MACHINE FOR PACKAGING PAPER TUBES

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MACHINE FOR PACKAGING PAPER TUBES.

This invention relates to machines for packaging paper tubes and has for its object to provide a machine of the class specified, simple in construction, accurate in operation and which may be operated at high speed.

To these ends and others which will appear later herein my improvements comprise features illustrated in their present preferred embodiment in the drawings accompanying this specification, wherein Figure 1 is a lengthwise sectional elevation of my improved machine, the section being taken on line 1—1 of Fig. 2. Fig. 2 is a cross-sectional elevation on line 2—2 of Fig. 1. Fig. 3 is a detail elevation looking in the direction of arrow 3 in Fig. 2. Fig. 4 is a front elevation showing details of the pneumatic package filling mechanism in front of what is shown in Fig. 1. Fig. 5 is a plan view corresponding with Fig. 4. Fig. 6 is a perspective view of one of the duplex cans shown in Figs. 4 and 5. Fig. 7 is a cross-sectional elevation of one of the air valves of Figs. 4 and 5. Fig. 8 is a section of one of the relief valves shown in Fig. 4. Fig. 9 is a plan of what is shown in the upper part of Fig. 1. Fig. 10 is a sectional elevation on line 10—10 of Fig. 9. Fig. 11 is a detail section on line 11—11 of Fig. 3 and Fig. 12 is a detail perspective view of a few of the teeth of gear 59, Fig. 3.

Figs. 1, 2, 3, 9, 10 and 11 are to one scale. Figs. 4, 5 and 6 are about one third larger than Fig. 1 and Figs. 7, 8 and 12 are more than twice the scale of Fig. 1.

My improved machine, while applicable to packaging a wide variety of articles such as pencils and other long, slim merchandise, is herein illustrated as particularly applied to gathering, counting, packaging and packaging slime paper tubes, such as are used as sippers at soda-fountains and the like. To these ends this present machine may receive said tubes from the machine in which they are made or from any other source of supply through a delivery guide from which the tubes fall one after another into one pocket of a gated duplex receiving hopper. After a predetermined number of tubes have been thus delivered, said gate is swung to direct subsequent tubes into the other of said hopper pockets. The contents of the filled pocket are then automatically pushed endwise into a carton which previously has been placed in receiving position on the end of said hopper pocket.

Referring now more particularly to the drawings, the operative parts of the machine are preferably mounted on hollow base 4, main driving shaft 5, Figs. 2 and 3, lying lengthwise along the rear of said base and being revoluably supported in ears 6 projecting from said base. Fixed to said shaft is bevel gear 7 meshing with and driving bevel gear 8 fixed to the outboard end of shaft 9. To the inboard end of shaft 9 is fixed bevel gear 10 meshing with and driving opposite bevel gears 12 and 13 which alternately oscillate hopper gate 14 through the following means. Tubular shaft 15 is mounted for rotation in brackets 16, 17 reaching inwardly from the front wall of base 4 (Fig. 1) and equal bevel gears 13, 13 turn freely on said shaft. Adjacent the right hand end of bracket 17 miter gear 18 is fixed to said tubular shaft and meshes with and drives miter gear 19 fixed to the lower end of vertical shaft 20. To the upper end of said shaft 20 is fixed miter gear 21 meshing with and driving miter gear 22 fixed to the right hand end of shaft 23, to the mid portion of which hopper gate 14 is fixed.

For oscillating tubular shaft 15 intermittently in opposite directions, and which intermittent oscillation is transmitted to gate 14, shaft 24 is slidably mounted within tubular shaft 15. Said shaft 24 is constrained to rotate with tubular shaft 15 by key 25, but has a slight endwise play relatively thereto, as keyway 26 in the tubular shaft is longer than key 25. Between gears 12, 13 is spool-shaped friction member 27 having opposite heads 28, 29 adapted for alternately engaging friction discs 30, 31 seated in gears 12, 13 respectively. Key 25 penetrates member 27 whereby said member may transmit rotary motion in either direction from gears 12, 13 respectively to the tubular shaft when frictionally rotated. For causing frictional engagement between the heads of member 27 and gears 12, 13, shaft 24 is thrust alternately endwise by means of oscillating arm 32 which terminates upwardly in yoke 33 having opposite pins as 34 engaging between the collars of sliding sleeve 35 on shaft 24. Said sleeve 35 is keyed to shaft 24 and its keyway has a slight end play on key 36 to permit excess movement of said sleeve. For urging said sleeve to central inoperative position, opposite springs 37, 38 are provided. For engaging pin 39 of arm 32, to move that arm alternately in opposite directions, dog 40 is fixed to disc 41, which in...
turn is fixed to cross shaft 42, having bearings in the front and back walls of base 4. Said shaft is rotated alternately in opposite directions, nearly a full revolution each time, by means of the following mechanism. Above driving shaft 5 and parallel therewith is shaft 43 having bearings in brackets 44, 45 projecting from the rear wall of base 4. To shaft 5 is fixed pinion 46 meshing with and driving gear 80 fixed to shaft 48. To said shaft 43 is fixed cylindrical member 47 having projecting from its periphery two raised parallel ribs 48, 49 which in cross-section are shaped like gear teeth. Member 47 comprises in addition to its body portion, cap member 53 held in place by screws as 54. Ribs 48, 49 extend circumferentially about member 47 including cap member 53 and terminate oppositely against cylindrical block 50, housed within a suitable bearing 52 in member 47 and cap 53. The axis of block 50 is radial to member 47 and said block is free to oscillate on said axis in its bearing 52. Block 50 has on its outer face a projecting rib or tooth 60, which in one position of said block, connects and makes continuous the adjacent end of rib 49 and the opposite adjacent end of rib 48. When said block is oscillated a short distance in anti-clockwise direction, Fig. 3, said tooth 60 will connect the upper adjacent end of rib 48 with the lower opposite end of rib 49. For oscillating block 50, head 55 thereof lies under cap 53 and has gear teeth in a portion of its periphery for engagement with the teeth of rack 57 mounted for sliding movement in member 47 under cap 53, parallel with shaft 43. Said rack 57 projects from either side of member 47 and is actuated alternately in opposite directions by dog 58 extending radially from large gear 59 fixed to shaft 42 therebelow. The teeth of gear 59 are engaged by ribs 48, 49 of member 47 and at each revolution of member 47 tooth 60 of block 50 engages between two adjacent teeth of gear 59 and rotates that gear an increment of one tooth. The teeth of said gear 59 are diamond shaped, see Fig. 12, so as to provide suitable engaging surfaces for tooth 60, irrespective of its angular relation to the teeth of said gear. For releasably retaining block 50 in either of its operable positions, sliding lock 61, having a wedge shaped end, is spring urged to engage one or the other of two suitable notches in the periphery of head 55.

Reverting now to the duplex hopper, the two members of which alternately receive a predetermined number of paper tubes or the like for final deposit into cartons, said hopper members 62, 63 are preferably of sheet metal and as illustrated, each has three walls and an open upper side facing gate 14. Said hopper members are supported from base 4 in a suitable bracket 64. Gate 14, fixed to rockshaft 28, is oscillated from time to time as required, by means already described.

The paper tubes may be advanced through lengthwise channel 66 in guide 67, Fig. 10 by some convenient means such as feed rolls 114, 115, geared together and driven from main shaft 5 through the train of gears shown in Fig. 3, wherein bevel gear 116, fixed to said shaft 5, meshes with and drives bevel gear 117, fixed to the lower end of vertical shaft 118. To the upper end of said shaft 118 is fixed bevel gear 119 meshing with and driving bevel gear 120 fixed to lower roll shaft 121. Said tubes, as 68, when delivered from the left hand end of said guide, fall between end wall 69 and the upstanding wall 70 of bracket 64, against gate 14 and into that hopper member which is at the moment open for their reception, as 63, Fig. 2. Said hopper members extend to the left beyond wall 69 and are adapted for receiving thereover, cartons as 71 shown on hopper member 63, Figs. 9 and 10.

For ejecting the tubes gathered in alternate lots in the alternate hopper members, two sets of mechanisms are provided, one for each hopper member. As these mechanisms are duplicates of one another a description of one will suffice. Shaft 72 is slidably mounted in bearing 73 in bracket 64 and terminates at the left, Fig. 10, in pushplate 74, the tube engaging face of which, when at rest, lying in the plane of hopper wall 70, just within the right hand end of hopper member 63. Said plate is square, filling the hopper member transversely, so as to eject the full contents of said hopper member, when moved forwardly to the left.

Lying below the top wall of base 4 is pneumatic cylinder 75, Figs. 1, 2, 3 and 10, whose piston 76 is connected at its outer left hand end, by arm 77 with shaft 72. Said cylinder 75 is connected near one end with air pipe 78 and near the other end with air pipe 79. Said pipes connect said cylinder with opposite outlets of valve 81, Figs. 4, 5 and 7. The other cylinder 85 is similarly connected by pipes 82, 83 with opposite outlets of valve 84. Said valves 81, 84 are connected at their lower sides respectively, by pipe 86 with some known source of air pressure, not shown. Valve 87 of known character may be used to open or close the flow of air in pipe 86.

Valve 81 is operated through its lever 88 by cams 89 and 90 fixed to shaft 42. Valve 84 is operated through its lever 91 by cams 92 and 93 also fixed to shaft 42. Directing attention particularly to valves 81 and 84, which are right and left duplicates, a description of valve 81 shown in section in Fig. 7 will suffice for both. The body of valve 81 has opposite small ports 94, 95 connecting its interior with pipes 78, 79 respectively and midway between said ports, in the bottom of said valve is larger port 96 connecting with inlet pipe 86. Valve plug 97, fixed to valve stem 98, has approximately opposite ports 99, 100 for alternately admitting air from
pipe 86 through ports 94, 95 to pipes 78, 79 respectively.

Valve lever 88, at its hub end is yoke-shaped, straddles block 101 fixed to valve stem 59 and swivels on pin 102 projecting oppositely from said block. Arm 88 is separated from 101 and the valve body is arm 103. Said arm supports at its outer end one end of spring case 104, the other end of said case impinging against lever 88. Within said case 104 is the usual push spring for urging lever 88 in clockwise direction, Fig. 5. Said lever is restrained from excess movement by the head of stop pin 105 seated in arm 103. Said lever 88 is urged to engagement with cam 89 by spring case 106, within which is the usual push spring. Said spring case is freely seated at its upper end, Fig. 4, in bracket 107 which also provides a seat for the companion spring case 108 for lever 91.

Valve 84 is operated through lever 91 from cams 92, 93 similarly in all respects to the described operation of valve 81.

Each end of each of cylinders 75, 85 is provided with a relief valve 109, such as shown in section in Fig. 8. In said figure said valve is shown open under pressure of air entering at 110, ports 111 of spring urged valve plug 112 being in register with ports 113 of the valve body.

The operation of my improved machine is as follows: Tubes 68, being delivered through guide 67, preferably at a uniform rate timed with the oscillation of gate 14, fall into hopper member 63, assuming said gate to be in the position of Figs. 2, 9 and 10. As the number of tubes to be put into a given carton nearly reaches the predetermined quantity in said hopper member 63, shaft 42 rotating in anti-clockwise direction, Fig. 1, causes dog 40 of disc 41 to push arm 32 to the left whereby shaft 24 moving to the left, urges head 29 of friction member 27 into engagement with gear 13, whereby said gear rotates tubular shaft 15, shafts 20 and 23, swinging gate 14 in clockwise direction, from the position of Fig. 2, where it is disposed to direct tubes into hopper member 63, to in front of said hopper member, whereby the tubes are directed into hopper member 62.

Directly following this operation, cam 89 rotating in anti-clockwise direction, Figs. 4 and 5, presents its projecting horn against the beveled end of valve arm 88 and swings that arm in anti-clockwise direction, Fig. 5. Then, under the pressure of spring means 106, said arm swings downwardly, Fig. 4, onto the low part of cam 90, thus bringing valve ports 100 and 93 into coincidence, Fig. 7. Air pressure thereupon passes through pipe 79 into the right hand end of cylinder 75 and forces piston 76, shaft 72 and push plate 74 to the left, Figs. 9 and 10, whereby the contents of hopper member 63 are ejected into carton 71.

Directly thereafter gear 59, rotating in clockwise direction, Fig. 3, presents its dog 58 against the left hand end of rack 57 in member 47 and, pushing that rack to the right, rotates block 50 a short distance in anti-clockwise direction, shifting its rib and tooth 60 to coincidence with the upper end of rib 48 and the lower end of rib 49, thus reversing the direction of rotation of gear 59. This reversed direction of rotation of gear 59 and shaft 42 will release block 40 of disc 41 from engagement with arm 32 and release the frictional engagement of head 29 with gear 13, and presently cam 90 will rotate sufficiently in clockwise direction, Fig. 4, to lift arm 88 again to the position of said Fig. 4, when the free end of said arm will snap back onto cam 89. This lifting of arm 88 will close the right hand port of valve 81, Fig. 7 and open the left hand port, thereby admitting air to pipe 78 and to the left hand end of cylinder 75, whereby push plate 74 is withdrawn to the right to the position of Figs. 9 and 10.

At the end of this cycle of movements hopper member 62 will be filled, gate 14 will be swung back to its position of Fig. 2 and the contents of hopper member 62 will be discharged, all as described in connection with hopper member 63.

I claim:

1. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, a gate, movably mounted between said hopper members, adapted, at one time, to close one hopper member and to direct tubes into the other hopper member and at another time to close said other hopper member and to direct tubes into said first mentioned hopper member, means for moving said gate and means for timing said instrumentalities with each other.

2. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, a gate, movably mounted between said hopper members, adapted, at one time, to close one hopper member and to direct tubes into the other hopper member and at another time to close said other hopper member and to direct tubes into said first mentioned hopper member, means for moving said gate, a push plate contiguous to one end of each hopper member, means for moving said push plates alternately lengthwise through said hopper members respectively for ejecting tubes therefrom and means for timing said instrumentalities with each other.

3. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, a gate, movably mounted between said hopper
members, adapted, at one time, to close one hopper member and to direct tubes into the other hopper member and at another time to close said other hopper member and to direct tubes into said first mentioned hopper member, means for moving said gate, a push plate contiguous to one end of each hopper member, means for moving said push plates alternately lengthwise through said hopper members respectively for ejecting tubes therefrom, means for timing said instrumentalities with each other and means on each hopper member for sustaining a tube receiving carton.

4. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, a gate, oscillatably mounted between said hopper members, adapted, at one time, to close one hopper member and to direct tubes into the other hopper member, and at another time to close said other hopper member and to direct tubes into said first mentioned hopper member, means for oscillating said gate comprising a rotatable member, means for rotating said rotatable member in opposite directions, two coaxial gears, means for driving one of said gears in one direction and the other of said gears in the opposite direction, means for frictionally engaging either of said gears, means operatively connecting said friction means with said gate, means carried by said rotatable member for urging said friction means to engagement alternately with said coaxial gears and means on each hopper member for sustaining a tube receiving carton.

5. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, a gate, oscillatably mounted between said hopper members, adapted, at one time, to close one hopper member and to direct tubes into the other hopper member and at another time to close said other hopper member and to direct tubes into said first mentioned hopper member, means for oscillating said gate comprising a rotatable member, means for rotating said rotatable member a predetermined amount in one direction and an equal amount in the opposite direction, two coaxial gears, means for driving one of said gears in one direction and the other of said gears in the opposite direction, means for frictionally engaging either of said gears, means operatively connecting said friction means with said gate, means carried by said rotatable member for urging said friction means to engagement alternately with said coaxial gears and means on each hopper member for sustaining a tube receiving carton.

6. In a machine of the character described the combination of a hopper, means for feeding tubes to said hopper, a push plate contiguous to one end of said hopper, means for moving said push plate including a cylinder, a piston therein operatively connected with said push plate, means for admitting pressure to said cylinder against one end of said piston at one time and against the other end of said piston at another time and means for timing said admission of pressure to the opposite ends of said piston.

7. In a machine of the character described the combination of a hopper, means for feeding tubes to said hopper, a push plate contiguous to one end of said hopper, means for moving said push plate including a cylinder, a piston therein operatively connected with said push plate, means for admitting pressure to said cylinder against one end of said piston at one time and against the other end of said piston at another time comprising a valve having a pressure intake and two pressure outlets, said pressure outlets being connected respectively with opposite ends of said cylinder and means for opening, at one time, one of said pressure outlets and closing the other and at another time, for opening the other pressure outlet and closing the first mentioned outlet.

8. A machine according to claim 7 characterized by the fact that the valve operating means includes a rock shaft in said valve, a cam lever operatively connected therewith for rocking said shaft, said lever being pivoted to swing in a plane parallel with the axis of said shaft, a pair of cams adapted for coaction with said lever, one of said cams being effective for swinging said lever in a plane parallel with the axis of said shaft, into engagement with the other cam, said other cam being effective for moving said lever for rocking said shaft and means for rotating said cams in unison alternately in opposite directions.

9. In a machine of the character described the combination of tube ejecting means including a push plate, a cylinder, a piston therein operatively connected with said push plate, a rotary valve for controlling the action of said piston, a rock shaft in said valve, a cam lever operatively connected therewith for rocking said shaft, said lever being pivoted to swing in a plane parallel with the axis of said shaft, a pair of cams adapted for coaction with said lever, one of said cams being effective for swinging said lever in a plane parallel with the axis of said shaft, into engagement with the other cam, said other cam being effective for moving said lever for rocking said shaft and means for rotating said cams in unison alternately in opposite directions.

10. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, means for feeding tubes to said hopper, means adapted and actuated for directing tubes alternately to said tube receiving member.
bers, a push plate contiguous to one end of each hopper member, means for moving said push plates alternately lengthwise said hopper members respectively for ejecting tubes therefrom and means for timing said instrumentalties with each other.

11. In a machine of the character described the combination of a duplex hopper having oppositely disposed tube receiving members, means for feeding tubes to said hopper, an oscillatable gate adapted for directing tubes alternately to said tube receiving members, means for oscillating said gate comprising a rotatable member, means for rotating said rotatable member in opposite directions and means for operatively connecting said rotatable member with said gate.

In witness whereof, I hereby affix my signature this 30th day of October, 1926.

CHARLES F. SMITH.