Sept. 12, 1933. H. H. ORR 1,926,241

PAPER BAG MACHINE

Filed May 31, 1930 7 Sheets-Sheet 1

FIG. 1

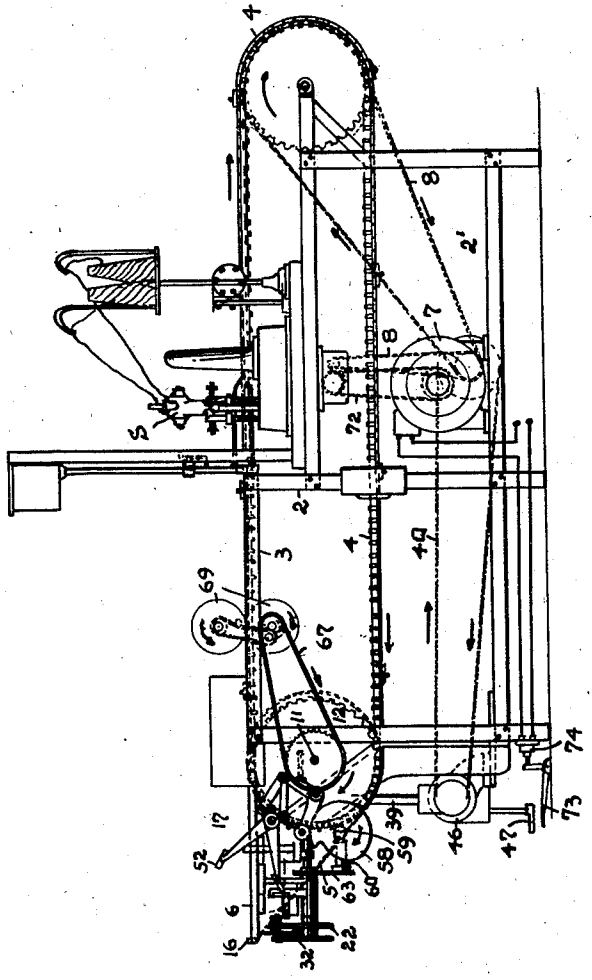


FIG. 7

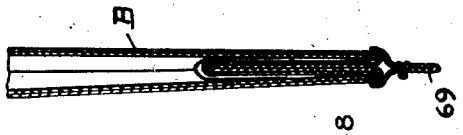


FIG. 6

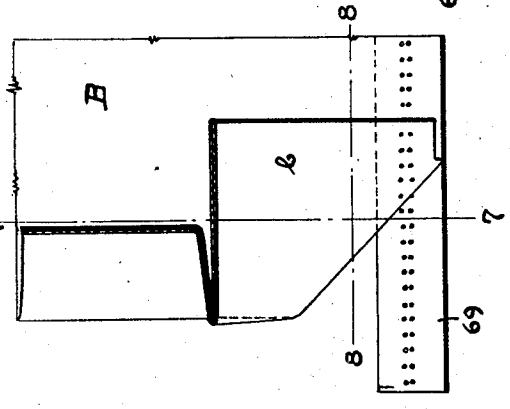
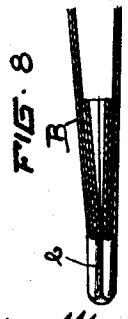


FIG. 8



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PAPER BAG MACHINE

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FIG. 2

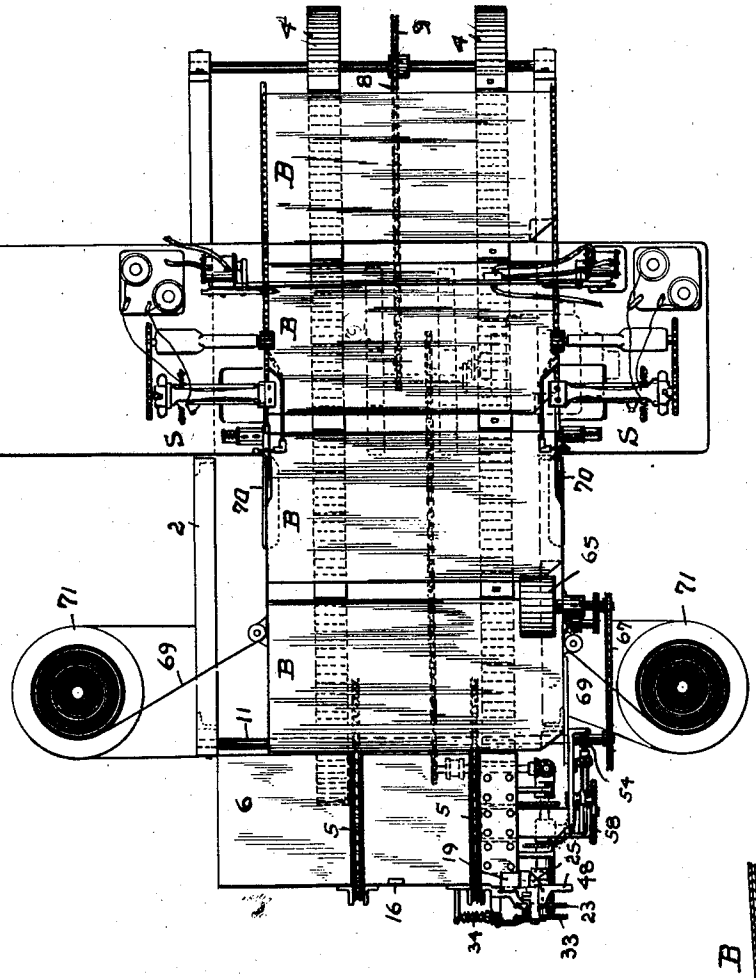


FIG. 3

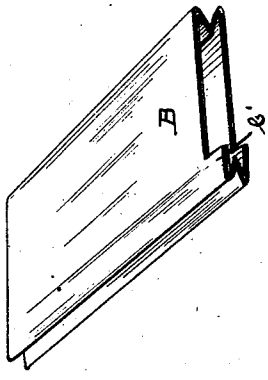


FIG. 4

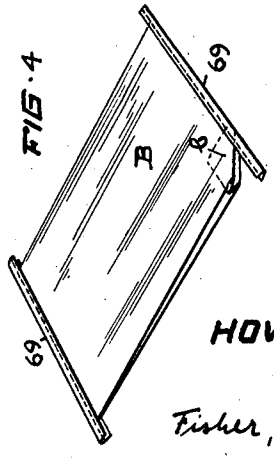
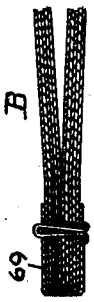


FIG. 5



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PAPER BAG MACHINE

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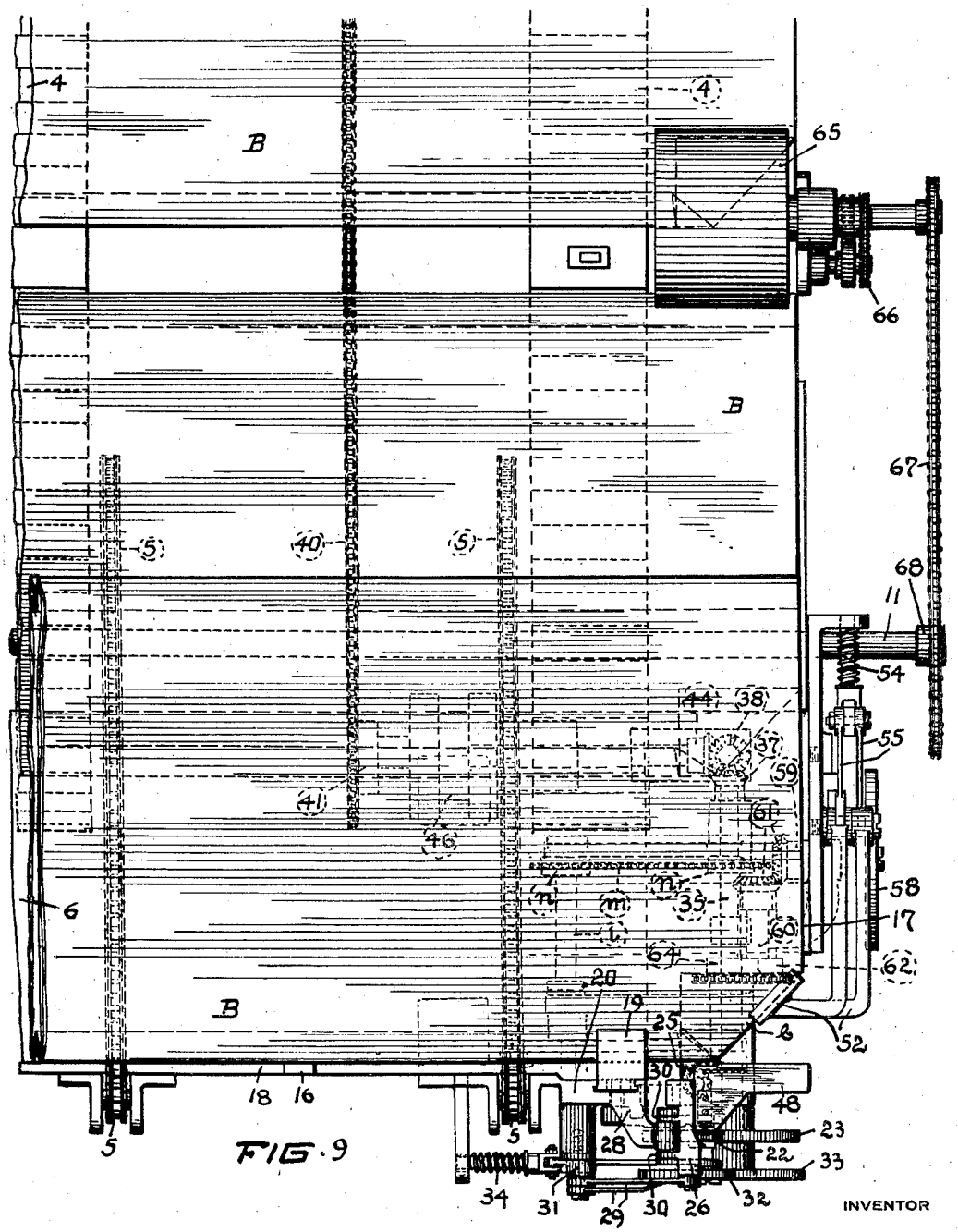


FIG. 9

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PAPER BAG MACHINE

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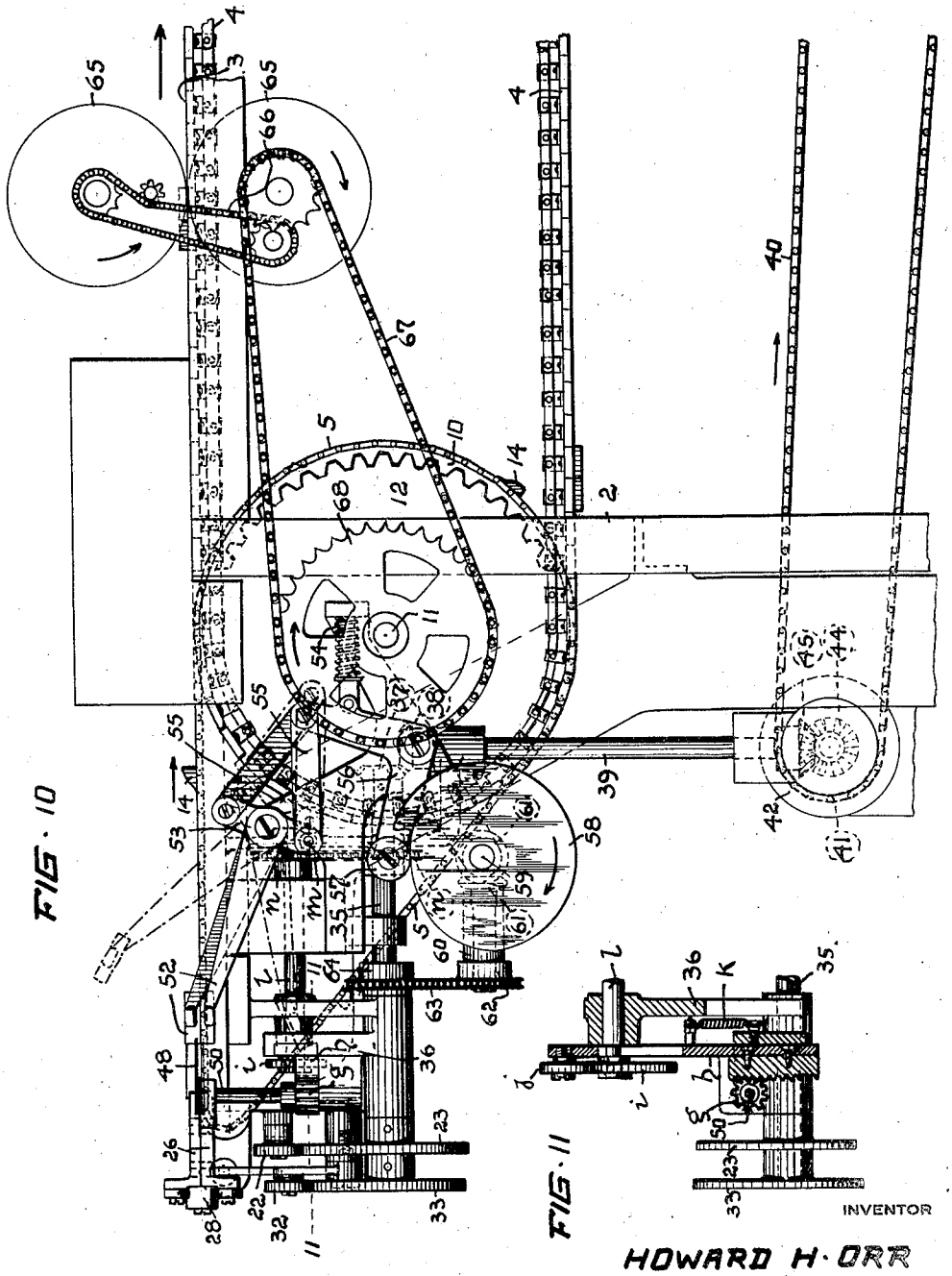


FIG. 10

FIG. 11

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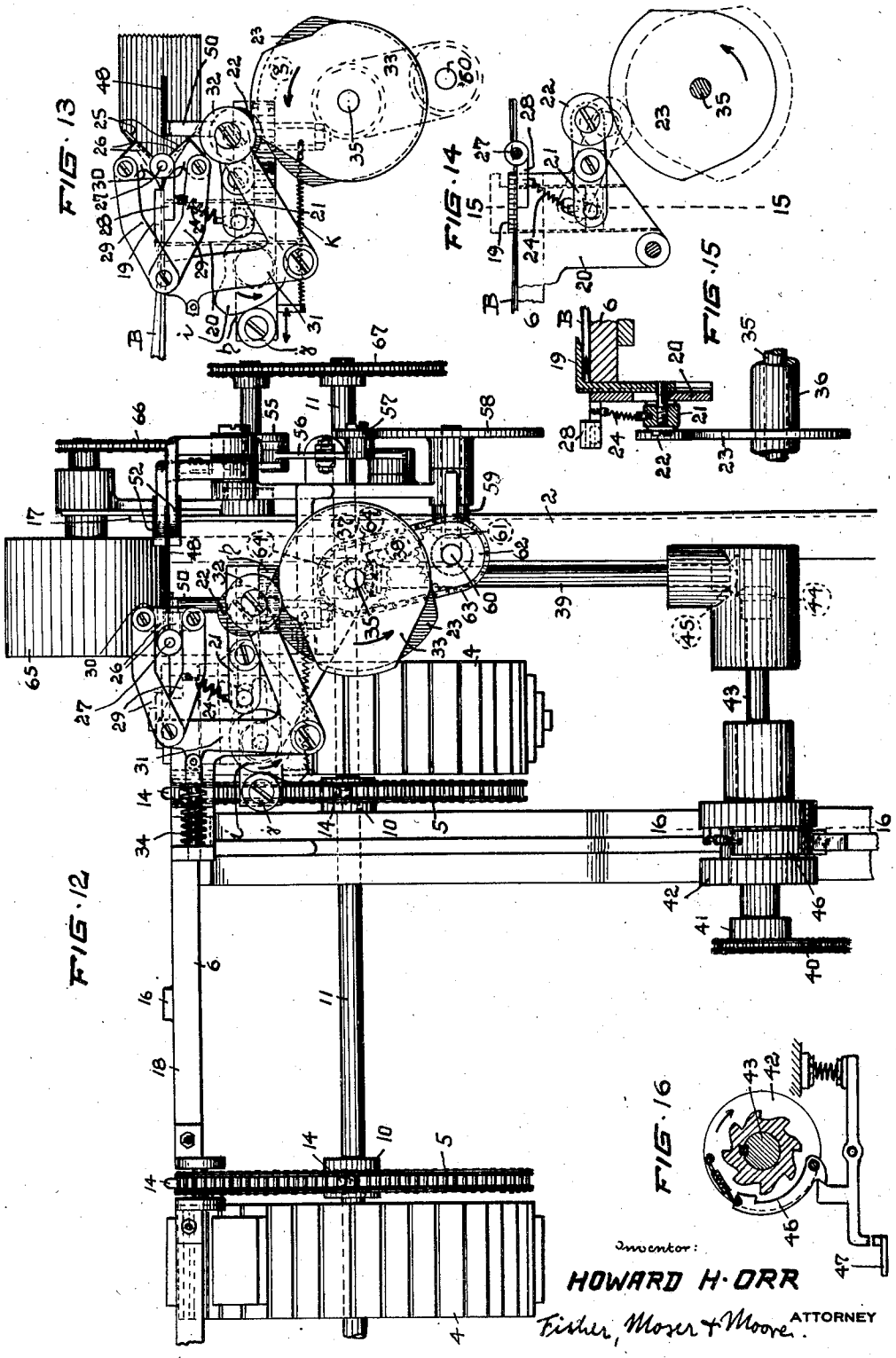


FIG. 12

FIG. 13

FIG. 14

FIG. 15

FIG. 16

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FIG. 19

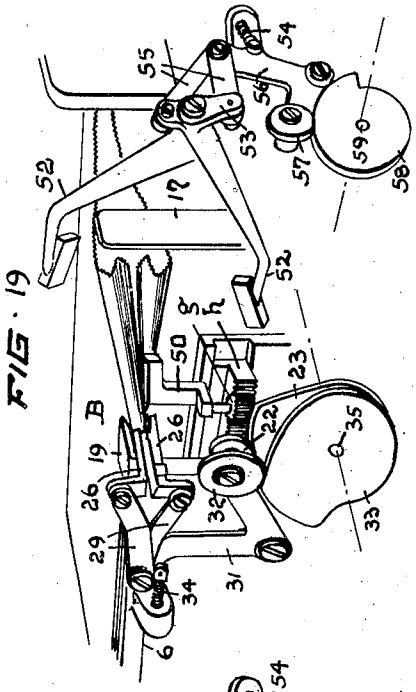


FIG. 20

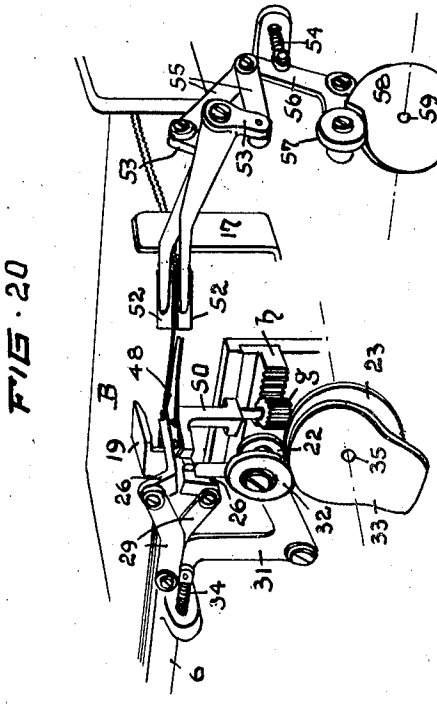


FIG. 17

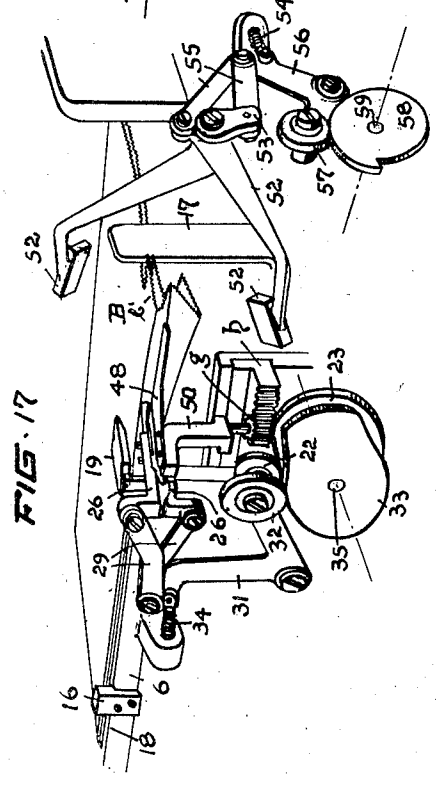
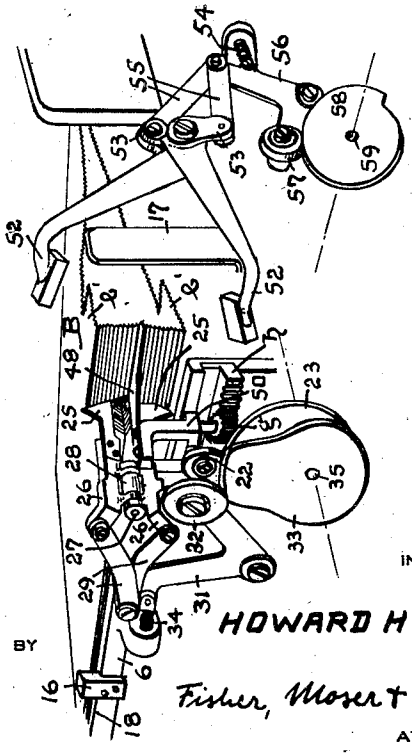


FIG. 18



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PAPER BAG MACHINE

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FIG. 21

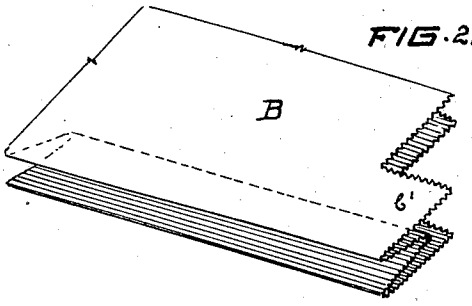


FIG. 22

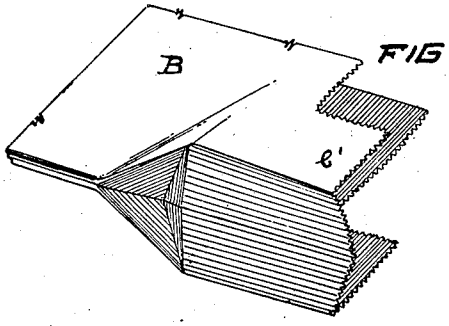


FIG. 23

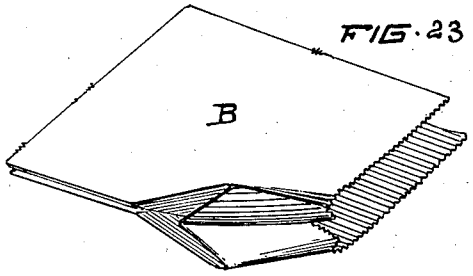


FIG. 24

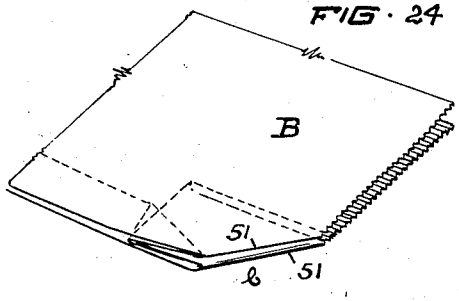


FIG. 25

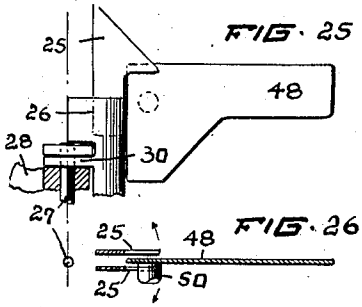


FIG. 26

FIG. 27

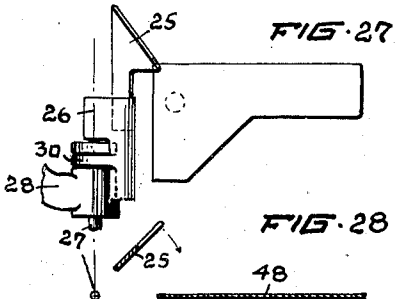


FIG. 28

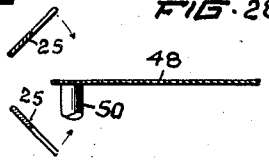


FIG. 29

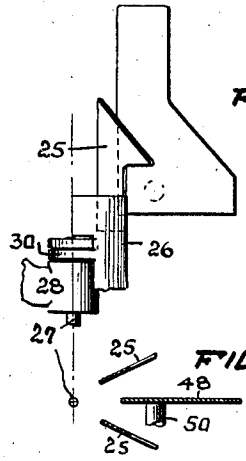


FIG. 30

FIG. 31

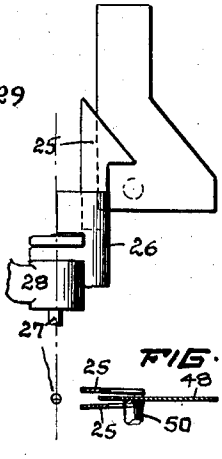


FIG. 32

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ATTORNEY

Patented Sept. 12, 1933 1,926,241

UNITED STATES PATENT OFFICE

1,926,241

PAPER BAG MACHINE

Howard H. Orr, Cleveland, Ohio, assignor to The Jaite Company, Jaite, Ohio, a corporation of Ohio

Application May 31, 1930. Serial No. 458,337

9 Claims. (Cl. 93—8)

My invention relates to a machine for manufacturing paper bags, particularly plicated paper bags which are sewn and bound transversely at their opposite ends and also formed with a self-closing sealing valve in one corner thereof. Bags of this type are commonly used for transporting cement and other powdered materials easily affected by weather or atmospheric conditions, and the bags are relatively large and must be strong enough to hold a substantial amount of material, say approximately one-hundred pounds. Customarily, four or more plies of tough paper stock are used to produce a bag embodying the desired protection, strength and durability. Therefore, in producing such bags automatically by machinery one problem is to produce rapidly and accurately tucked folds on angular lines in the relatively stiff plicated walls to form the valvular part of the bag. This problem the present machine has been designed to overcome, together with other related problems entailed in sewing and binding the opposite ends of one tucked product during feed movements thereof, and while tucking proceeds co-incidently on other bag bodies. Thus, the present machine is particularly constructed to tuck, sew and bind multi-ply plicated paper bodies in rapid succession and without stop or interruption simply by supplying or placing flat tubular blanks or bodies upon the receiving end of the machine, and while the finished bags are being discharged at the opposite end of the machine.

In the accompanying drawings, Fig. 1, (Sheet 1) is a side view, on a reduced scale, of a bag making machine embodying my improvements, and Fig. 2 (Sheet 2) is a top view thereof. Fig. 3 is a perspective view of a tubular blank from which a bag is produced, and Fig. 4 is a similar view of a completed bag. Fig. 5 is an enlarged sectional view of one sewed end of a bag, and Fig. 6 is an enlarged sectional view of the valve portion of the bag. Fig. 7 is a longitudinal section of the valve portion of the bag on line 7—7 of Fig. 6, and Fig. 8 a transverse section of the valve portion of the bag on line 8—8 of Fig. 6. Fig. 9 (Sheet 3) is a top view on a larger scale than Fig. 2, showing one corner of the receiving end of the machine, and Fig. 10 (Sheet 4) is a side elevation of the receiving end of the machine, and Fig. 11 is a plan view in section on line 11—11 of Fig. 10. Fig. 12 is an end elevation showing the folding devices in one operating position, and Fig. 13 is a similar view of the same devices in another working position. Fig. 14 is an end view of the clamping devices associated with the fold forming devices, and Fig. 15 a sectional view of the same parts on line 15—15 of Fig. 14. Fig. 16 is a sectional view of the clutch, on line 16—16 of Fig. 12. Figs. 17 to 20, inclusive, (Sheet 6) are perspective views of the valve folding and forming devices in different operating positions.

Figs. 21 to 23, inclusive, are perspective views of the valve portion of a single-ply bag in several stages of development, and Figs. 24 to 32, inclusive, are plan and sectional views of the folding and tucking blades in the different operating positions which they assume in producing the folds shown in Figs. 21 to 23, inclusive.

The machine comprises a main frame 2 having a flat top or table 3 which is slotted or channeled longitudinally to permit the upper reach or stretch of an endless conveyor, or a pair of conveyors 4—4 to feed a series of flat tubular bag bodies or blanks B in parallel spaced relation from end to end thereover. Co-operating with conveyors 4—4 are two shorter endless feed chains or belts 5—5 located beneath the receiving shelf 6 of table 3. An electric motor 7 mounted within the base part 2' of frame 2, and sprocket chains 8 and sprocket gears 9, drive conveyors 4—4. The feed chains or belts 5—5 are driven by the movement imparted to conveyors 4—4, gears 10 being fixed to the driven shaft 11 carrying one pair of sprocket wheels 12 for the conveyors 4—4.

The feed chains 5—5 are provided at spaced intervals with lugs 14 adapted to project upwardly beyond the flat top of table 3 and to travel a short distance lengthwise thereof in the same horizontal plane as the upper reach of the conveyors 4—4. These conveyors have projecting pieces 15 at spaced intervals thereon to pick up and move the blanks or bodies B lengthwise over the table top when fed forward singly and successively in parallel spaced relation by the feed chains 5—5. The bag bodies B are flat plicated tubes which are relatively thick where plicated, owing to the number of plies or sheets of paper of which they are composed. The plicated side also tends to spread open so that when these bag bodies B are placed transversely upon receiving shelf 6 the feed chains 5—5 will engage the plicated edges and feed the bag bodies forward singly and in succession to the conveyors 4—4. However, the spacing of the feed lugs 14 on the chains is such that each bag body B remains at rest for a short interval on table 3 before it is fed forward, although the feed chains and

the conveyors are moving continuously. The bag bodies B which are fed forward in that way are therefore spaced apart uniform distances and carried forward in that relation so that each may be operated upon separately after producing a triangular tuck or pocket *b* in one plicated corner of each tube or body B, while it is temporarily at rest upon shelf 6.

Assuming that a tucking operation has just been completed on one tube or bag body B, the next tube to be operated on is lowered in an overlapping position upon the tucked tube while the latter is being fed forward by chains 5—5. In this proceeding one end edge of the new tube is placed against a guide rail 16 and an upright stop 17, and the plicated longitudinal side edge of the tube is aligned with the straight transverse edge 18 of shelf 6 and placed beneath a clamping jaw 19 which is mounted to slide vertically upon a channeled bracket 20 suspended from the shelf at said edge 18. A short pivoted lever 21 is connected at one end to a depending part of clamping jaw 19, and the opposite end of this lever carries a roller 22 which rides on a cam 23, against which it is yieldingly held by a tension spring 24. Thus, the rotatable movement of cam 23 will raise the clamping jaw at timed intervals and also lower and hold it in a clamping position for a given period of time. When lowered it clamps the plicated portion of tube B down upon the shelf a predetermined distance back from the end edges of the tube, and it is in this plicated corner area of the tube that the triangular tuck or pocket *b* is produced. Shelf 6 is also of less width than table 3 at the corner of the machine so that the end of the tube overhangs an open space when the tube is deposited on the shelf with its end edge abutting guide rail 16 and stop 17. A short tongue *b'* is also provided at one end corner of the tube, which tongue forms an extension of the valve pocket in the bag eventually. Thus, in placing the tube against guide rail 16 the tongue *b'* projects beyond the upright stop 17, thereby preventing the tube from being carried onward until the clamping jaw 19 grips the tube while the tucked bag beneath it is being fed forward by chains 5—5.

When the tube is first placed in position upon the shelf its plicated side walls enfold a pair of oscillatory plates 25—25 of triangular shape lying normally close together face to face in a horizontal plane. These plates are affixed to separate hinge members 26 having a common axis or shaft 27 supported by a bracket 28 extending outwardly from shelf 6, so that both folding plates may be turned and unfolded in opposite directions until they stand at acute angles to the horizontal plane of the tube. In so doing portions of the plicated walls of the tube between the plates and the clamping jaws are spread apart upon definite angular folds lines corresponding to the outlines of a tetrahedron, while other portions of the plicated walls extending toward the open end of the tube are buckled outwardly to approximately right angles to the plane of the bag, see Figs. 13 and 18.

The means for rotating the folding plates 25—25 in opposite directions simultaneously consist of a pair of links 29—29 connected pivotally to the ears 30 on the folding plates, both links being also pivotally connected to a bell crank 31 having a roller 32 at the end of one of its arms. This roller is pressed constantly against a rotatable cam 33 by a compression spring 34 connected to the second arm of the bell crank. Cam 33 is fixed to the outer end of rotatable shaft 35 supported in a hanger 36, and this shaft is driven by bevel gear 37 meshing with a bevel gear 38 on an upright shaft 39. Power is transmitted to these parts from motor 7 by a sprocket chain 40 extending lengthwise of the machine to a sprocket wheel 41 carried by a sleeve 42 on a clutch shaft 43 having a bevel gear 44 meshing with a similar gear 45 at the lower end of upright shaft 39. A normally dis-engaged clutch 46 of any suitable kind may be employed to connect shaft 43 with the power driven sleeve 42, together with a foot treadle 47 and other controlling devices whereby the train of operating parts for the folding plates 25—25 may be thrown into action for a brief interval whenever a bag tube is in position and the operator wishes to spread the plicated sides and produce tucked folds therein. This operation is speedy and when finished the clutch is disconnected or thrown out automatically.

Several operations take place when the clutch is thrown in; first, the folding plates are unfolded to spread the plicated sides of the tubes and develop triangular folds therein; and secondly, a tucking blade 48 is oscillated, that is, rotated a quarter and back again while the folding plates are being folded together again. Tucking blade 48 is mounted on the upper end of a vertical shaft 50 and oscillates in a horizontal plane corresponding to the axis of the folding plates and closely adjacent thereto. Normally the tucking blade extends forwardly and parallel with the plicated side edges of the tube so that it may strike the plicated side wall centrally thereof after the folding plates have spread the tube open and stretched the plicated portions of the tube at substantially right angles in respect to the tucking blade. The blade is then rotated a quarter or a degree or more beyond a quarter turn, to buckle and tuck the corner walls and extension *b'* of the tube inwardly between the flat outer walls of the tube. In so doing a short valve pocket is formed extending transversely of the tube and open to the interior thereof, and during the striking movement of the tucking blade the folding plates are caused to move toward each other co-incidently with the flexing movement of the main walls of the tube which are necessarily drawn together at the mouth thereof when tucking takes place. The triangular portions are therefore always under tension during tucking operations. The means for oscillating the tucking blade 48 at time intervals comprises a pinion gear *g* on shaft 50, a reciprocable rack bar *h* in mesh with said gear, a rotatable cam *i* engaging a roller *j* on rack bar *h*, a coiled tension spring *k* attached to bar *h*, and a short shaft *l* which is rotated by a sprocket chain *m* and sprocket wheels *n* deriving their power from shaft 35, see Figs. 10 and 11.

Keeping in mind that the tube is composed of a plural number of plies of stiff paper it is self-evident that all the bent folds formed in the corner of the tube are not sharply and abruptly defined but are more or less rounded and still capable of springing open and apart, especially the corner folds 51—51 inclined at an angle of about 45° to the straight side and end edges of the tube. Consequently, these corner folds are compressed to nearly a flat state by a pair of

pivoted pressing devices 52—52 having short crank arms 53—53. These devices are adapted to be spread and held apart for an interval of time and then suddenly released and forced together by a compression spring 54 to compress the rolled folds which tend to gap open. Thus, arms 53 are connected by links 55 to a bell crank 56 which is subject to the pressure of a compression spring 44. This bell crank carries a roller 57 having riding engagement with a rotatable cam 58 mounted on a jack shaft 59 driven by a second jack shaft 60 and miter gears 61. A sprocket 62 on shaft 60 is connected by a sprocket chain 63 to a sprocket wheel 64 fixed to a rotatable shaft 35 hereinbefore described, thereby completing the train of mechanism for oscillating the pressing or compacting devices 52.

After each pressing operation the devices 52—52 are opened or spread apart and the tube operated on is picked up by the projections on the feed chains and shifted bodily over the shelf to the conveyors. While this particular tube is in motion a second tube is deposited thereon and on shelf 6 beneath clamping jaw 19. All the folds in the tube being fed forward are not fully developed, that is, they are not all sharply creased, and there is still a tendency in the folded walls to spring open or apart at the mouth of the tube, a condition which is apt to bring about mal-function in subsequent binding and sewing operations. Therefore the folded end of the tube is caused to pass between a pair of flattening rollers 65—65 which are driven in opposite directions by a train of sprocket wheels and chains 66 and 67, respectively, deriving their power from a sprocket wheel 68 on one of the conveyor wheel shafts, shaft 11 in this instance.

The tucked product is now completely flattened and carried forward in that condition by the conveyors to a pair of sewing machines S—S which are operated simultaneously to stitch or sew the opposite ends of each tube shut, including the parallel end edges of the tucked portion in one corner of the tube.

Two strips of binding tape 69—69 are also folded around the end edges of the tube and stitched thereto in the sewing operation, the tape being fed to yielding folders or hemming devices 70—70 from separate reels 71—71 mounted rotatably at opposite sides of the machine. The tape feeding and hemming devices and the sewing machines are preferably of the type and kind shown and described in Letters Patent of the United States, No. 1,749,118, granted to Samuel Wechsler, on March 4, 1930, and therefore, a detailed description thereof is omitted herein to avoid prolixity, especially as no claim for such mechanism per se is made herein.

However, the present feeding and tucking devices are co-operatively connected and combined with such old mechanisms that the operations thereof to produce finished bags from mere tubes may proceed rapidly and continuously under the control of a single operator. Thus, the sewing machines are also operatively driven by sprocket gears and chains 72 from motor 7, to permit tucking, hemming, and sewing operations to proceed simultaneously. Hemming and sewing are continuous operations coinciding with the movement of the conveyors, while clamping tucking and compressing of the tubes are intermittent operations quickly produced but also timed to co-incide with the feed movement of the conveyors. All the operations incident to tucking, feeding, hemming and sewing may be stopped instantly by stopping motor 7, a foot treadle 73 and an electric switch 74 being provided at the tucking end of the machine for starting and stopping purposes. The operator also is in touch and controls clutch pedal 47 at this point. Consequently, he may start and stop the machine at all times, and also control each tucking operation while the machine is running, timing the tucking to occur with the clamping of a tube on the receiving shelf while the last tube tucked is being forced forward by the feed chains to the conveyors 4—4.

What I claim, is:

1. In a machine for making valved bags from flat plicated tubes, means for folding a valve pocket in a plicated tube, means for compressing the folds of said valve pocket flat, means for sewing the opposite ends of said tube including a part of said valve pocket shut, and means for automatically conveying the tubes from said folding and compressing means to said sewing means.

2. In a machine for making valved bags from flat plicated tubes, devices for producing valve folds in a plicated tube; a conveyor for delivering the tubes from said devices to a pair of sewing machines; power-driven mechanisms for operating said devices, sewing machines and conveyors; and manually-controllable means for effecting intermittent operation of said valve producing devices co-incident with conveying and sewing operations.

3. In a machine for making valved bags from flat plicated tubes, means for forming valve folds in one corner of a plicated tube; a pair of sewing machines for stitching the opposite ends of the tubes concurrently; means for conveying the tubes from said forming means to said sewing machines; controllable means for operating said sewing machines and conveying means concurrently; and means, including a manually-controllable device, for operating said forming means intermittently.

4. In a machine for making valved bags from flat tubes, a pair of oppositely disposed sewing machines, automatic means for feeding bag tubes between and to said machines; and automatic means for tucking a valve pocket in a corner of each tube including spring actuated means for flattening the tucked folds at said corner, preliminary to feeding the same to said sewing machines.

5. In a bag making machine, means for clamping a plicated tube a predetermined distance back from one end edge thereof, triangular oscillating devices adapted to extend into the plicated portion of said tube adjacent said clamping means, means for oscillating said triangular devices to form triangular folds in said plicated portion, means for tucking the plicated walls of the tube inwardly adjacent said folds to form a short valve pocket at one end edge of said tube, means for shifting during tucking operations said triangular blades gradually toward each other, and means for flattening the folded portions of said tube.

6. In a bag making machine, a shelf; means adapted to clamp a plicated portion of a plicated tube upon said shelf; oscillating means, including plates of triangular shape extending into the plicated portion of said tube; means

adapted to oscillate said plates in opposite directions, a tucking device adapted to oscillate in respect to said plates, and cam mechanism and a clutch for operating said clamping and oscillating means and said tucking device.

7. In a bag making machine, a shelf, a reciprocable clamping member adapted to clamp a plicated portion of a plicated tube upon said shelf, means adapted to spread and form triangular folds in the plicated portion of said tube adjacent said clamping means, tucking means adapted to buckle the spread walls of the tube inwardly at approximately right angles to the plicated edge of the tube to form a short valve pocket, and a pair of pivotally mounted oscillatory means adapted to swing toward each other to compress the folds in said tube.

8. In a bag making machine, a shelf, a clamping means at one edge of said shelf, a pair of triangular plates rotatably mounted in the plane of said shelf, means adapted to oscillate said plates simultaneously in opposite directions, rotatable tucking means arranged in the plane of said shelf between said plates, and a pair of pivotally mounted and spring actuated oscillatory pressing devices opposite said tucking means.

9. A method of forming a valve pocket in one corner of a plicated tube, consisting in clamping the plicated portion of a tube near one corner of the tube, in spreading the plicated portion of the tube adjoining the clamped area and forming triangular folds in said portion close to said area, in tucking the spreaded plicated portion inwardly between the walls of the tube, while simultaneously decreasing the spreading of the plicated portion of the tube for maintaining the material in the tringular folded areas under predetermined tension during such tucking.

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