30 and 31, 31, is somewhat faster than that of belt 19, so that the stacks 33 thus acted upon are spaced apart as shown in Figs. 1 and 2. Each stack 33, in substantially U-form as it passes between guides 36, 36, is to have a retaining band applied thereto, and to this end the framework 26 supports, in front of said guides, a magazine 37, in which are laid flatwise a stack of endless retaining bands 38, each of such a size or length as to snugly encircle one of the stacks 33 when the sheets of the latter lie flat. The bottom of the stack of bands 38 is supported on a movable plate 39 having extensions 40 at each end which project through vertical slots 41 in the end walls of the magazine 37, said plate 39 being urged upwardly by a constant force, such as weights 42 hanging from cords 43 which are attached to said extensions 40. In this way the uppermost band 38 is pressed against retaining and separating devices 44 of any well known form at the top of the magazine, and it will be clear that upon each removal of a band from the top of the magazine the remaining bands will be moved upwardly and held against devices 44 with a constant pressure.

The framework 26 provides a pivotal support 45, Fig. 2, for a swinging pick-up device 46, the latter having its end 47 in position to descend at intervals into contact with the center of the uppermost band 38, as shown in Fig. 3. The pick-up device 46 is made hollow, and has a suitable flexible connection 48 with a suction agency, such as a pump, not shown, so that the end 47 when in the position shown in Fig. 3, seizes upon the band 38 by suction and separates it from the remaining bands in the magazine. The pick-up device 46 is oscillated through a link 49, pivotally connected at 50 to a swinging lever 51 which is acted upon by cam 52 on shaft 53, the latter having a belt connection 54 with the shaft of roll 27. A spring 55 maintains the lever 51 in contact with said cam, so that the pick-up device is moved from its band engaging position, Fig. 3, to the position shown in Fig. 4, in which the uppermost band, seized at the center of its top surface by the suction pick-up, becomes distended in substantially rectangular outline by the elevation of the pick-up, and is

thus opened up to inclose a space which is more than large enough to receive the stack 33 in U-form at that time passing between guides 36.

5 As each stack in U-form is advanced through the guides 36, by the belt 30, toward the opened up band as shown in Fig. 4, the forward end thereof has a tendency to spread out, as shown in Fig. 5, by reason
10 of passing beyond the forward portions of said guides. The forward portions of said guides are preferably made with diverging surfaces, to facilitate this action, so that finally the stack flattens out into contact
15 with the corners 57, 57, of the open band, and the weight of said stack pulls the band away from the end 47 of the suction device, as shown in Fig. 5, approximately coincident with the movement of said stack from
20 between the guides 36. This movement allows the stack to flatten out gradually, thereby causing its snug inclosure by the band, just as it is received on an endless conveying belt 58 employed to conduct it
25 away from the banding mechanism to a table or other support, not shown, on which the assembled and banded stacks are adapted to be received. The conveying belt 58 passes around rolls 59 and 60 journaled in
30 the framework 26, the roll 60 being driven by a belt connection 61 with shaft 53.

I claim,

1. In a machine of the class described the combination with banding mechanism for
35 stacks of flexible sheets, of means for advancing successive stacks to said banding mechanism, said advancing means progressively imparting a U-form to each stack as it approaches said banding mechanism, and
40 means for disposing a distended endless band in the path of each stack.

2. In a machine of the class described, mechanism for advancing successive stacks
45 of flexible sheets comprising a traveling support on which said stacks are received in flat form, means for progressively imparting a U-form to each stack as it is advanced by said traveling support, and means for
50 disposing a distended endless band in the path of each stack.

3. In a machine of the class described, mechanism for advancing successive stacks of flexible sheets comprising a plurality of endless belts traveling in unison, and con-

stituting at one end a flat surface for the
55 reception of said stacks, certain of said belts at their other ends being disposed substantially at right angles to said flat surface, whereby to progressively impart a U-form
60 to each stack as it is advanced by said belts in combination with means for interposing a distended endless band in the path of each stack, to receive said stack, in U-form, in
the space inclosed by said band, said advancing means operating to release each
65 stack, when encircled by said band, to cause its flattening out by gravity.

4. In a machine of the class described, means for distending an endless retaining
band, and means for advancing a stack of
70 flexible sheets held in U-form, into the space inclosed by said band, and for thereafter permitting said stack, by gravity, to flatten out.

5. In a machine of the class described, means for feeding successive stacks of flexible
75 sheets, held in U-form, means for interposing a distended endless band in the path of each stack, to receive the same in the space inclosed thereby, and means for re-
80 leasing each stack, to flatten out, by gravity, when encircled by said band.

6. In a machine of the class described, means for seizing and elevating one side
85 of an endless band, whereby the band, by gravity, is distended vertically, to define a space, and means for advancing a stack of flexible articles, held in U-form, into said
space, whereby the release of said stack, to allow the same to flatten out, by gravity,
90 strips said band away from said seizing and elevating means.

7. In a machine of the class described, a magazine containing a stack of flattened
95 endless bands, a suction pick-up for seizing and elevating the central portion of the top surface of each uppermost band of the stack, to distend said band, means for advancing a stack of flexible articles, held in
100 U-form, into the space inclosed by each distended band, and means for releasing said stacks to flatten out by gravity, whereby to strip the bands from the suction pick-up.

Dated this 23rd day of February, 1917.

GEORGE I. WALKER.

Witnesses:

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COLEMAN H. WAITE.