Sept. 11, 1962 J. WEXLER 3,053,024

MACHINE FOR FOLDING AND WRAPPING PAPER BUNDLES

Filed April 7, 1961 4 Sheets-Sheet 1

FIG. 1

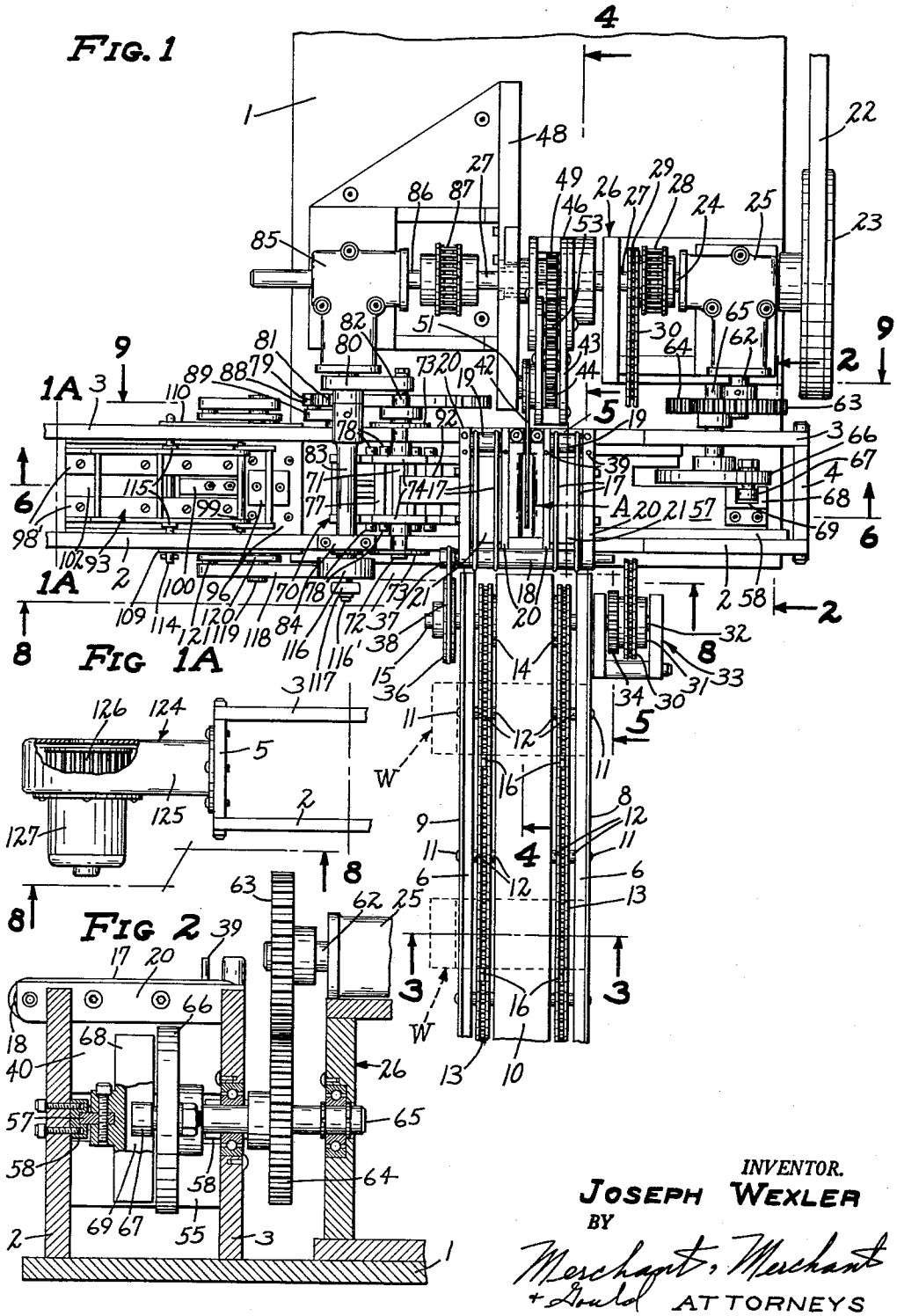


FIG 1A

FIG 2

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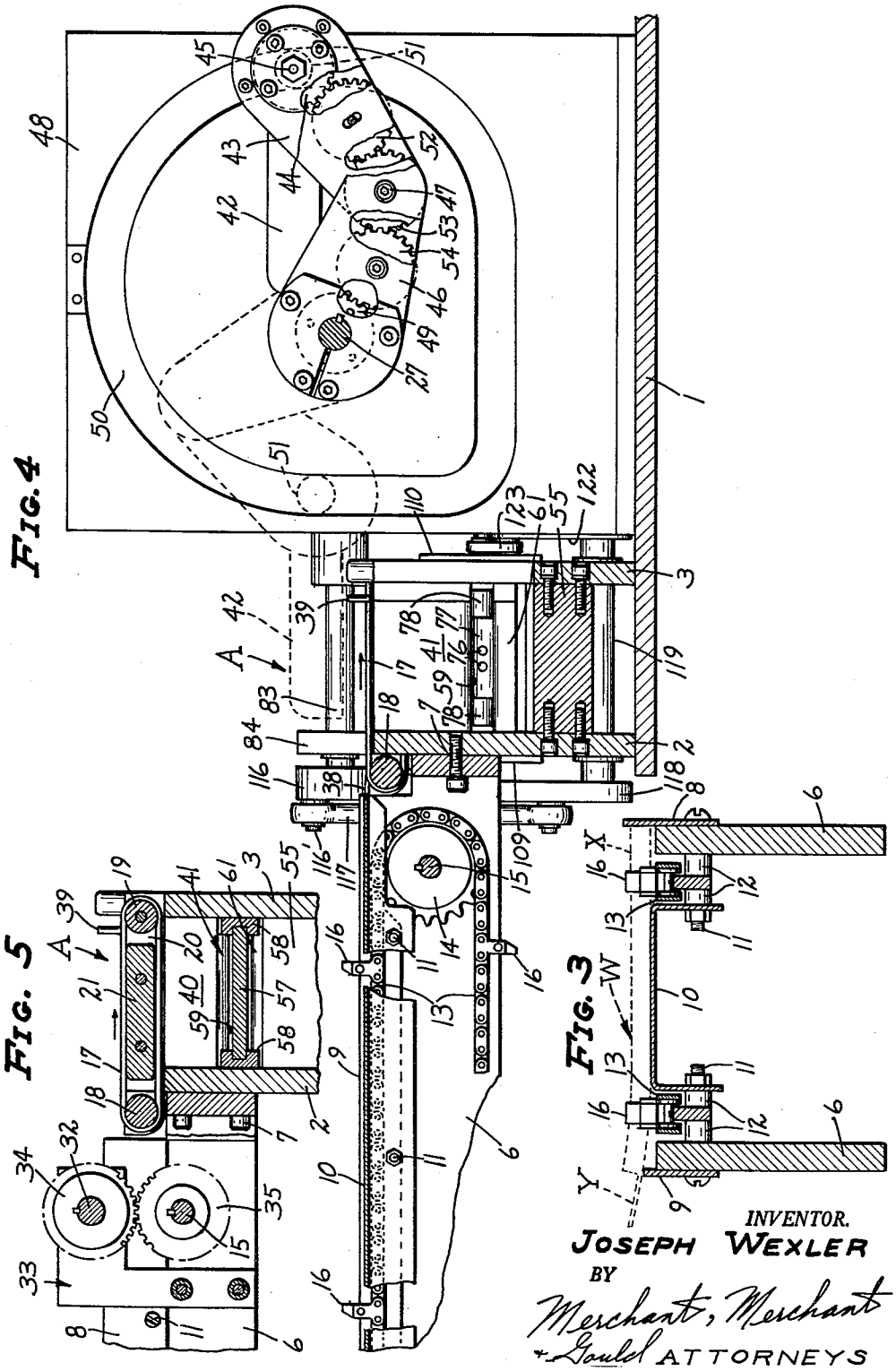


FIG. 4

FIG. 5

FIG. 3

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MACHINE FOR FOLDING AND WRAPPING PAPER BUNDLES

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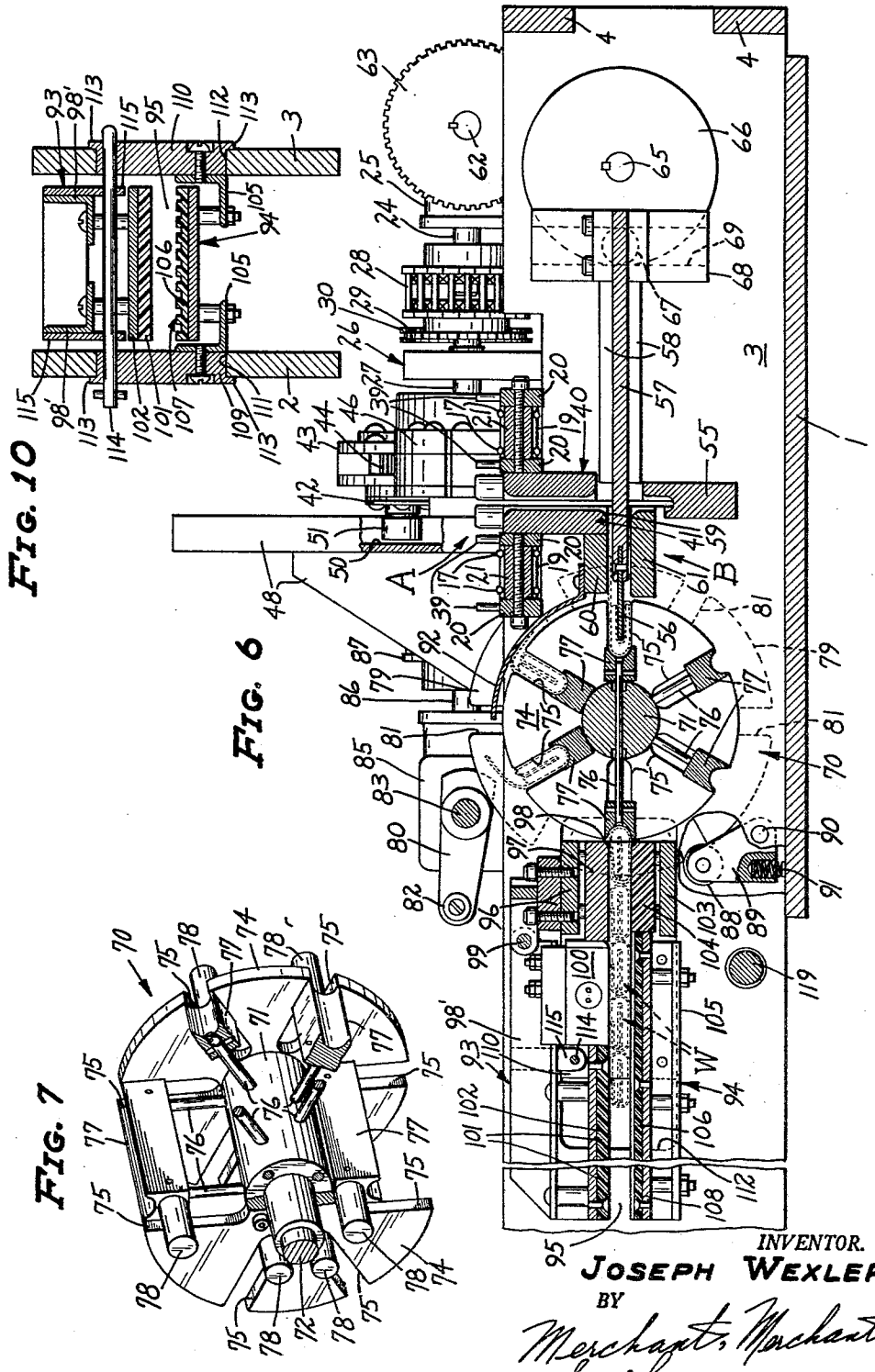


FIG. 10

FIG. 6

FIG. 7

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MACHINE FOR FOLDING AND WRAPPING PAPER BUNDLES

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FIG. 8

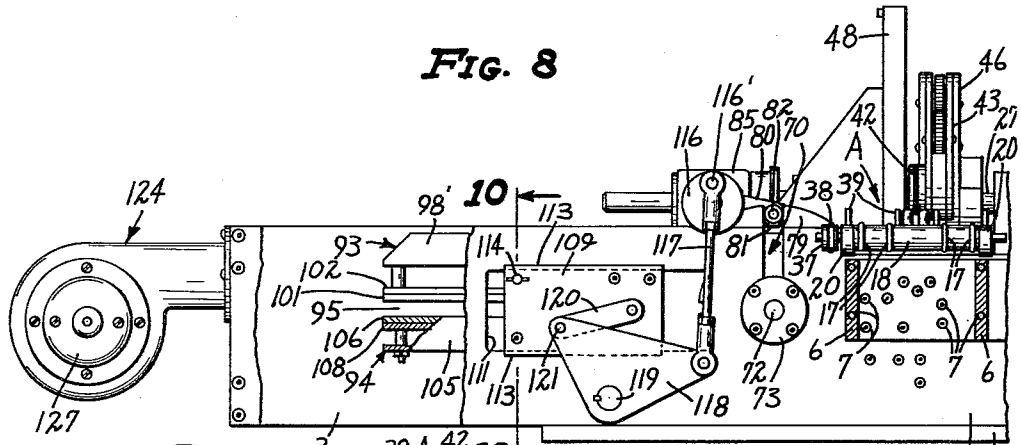


FIG. 9

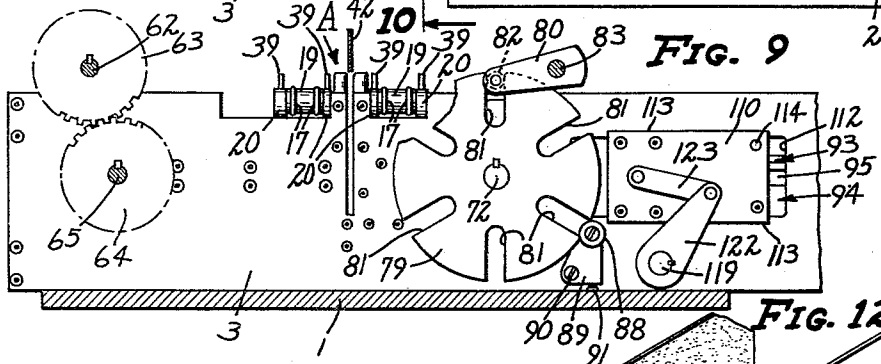


FIG. 11

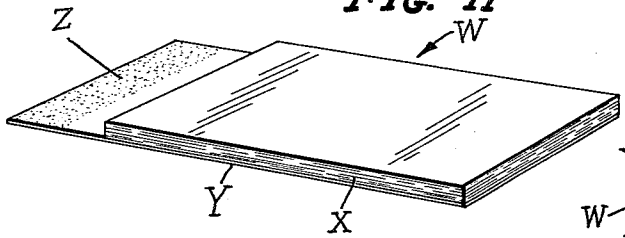


FIG. 12

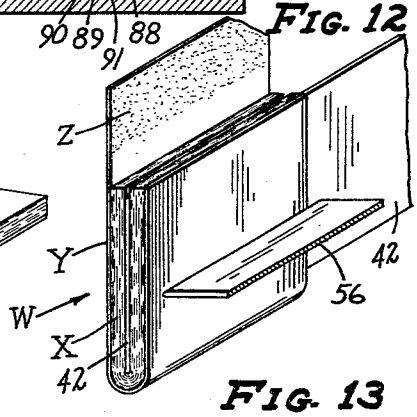


FIG. 14

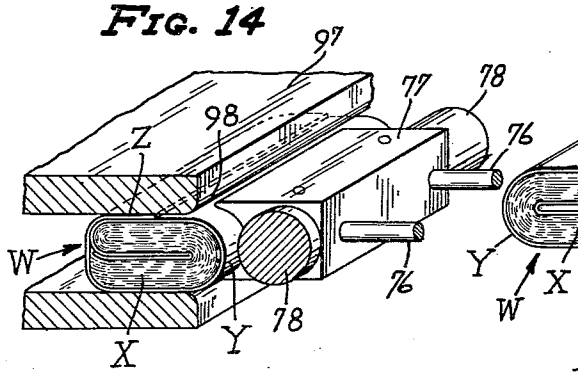
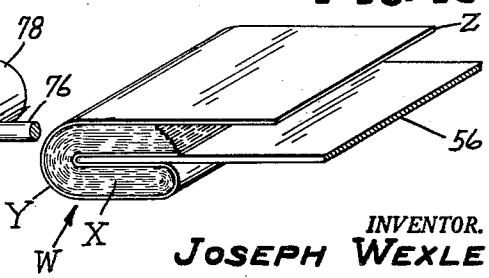


FIG. 13



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United States Patent Office 3,053,024
Patented Sept. 11, 1962

3,053,024

MACHINE FOR FOLDING AND WRAPPING PAPER BUNDLES

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Filed Apr. 7, 1951, Ser. No. 101,417
4 Claims. (Cl. 53—120)

My invention relates generally to paper folding and wrapping machines, and more particularly to machines for folding and wrapping flat bundles of paper sheets, such as sheets of toilet tissue and the like.

An important object of my invention is the provision of a machine which will fold and wrap a plurality of superposed sheets of paper, such as toilet tissue, into a compact bundle for storing in a knapsack, luggage, purse, or in any convenient package.

Another object of my invention is the provision of a machine of the type herein disclosed which is capable of folding and wrapping bundles of superposed sheets of paper and the like in rapid succession. To this end, I provide conveyor means for delivering a plurality of wrapper equipped flat bundles of paper or the like to a first folding zone, means at said first folding zone for imparting a first fold to the bundle and wrappers in succession and delivering the folded bundles to a second folding zone, means for imparting a second fold to the bundles and delivering the same to a movable carriage, and means for receiving the bundles from the carriage and closing and sealing the wrapper around the bundles.

Another object of my invention is the provision of a machine as set forth having novel carriage means for transferring folded bundles from a second folding zone to a wrapper closing and sealing device in a manner to dispose the wrapper for easy closing and sealing.

Still another object of my invention is the provision of a carriage as described, having novel ejector means for delivering folded bundles to the wrapper closing and sealing means, and responsive to folding movement of one of the folding means for effecting such delivery of the bundles to the wrapper closing and sealing means. The above, and still further highly important objects and advantages of my invention will become apparent from the following detailed specification, appended claims and attached drawings.

Referring to the drawings, which illustrate the invention, and in which like reference characters indicate like parts throughout the several views:

FIG. 1 is a fragmentary view in top plan of a bundle folding and wrapping machine produced in accordance with my invention;

FIG. 1A is a view in top plan of a portion of the machine of FIG. 1 disposed to the left of the broken line 1A—1A of FIG. 1;

FIG. 2 is an enlarged fragmentary section taken on the line 2—2 of FIG. 1, some parts being removed;

FIG. 3 is an enlarged fragmentary transverse section taken substantially on the line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary section taken substantially on the line 4—4 of FIG. 1;

FIG. 5 is an enlarged transverse section taken substantially on the line 5—5 of FIG. 1;

FIG. 6 is an enlarged fragmentary section taken substantially on the line 6—6 of FIG. 1;

FIG. 7 is an enlarged fragmentary view in perspective of the rotary transfer carriage of my invention, some parts being broken away and some parts being shown in section;

FIG. 8 is a view partly in side elevation and partly in section as seen from the lines 8—8 of FIGS. 1 and 1A;

FIG. 9 is a fragmentary view partly in side elevation and partly in section as seen from the line 9—9 of FIG. 1;

FIG. 10 is an enlarged transverse section taken substantially on the line 10—10 of FIG. 8;

FIG. 11 is a view in perspective of a wrapper equipped bundle of superposed sheets adapted to be folded and wrapped by the machine of my invention;

FIG. 12 is a fragmentary view in perspective for illustrating the manner in which the first fold is applied to the bundle of FIG. 11 by the machine of my invention;

FIG. 13 is a fragmentary view in perspective showing the second fold applied to the bundle; and

FIG. 14 is a fragmentary view in perspective showing the manner in which a completely folded and wrapped bundle is transferred to the wrapper closing and sealing means of my invention.

In the preferred embodiment of the invention illustrated, the supporting frame structure is shown as comprising, a base 1, a pair of laterally spaced elongated rigidly secured to the base plate 1 and connected at their plate-like frame members 2 and 3 welded or otherwise rigidly secured to the base plate 1 and connected at their opposite ends by cross bars 4 and 5, and a pair of laterally spaced elongated longitudinal frame members 6 that extend horizontally outwardly from the frame member 2 and bolted or otherwise rigidly secured thereto, as indicated at 7. Suitable means, not shown, may be additionally used to support the outer ends, not shown, of the frame members 6. Each of the frame members 6 carries a different one of a pair of elongated rails 8 and 9, and a flanged plate or table 10 is supported between the frame members 6 by nut-equipped screws or the like 11, and held in spaced parallel relation to the members 6 by tubular spacers 12 through which the screws 11 extend. Preferably, the nut-equipped screws 11 mount the rails 8 and 9 to their respective frame members 6.

A pair of laterally spaced parallel endless conveyor chains 13 having their upper horizontally disposed delivery flights disposed between opposite sides of the plates or table 10 and adjacent ones of the frame members 6, the chains 13 being entrained over drive sprockets 14 that are keyed or otherwise rigidly mounted on a shaft 15 journalled in the inner end portions of the frame members 6, see FIGS. 1, 4 and 5. At the outer end portions of the frame members 6, the chains 13 may be assumed to be entrained over suitable idler sprockets, not shown, in the usual manner. The conveyor chains 13 are provided with longitudinally spaced feed lugs 16 that are adapted to engage one side of a wrapper equipped bundle to be folded, to feed bundles in succession toward a first folding zone indicated at A, between the frame members 2 and 3, beyond the inner ends of the frame members 6. The bundles, indicated generally at W comprise superposed generally rectangular sheets X of toilet tissue, facial tissues, or the like, and an underlying wrapper sheet Y. The wrapper sheet Y is substantially of the same width as the sheets X, and is substantially longer than said sheets X to provide an adhesive equipped flap portion Z which projects longitudinally outwardly from one end of the bundle or stack of superposed sheets X. With reference to FIG. 1, it will be seen that the bundles W are disposed in spaced relation longitudinally of the conveyor chains 13 when engaged by the feed lugs 16. Further, with reference to FIG. 3, it will be seen that the upper edge of the rail 8 is disposed at a higher level than the upper edge of the rail 9 and the top surface of the table 10, the rail 8 serving as a guide member for the adjacent ends of the bundles W. The guide rail 9 and table 10 support the bundles W as they are being conveyed toward the first folding zone A.

The conveyor chains 13 feed the bundles W to a secondary conveyor involving a plurality of endless rubber-like belts 17 that are entrained over spaced rollers 18 and

19 journalled at their opposite ends in cross bars 20 secured at their opposite ends to the uppermost edges of the frame members 2 and 3. Intermediate the rollers 18 and 19, the upper delivery flights of the belts 17 are supported by filler blocks 21, bolted or otherwise secured between adjacent cross bars 20. With reference particularly to FIGS. 1 and 6, it will be seen that the conveyor belts 17 are provided in pairs, each pair being disposed adjacent an opposite side of the first folding zone A, and each pair being substantially aligned with a different one of the endless conveyor chains 13.

The conveyor chains 13 and conveyor belts 17 are adapted to be driven from a suitable prime mover, such as a motor, not shown, but to which may be assumed to be coupled a drive belt 22, see FIG. 1. The drive belt 22 is entrained over a pulley 23 mounted fast on a shaft 24 that is journalled in a power transmission housing 25 mounted on a bracket 26, which in turn is suitably mounted on the base plate 1. A second shaft 27 is journalled in the bracket 26 and secured to the shaft 24 by a conventional coupling 28, and has secured thereon a sprocket wheel 29 over which is entrained an endless link drive chain 30. The drive chain 30 runs over a second sprocket 31 that is mounted on a shaft 32 journalled in a bracket 33 secured to the inner end portion of an adjacent one of the frame members 6, see FIG. 1 and 5. A toothed gear 34 is keyed or otherwise rigidly secured to the shaft 32, and has meshing engagement with a cooperating toothed gear 35 that is keyed to the adjacent end portion of the shaft 15. A pulley 36 is rigidly secured to the opposite end portion of the shaft 15 in alignment with a second pulley 37 rigidly secured to the adjacent end of the roller 18; and an endless belt 38 is entrained over the pulleys 36 and 37, see FIG. 1. The conveyor chains 13 and belts 17 are continuously driven in a direction to feed the bundles W toward the first folding zone A, movement of the bundles W on the belt 17 being arrested by a plurality of stop pins 39 projecting upwardly from the cross bars 20, see particularly FIGS. 2, 4–6 and 8.

Means for imparting a first fold to the bundles W at the first folding zone A comprises a pair of laterally spaced parallel die elements 40 and 41 rigidly secured between the frame members 2 and 3, and a first folding blade 42. The folding blade 42 is journalled on one end of a bifurcated arm 43 for common rotation with a gear 44, the blade 42 and gear 44 being journalled on a nut-equipped shaft 45, see particularly FIG. 4. The opposite end of the bifurcated arm 43 is pivotally secured to one end of a second bifurcated arm 46, the opposite end of which is keyed or otherwise rigidly secured to the shaft 27 for common rotation therewith, the pivotal connection between the arms 43 and 46 being indicated at 47 in FIG. 4. The shaft 27 extends through an L-shaped bracket 48 and is journalled therein and in a gear 49 within the second bifurcated arm 46, the gear 49 being rigidly secured to the L-shaped bracket 48 and held against common rotation with the shaft 27. The bracket 48 defines a cam track 50 for reception of a cam follower roller 51 that is journalled on the shaft 45. The gear 44 is operatively coupled to the gear 49 by intermediate gears 52, 53 and 54, the gear 52 being journalled in the arm 43 and having meshing engagement with the gear 44, and the gear 54 being journalled in the intermediate portion of the arm 46 and having meshing engagement with the stationary gear 49. The gear 53 is journalled on the pivot 47 between the arms 43 and 46, and has intermeshing engagement with the gears 52 and 54. The gears 44, 49 and 52–54 are preferably of a common diameter, the arrangement being such that during rotation of the shaft 27, and resultant travel of the cam follower roller 51 about the cam track 50, the folding blade 42 will be maintained in a constant attitude relative to the die elements 40 and 41, or horizontally disposed, as shown in FIG. 4 by full and dotted lines.

Rotation of the shaft 27 in a counterclockwise direction with respect to FIG. 4 causes the folding blade 42 to pass downwardly between the die elements 40 and 41, whereby to impart a first fold to a bundle W, as indicated in FIG. 12, and move the bundle downwardly to a second folding zone indicated at B in FIG. 6. Downward movement of the bundle W is limited by a stop member 55 between the frame members 2 and 3, which stop member cooperates with the die elements 40 and 41 to support the bundle W after the first fold has been imparted thereto. The cam track 50 is so shaped that, when the bundle W engages the stop member 55, the folding blade 42 will be withdrawn from the folded bundle W in a horizontal direction, or in a direction normal to that of folding movement of the folding blade 42.

A second horizontally disposed flat folding blade 56 is rigidly secured to one end of a plate-like reciprocatory member 57 that is mounted for horizontal reciprocatory movements through the second folding zone B and in guideways 58 rigidly secured to opposed inner wall surfaces of the frame members 2 and 3. The second folding blade 56 cooperates with a pair of die elements, one of which comprises the lower end 59 of the die element 41 and an adjacent member 60, and the other of which comprises a block-like element 61 in downwardly disposed parallel relationship to the member 60, the members 60 and 61 being rigidly secured at their opposite ends to the frame members 2 and 3.

Reciprocatory movement is imparted to the reciprocatory member 57 and the second folding blade 56 carried thereby, to impart a second fold to the bundles W, in succession, and in the manner illustrated in FIG. 13, by means now to be described. The power transmission housing 25 contains conventional gearing, not shown, which drives an output shaft 62 that is journalled in the housing 25 and to which is keyed or otherwise rigidly secured a gear 63. The gear 63 has intermeshing engagement with a second gear 64 that is mounted fast on a horizontally disposed shaft 65 that is journalled in suitable bearings in the frame member 3 and bracket 26, see FIG. 2. A disc-like crank 66 is rigidly mounted on the shaft 65 between the frame members 2 and 3, and carries a crank pin in the nature of a roller 67. A cross head or scotch yoke 68 is rigidly mounted on the end of the reciprocatory member 57 opposite the folding blade 56, and is formed to provide a vertically extended channel 69 for reception of the roller 67.

As shown in FIG. 6, reciprocatory movement of the folding blade 56 in a direction from the right to the left imparts a second fold to successive bundles W and discharges the folded bundles W outwardly from between the left hand or discharge end portions of the die elements 60 and 61, to a rotary carriage indicated in its entirety by the reference character 70. The carriage 70 comprises a cylindrical core 71 having trunnion or shaft portions 72 extending axially outwardly from its opposite ends, the shaft portions 72 being journalled in suitable bearings 73 secured to the outer surfaces of the frame members 2 and 3. The carriage 70 further includes a pair of axially spaced flanges 74 rigidly secured to opposite ends of the cylindrical core 71, said flanges 74 being formed to provide cooperating circumferentially spaced radially outwardly opening notches or recesses 75. With reference particularly to FIG. 7, it will be seen that each recess 75 in one of the flanges 74 is aligned with a cooperating recess 75 in the opposite flange 74 in a direction axially of the carriage 70. Further, with reference to FIG. 6, it will be seen that the axis of the carriage 70 lies in the extended plane of the second folding blade 56, so that the recesses 75 are adapted to move into register with the discharge end portion of the die elements 60 and 61 associated with the second folding zone B. The recesses 75 are preferably of a width substantially equal to the distance between the die elements 60 and 61 so as to receive bundles W discharged

thereto from the second folding zone B. It will be noted that the recesses 75 in each of the flanges 74 are disposed in diametrically opposed pairs. The carriage 70 is provided with bundle ejectors each comprising a pair of axially spaced ejector rods 76 extending diametrically through the cylindrical core 71 and freely slidable therein, and ejector heads 77 rigidly secured to opposite ends of the ejector rods 76, the heads 77 extending in a direction axially with respect to the core 71 and each having axially aligned trunnions 78 at its opposite ends, the trunnions 78 being radially slidable in respective ones of said recesses 75. As shown in FIG. 6, when the second folding blade 56 moves a given folded bundle W outwardly from the second folding zone B and into a given recess 75, the adjacent ejector head 77 will be moved radially inwardly thereby to cause the opposite ejector heads 77 to be moved radially outwardly to discharge its respective bundle W radially outwardly of the carriage 70.

For the purpose of imparting intermittent rotary movement to the carriage 70 in a counterclockwise direction with respect to FIG. 6, I provide Geneva mechanism comprising a Geneva wheel 79 and a cooperating crank 80. The Geneva wheel 79 is keyed or otherwise rigidly secured to the shaft 72 and is provided with a plurality of circumferentially spaced radial notches or recesses 81, in number equal to the recesses 75 in each of the flanges 74. At its outer end, the crank 80 is provided with a crank pin in the nature of a roller 82 that is adapted to be received into successive ones of the notches 81, the inner end portion of the crank 80 being mounted fast on a rotary shaft 83 which extends transversely of and overlies the uppermost edges of the frame members 2 and 3. The shaft is journalled adjacent one end in a bearing 84 rigidly secured to the upper edge portion of the frame member 2, the opposite end portion of the shaft 83 being journalled in a power transmission housing 85 similar to the transmission housing 25. Rotary movement is imparted to the shaft 83 by conventional gearing, not shown, but contained within the housing 85, and an input shaft 86 operatively coupled to the gearing within the housing 85, the input shaft 86 being secured to the adjacent end of the shaft 27 by a conventional coupling 87.

The shaft 83 is adapted to be rotated in a counterclockwise direction with respect to FIG. 6, and for each revolution thereof, the crank 80 rotates the carriage 70 a distance sufficient to dispose a succeeding recess 75 and cooperating ejector head 77 into register with the space between the die elements 60 and 61. For the purpose of preventing over-run of the rotary carriage 70, I provide a detent roller 88 that is journalled on a rock arm 89 pivotally secured to the adjacent outer surface of the frame member 3, as indicated at 90. The detent roller is positioned to ride on the peripheral surface of the Geneva wheel 79 and to partially enter each succeeding notch 81 therein as intermittent rotary movement is imparted to the Geneva wheel 79 and rotor 70 by the crank 80. As shown particularly in FIG. 6, the rocker arm 89 and detent roller 88 are yieldingly urged toward engagement with the Geneva wheel 79 by a coil compression spring 91 mounted in a recess in the rocker arm 89 and having abutting engagement with the underlying portion of the base plate 1. An arcuate plate-like guard 92 is rigidly secured at one end to the die element 60 and overlies a portion of the carriage 70 intermediate its ends, for a purpose which will hereinafter be described.

Disposed between the frame members 2 and 3 are vertically spaced upper and lower pressure elements or structures 93 and 94 respectively which define therebetween a horizontally extended passage 95, said passage 95 being disposed in a horizontal plane of the axis of the carriage 70 and aligned with the path of movement of the second folding blade 56. The pressure elements 93 and 94 provide means for closing and sealing the adhesive equipped flap portions Z against adjacent portions of the wrappers Y, as shown in FIG. 14. The upper pressure element 93 comprises a main body structure 96 to which is rigidly secured a primary pressure plate 97 which is formed to provide a curved cam surface 98, see particularly FIGS. 6 and 14. A pair of laterally spaced connected angle bars 98' are pivotally connected to the main body portion 96 for swinging movements on a horizontal axis, as indicated at 99, between a normally horizontally disposed operative position shown in FIG. 6, and an inoperative position angularly upwardly spaced therefrom. The bars 98 carry a conventional electrically operated heating element 100 and a secondary pressure plate 101, preferably made from synthetic resin or the like and rigidly secured to a backing plate 102. The primary and secondary pressure plates 97 and 101, together with the heating element 100 have wrapper engaging bottom surfaces normally disposed in a common horizontal plane to define the upper surface of the passage 95.

The lower pressure element 94 comprises a main body portion 103 which supports a lower primary pressure plate 104, and a pair of laterally spaced angle bars 105 which rigidly support a secondary lower pressure plate 106. The primary and secondary pressure plates 104 and 106 respectively are preferably made from synthetic resins, the wrapper engaging top surface of the secondary pressure plate 106 being preferably longitudinally corrugated, as indicated at 107, said pressure plate 106 being reinforced by a metallic backing plate 108. With reference particularly to FIG. 6, it will be seen that the wrapper engaging top surfaces of the primary and secondary plates 104 and 106 are disposed in a common horizontal plane, these top surfaces providing the bottom surface of the passage 95.

The pressure elements 93 and 94 are connected together and mounted and guided in the frame members 2 and 3 by a pair of spaced side plates 109 and 110 each bolted or otherwise rigidly secured to an opposite side of the main bodies 96 and 103. The side plates 109 and 110 are each mounted for sliding movements longitudinally of the frame members 2 and 3, in longitudinally extended openings 111 and 112 in the frame members 2 and 3 respectively. The side plates 109 and 110 are each bolted or otherwise rigidly secured to an adjacent one of the angle bars 105, and are each provided with longitudinally extending flanges 113 that engage adjacent outer surfaces of the frame members 2 and 3 adjacent their respective openings 111 and 112. Means for releasably holding the angle bars 98, together with the heating element 100 and secondary pressure plate 101 carried thereby, in their normal operative horizontal positions shown in FIG. 6, comprises a transverse horizontal locking pin 114 that extends through the opposed side plates 109 and 110 and through a pair of apertured ears 115 depending from the angle bars 98, see FIGS. 6 and 10.

A disc-like crank 116 is rigidly mounted on the shaft 83 and includes a crank pin 116', to which is pivotally secured one end of a pitman arm 117. The opposite end of the pitman arm 117 is pivotally secured to one end portion of a bell crank lever 118, the intermediate portion of which is keyed or otherwise rigidly secured to a transverse shaft 119 journalled in the frame members 2 and 3. A rigid link 120 has one end pivotally connected to the bell crank 118, as indicated at 121, and has its opposite end pivotally connected to the adjacent side plate 109, see particularly FIG. 8. A crank arm 122 is keyed or otherwise rigidly secured to the shaft 119 adjacent the frame member 3 and side plate 110, and has its outer end pivotally connected to one end of a rigid link 123 that is identical to the link 120, the other end of the link 123 being pivotally connected to the adjacent side plate 110. The arrangement of the bell crank lever 118, shaft

119, and links 120 and 123 is such that reciprocatory movement is applied to both side plates 109 and 110 equally, to insure smooth reciprocatory movement of the upper and lower pressure elements 93 and 94 toward and away from the carriage 70.

A conventional blower 124 comprises a housing 125 rigidly mounted to the cross bars 5 and a fan or impeller 126 that is driven by a motor 127 rigidly mounted on the housing 125, for the purpose of delivering cooling air to the closed and wrapped bundles W during movement thereof between the secondary pressure plates 101 and 106.

For clarity of showing in the drawings, it will be noted that some of the parts of my folding machine are disposed in different positions in some of the views with respect to the positions thereof in others of the views. For instance, in FIG. 1 the first folding blade is shown as being positioned directly above or within the first folding zone A, whereas in FIG. 4, the blade 42 is shown in full lines as being remotely positioned therefrom, a position corresponding substantially to that of FIG. 1 being illustrated in FIG. 4 by dotted lines. Further, the second folding blade 56 with its associated driving parts is shown in FIG. 1 as being fully retracted, whereas in FIG. 6, the same is shown as being fully advanced. Still further, in FIG. 6, the crank arm 80 and its associated roller 82 are shown as being spaced substantially 180 circular degrees from the position thereof illustrated in FIGS. 8 and 9.

The various driving connections between the several operating components of the instant machine are so arranged, that the operation is as follows:

During downward movement of the first folding blade 42 between its cooperating die elements 40 and 41, the second folding blade 56 is disposed in a substantially fully retracted position to permit a bundle W to be disposed in the second folding zone B. Immediately following withdrawal of the first folding blade 42 from the bundle W in the second folding zone B, the second folding blade 56 advances to the left with respect to FIG. 6 to apply a second fold to the bundle W and advance the same between the die elements 60 and 61 to a pair of the cooperating recesses 75 of the flanges 74, said recesses being aligned with the space between the die elements 60 and 61. As the folded bundle W is pushed into the recesses 75, said bundle engages the adjacent ejector head 77 and moves the same radially inwardly, thus causing radially outward movement to be imparted to the diametrically opposed ejector head 77. With reference of FIG. 6, it will be noted that, as the folded bundle is discharged from the second folding zone B to the carriage 70, the adhesive equipped flap Z of the bundle W is disposed in trailing relationship to the bundle W. As the second folding blade 56 is moved to the left from its position shown in FIG. 6 and clears the rotor 70, the crank 80 rotates in a clockwise direction with respect to FIG. 6 to engage the uppermost notch 81 in the geneva wheel 79 to impart counterclockwise rotation thereto, whereby to cause a subsequent pair of cooperating recesses 75 of the rotor 70 to move into register with the space between the die elements 60 and 61 at the delivery end of folding zone B. During this partial revolution of the rotor 70, the upper die element 60 and arcuate guard plate 92 cause the trailing flap Z of the carriage mounted bundle W to become partially folded over the adjacent edge of the bundle.

As successive bundles W are fed to the carriage 70 and moved therein toward registration with the passage 95 between the pressure elements 93 and 94, each thereof are moved in succession into register with said passage 95. Then, when the second folding blade advances to fold a bundle W and insert the same into the carriage 70, a diametrically opposite bundle W is ejected into the passage 95. When this occurs, the trailing adhesive equipped flap Z is folded into contact with an underlying adjacent portion of the wrapper Y and held thereagainst by the upper primary pressure plate 97.

It will be noted, with reference to FIG. 6, that a given ejector head 77 does not move its respective bundle W completely into the passage 95 during its radially outward movement. Hence, the pressure elements 93 and 94 are moved by the crank 116, pitman arm 117, and members 118–123, in a direction away from the carriage 70, to permit subsequent rotation thereof. As soon as a subsequent bundle W is moved by the carriage 70 into registration with the passage 95, the pressure elements 93 and 94 move toward the carriage 70 and subsequent movement of an aligned bundle W toward the closing and sealing mechanism will cause the previous bundle to be advanced in the passage 95 to the left with respect to FIG. 6. As each bundle advances, it is engaged by the heating element 100 to cause sealing of the adhesive equipped flap Z to the underlying portion of the wrapper Y. For the purpose of the present example, it may be assumed that the adhesive is in the nature of thermoplastic resin which will cause the flap to adhere to the underlying portion of the wrapper when the resin is heated and thereafter cooled. As each bundle W is moved to the left with respect to FIG. 6 beyond the heating element 100, and between the secondary pressure plates 101 and 106, it is subject to cooling by a current of air moving through the passage 95 from the blower 124, each bundle W being moved to the left by succeeding bundles until it moves longitudinally outwardly from between the pressure elements 93 and 94 from whence each bundle drops to a suitable collection container or the like, not shown.

It will be appreciated that the flaps Z may be provided with any desired type of adhesive, and that any conventional means may be used to apply the adhesive.

In the event of interruption of the supply of bundles W to the folding zones A and B, the second folding blade 56, during its folding movement, will engage the registered ejector head 77 and move the same radially inwardly sufficient to cause the diametrically opposed bundle W to be moved into the passage 95 between the plates 97 and 104. Thus, at the end of a run, the rotary carriage 70 may be totally cleared of bundles W. Thereafter, when it is desired to remove the wrapped and sealed bundles W from the passage 95, the locking pin 114 is withdrawn from the side plates 109 and 110, and the angle bars 98, heating element 100 and secondary pressure plate 101 are swung upwardly about the axis of the pivot pin 99, thereby affording access to the underlying wrapped and sealed bundles W. The remaining bundles W between the primary pressure plates 97 and 104 are easily moved from the passage therebetween by the operator's fingers, whereby the entire machine is cleared of the bundles W.

My machine has been thoroughly tested and found to be completely satisfactory for the accomplishment of the objectives herein set forth; and, while I have shown a commercial embodiment of my folding and wrapping machine, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention, as defined in the claims.

What I claim is:

1. In a machine for folding and wrapping paper bundles, conveyor means for delivering wrapper equipped paper bundles in succession to a first folding zone, folding mechanism for imparting a first fold to said bundles and their wrappers at said first folding zone in succession and for delivering said folded bundles successively to a second folding zone, said folding mechanism comprising, a pair of laterally spaced die elements and a blade element, said die elements being stationary and said blade element being movable toward and away from the space between said die elements, means including a cam mounting and guiding said blade element for movement in one direction toward said die elements and in a second direction away from said die elements generally normal to said one direction of movement, and power operated means for im-

parting said movements to said blade element, a rotary carriage defining a pair of diametrically opposed bundle receiving recesses, means for imparting intermittent rotary movement to said carriage to move said recesses alternately into register with said second folding zone, second folding mechanism including a reciprocatory member for imparting a second fold successively to said bundles at said second folding zone and delivering said bundles in succession into the recesses of said rotary carriage, a reciprocatory ejector in said carriage operatively associated with said recesses, said ejector being responsive to movement of a folded bundle into one of said recesses to eject a folded bundle from the opposite recess, and wrapper closing and sealing means receiving folded bundles in succession from said carriage, said wrapper closing and sealing means including a wrapper engaging cam portion for moving a free end of the wrapper into over-lapped sealing engagement with an adjacent portion thereof responsive to bundle ejecting movement of said ejector.

2. The structure defined in claim 1 in which said power operated means for imparting said movements to the blade element includes gearing for maintaining said blade element in a constant attitude relative to said die elements during movement of said blade element toward and away from said die elements.

3. In a machine for folding and wrapping flat paper bundles equipped with wrappers having sealing flaps extending outwardly from one end of said bundles, said sealing flaps having adhesive thereon, a frame structure, conveyor means carried by said frame structure for delivering wrapper equipped bundles in succession to a first folding zone, folding mechanism mounted on said frame structure and including spaced stationary die elements and a movable folding blade, means mounting said folding blade on said frame structure for movements in a direction to impart a first fold to said bundle and to deliver said folded bundles to a second folding zone in succession, second folding mechanism including a reciprocatory folding blade mounted in said frame structure for movements in a direction to impart a second fold to said bundles and discharge said bundles from said second zone in succession, a rotary carriage journalled in said frame structure adjacent said second folding zone, said carriage defining a plurality of circumferentially spaced pairs of diametrically opposed bundle receiving recesses, wrapper closing and sealing means carried by said frame structure adjacent said rotary carriage, the diametrically opposed recesses of each pair thereof being adapted to register alternately with said second folding zone and said wrapper closing and sealing means, a plurality of reciprocatory ejectors mounted in said carriage and each operatively associated with a different one of said pairs of said diametrically opposed recesses, said ejectors being responsive to reception of a folded bundle moved into one of their respective recesses by said second folding blade to move the bundle in the opposite recess outwardly therefrom to said wrapper closing and sealing means, and power operated mechanism for imparting folding movements to the first and second folding blades and intermittent rotary movement to said carriage in definite timed relation to folding movements of said folding blades to register successive ones of said recesses with said second folding blade.

4. The structure defined in claim 3 in which said ejectors include ejector rods extending diametrically of said carriage and having bundle-engaging head portions at their opposite ends, the ejector rods of each pair thereof being disposed in axially spaced relation to the ejector rods of the other pairs of ejectors.

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