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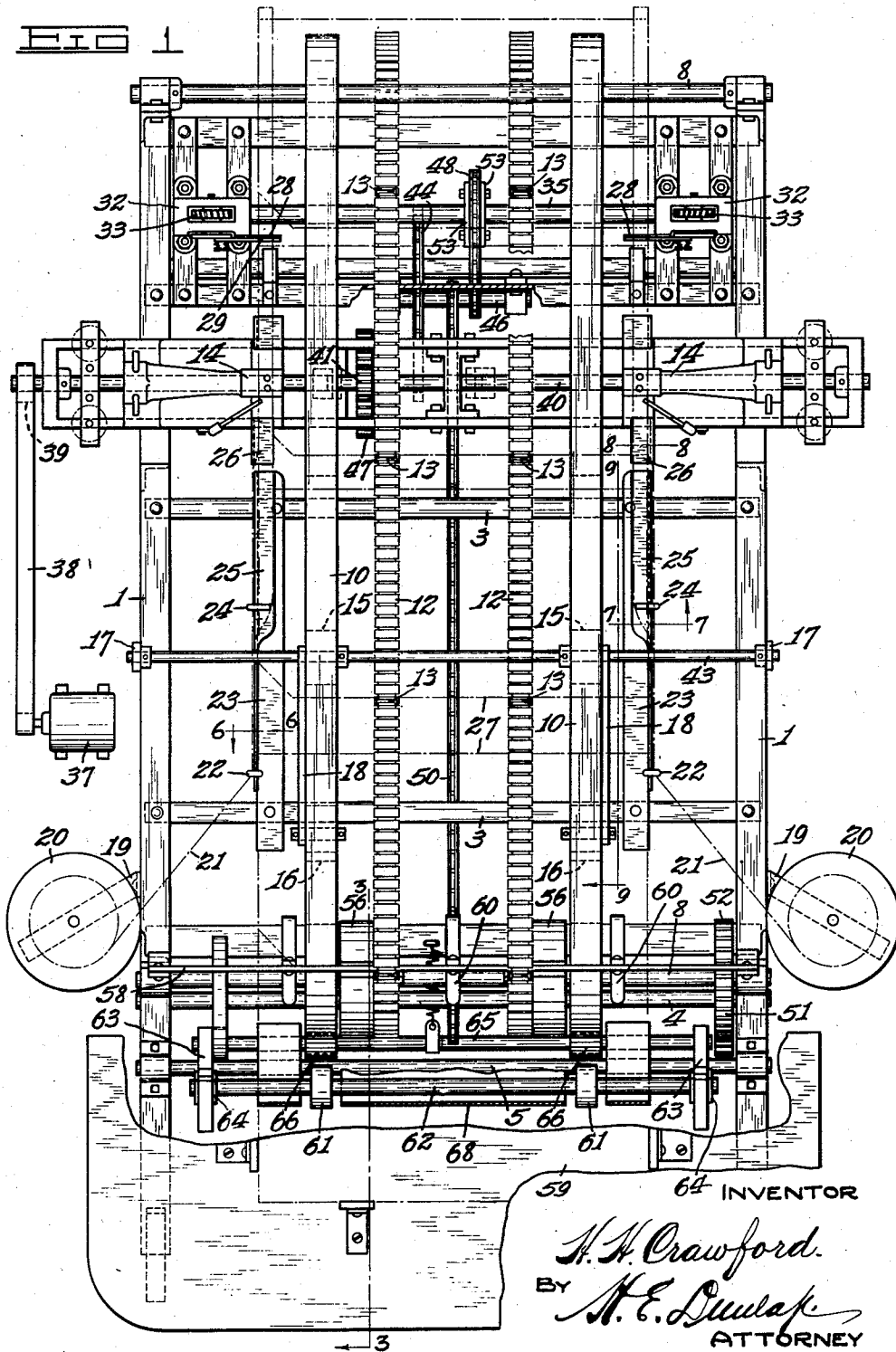
H. H. CRAWFORD

1,780,005

END CLOSING MACHINE FOR PAPER BAGS

Filed April 3, 1928

4 Sheets-Sheet 1



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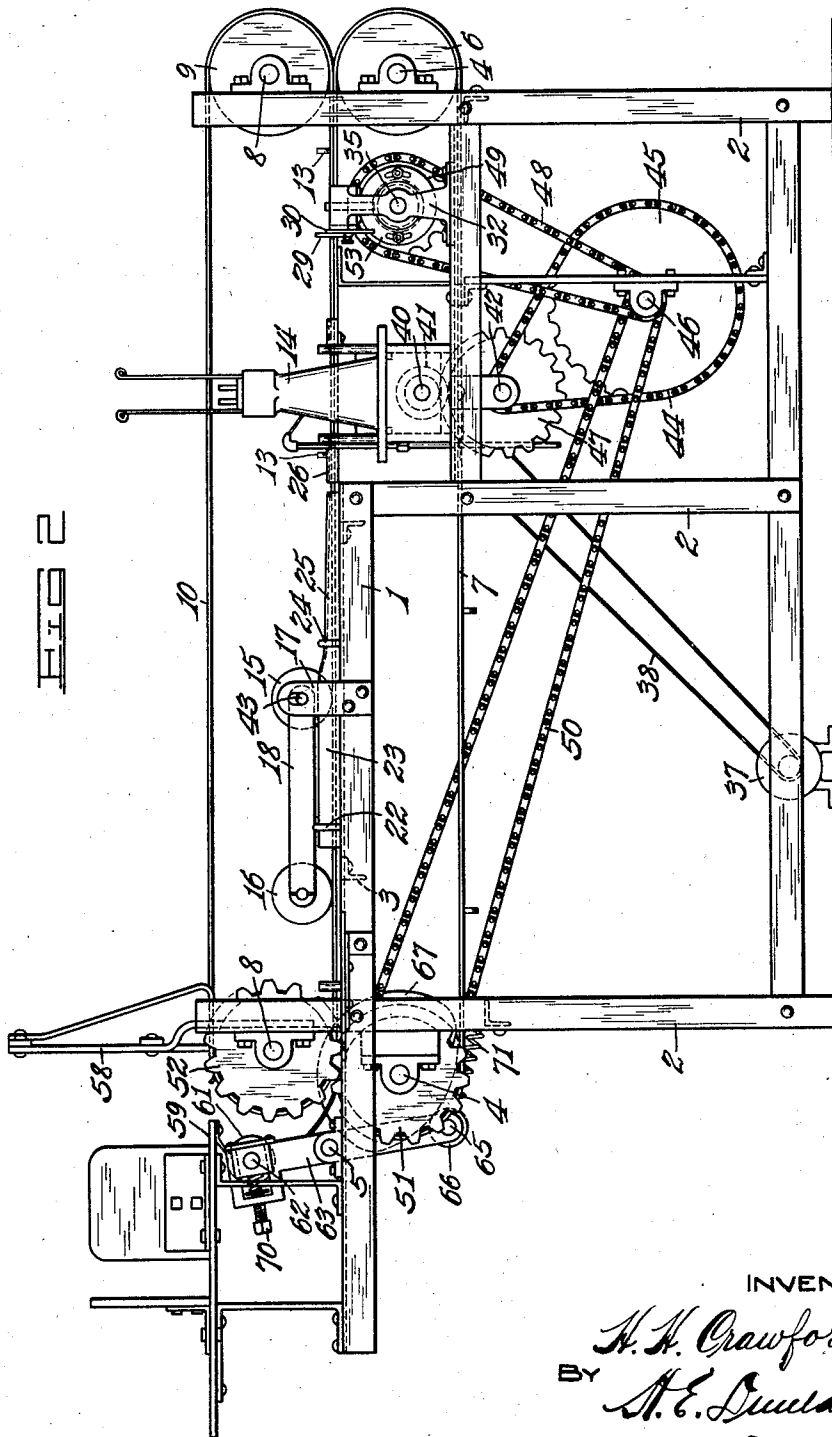
H. H. CRAWFORD

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4 Sheets-Sheet 2



INVENTOR

H. H. Crawford.

BY

N. E. Dunlap

ATTORNEY

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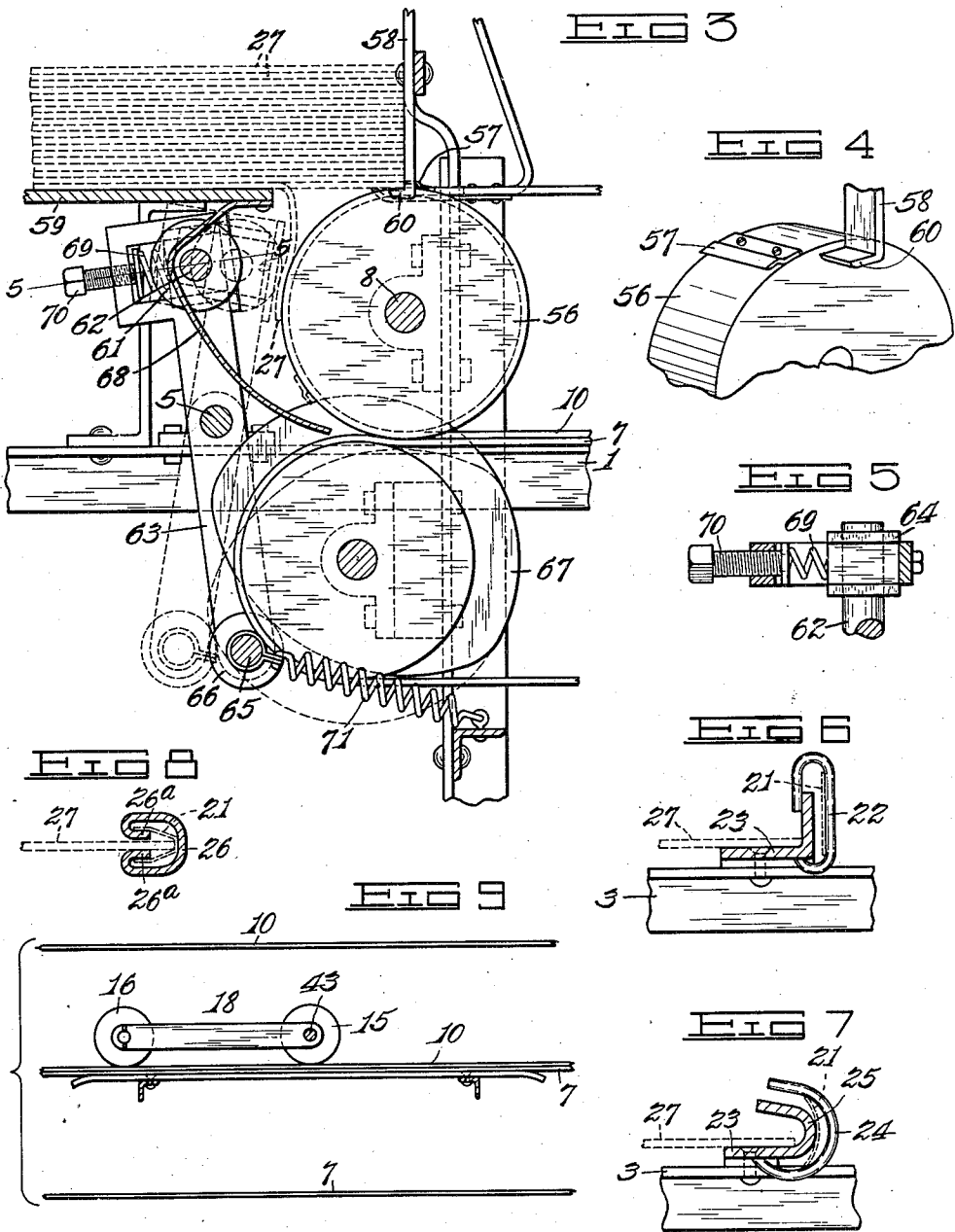
H. H. CRAWFORD

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4 Sheets-Sheet 3



INVENTOR

H. H. Crawford.

BY *M. E. Dunlap*
ATTORNEY

Oct. 28, 1930.

H. H. CRAWFORD

1,780,005

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4 Sheets-Sheet 4

FIG 10

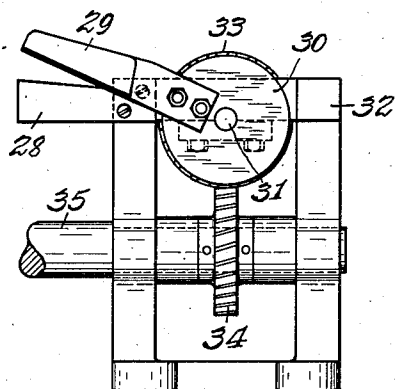


FIG 11

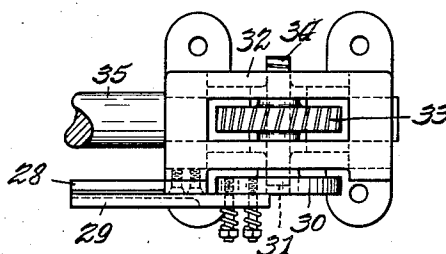


FIG 12

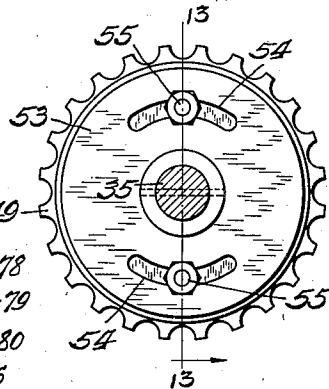


FIG 14

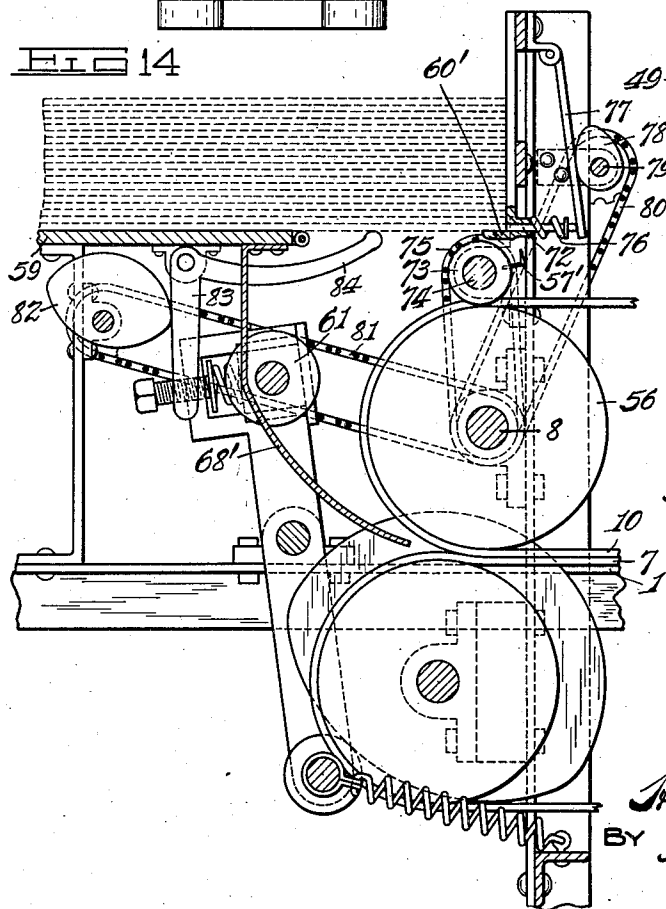
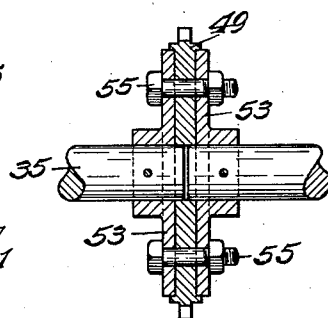


FIG 13



INVENTOR

H. H. Crawford.

BY N. E. Simlap
ATTORNEY

UNITED STATES PATENT OFFICE

HARRY HAMMOND CRAWFORD, OF WELLSBURG, WEST VIRGINIA, ASSIGNOR OF ONE-FOURTH TO T. H. HAMMOND, ONE-FOURTH TO M. J. DAVIS, AND ONE-FOURTH TO HAMMOND BAG & PAPER CO., A CORPORATION OF WEST VIRGINIA, ALL OF WELLSBURG, WEST VIRGINIA

END-CLOSING MACHINE FOR PAPER BAGS

Application filed April 3, 1928. Serial No. 266,945.

This invention relates to paper bag machines, and it has for its primary object to provide a machine for automatically closing the ends of paper bags in the manufacture of the latter.

A further object is to provide a machine, designed primarily for use in closing the ends of the tubular blanks employed in the formation of heavy paper bags of that type commonly employed as containers for heavy powdered or granular materials, as cement, which materials are introduced in the bag through a filler opening formed by the provision of a valve in one of the bag ends.

A still further object is to provide a machine whereon the folded tube blanks, cut to length, are advanced in rapid succession and whereby, in the advance of said blanks, a folded paper tape is applied to each of the opposite ends of the tubes, is sewed in enclosing relation to said ends for closing the latter, and the tapes between adjacent advancing tubes are then severed, thus completing the manufacture of the bag without human intervention.

With these and other objects in view, the invention resides in the features of construction, arrangement of parts and combinations of elements which will hereinafter be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view of the invention;

Figure 2 is a side elevation of the same;

Figure 3 is an enlarged section of the feeding mechanism taken substantially on line 3—3, Fig. 1;

Figure 4 is an enlarged perspective view of a fragmentary portion of a lower blank stripping roll;

Figure 5 is a detail section on line 5—5, Fig. 3;

Figure 6 is an enlarged detail section on line 6—6, Fig. 1;

Figures 7 and 8 are similar sections taken on lines 7—7 and 8—8, respectively, of Fig. 1;

Figure 9 is a sectional elevation on line 9—9, Fig. 1;

Figure 10 is an enlarged front elevation of

one of the shears, showing its drive mechanism;

Figure 11 is a top plan view of the same;

Figure 12 is an enlarged side elevation of the adjustment for the shears;

Figure 13 is a section on line 13—13, Fig. 12; and—

Figure 14 is a view similar to Fig. 3, showing a modified form of feed mechanism.

Referring to said drawings, 1 designates the side members of a rectangular frame which occupies a suitably elevated position with respect to the factory floor level, being suitably supported, as by upright legs 2; and 3 indicates cross members which rigidly connect said side members.

Suitably journaled upon opposite ends of the frame below the level of the side members 1 of the frame are transverse shafts 4 having mounted thereon pulleys 6 which carry endless traveling belts 7. Also journaled at the opposite ends of the frame are transverse shafts 8 having mounted thereon pulleys 9 which carry endless traveling belts 10, the lower laps of the belts 10 being located in closely overlying relation to the upper laps of the lower belts 7, as shown in Figs. 2 and 9.

Fixed on each of the shafts 4 between the pulleys 6 are drive wheels 11 upon which are carried endless traveling chains 12 which constitute members of a conveyor whereon the tubular bag blanks 27 are transported from one end of the frame to the other. Fixed on each of said chains at suitable regularly spaced intervals, corresponding substantially to the width of the bag blanks, are lugs 13 which serve to properly space the successive bag blanks relative to each other and, in the advance travel of said blanks, to advance the latter positively, or without chance shifting movement on the chains. The lower belts 7 supplement the chains as conveyors, while the upper belts ride upon the tops of the bag blanks for maintaining the latter in closely seated relation to the conveyor belts and chains and for preventing kinking and buckling of said blanks to the extent that the opposite ends of the latter are presented in properly flattened condition to sewing machines.

14 which are suitably located at opposite sides of the path of travel of the conveyors, said sewing machines being designed to introduce one or more bag closing rows of stitches in each of the opposite ends of said tubular bag blanks as the latter are advanced beneath the presser feet thereof.

For causing the belts 10 to seat upon the underlying belts 7 with sufficient firmness to insure that the blanks shall lie flat, rollers 15 and 16 are mounted in overlying relation to the lower laps of said belts 10. As herein shown, the rollers 15 are carried by a shaft 43 which is journaled in brackets 17 fixed to the sides of the frame, and the rollers 16 are journaled in the rear ends of bars 18 which are directed rearward from said brackets.

Suitably mounted, as upon frame-carried brackets 19, at or adjacent to the front end of the frame, are two oppositely disposed reels 20 upon each of which is wound a tape 21 of paper which, in properly folded, or doubled-over, form is designed to be applied as a reinforcing strip to bag blanks, said tapes being sewed in place by the sewing machines in the aforesaid operation of closing the ends of the blanks. From each of said reels, the tape 21 is directed forwardly to a suitably shaped tape guide 22 which is rigidly carried by a longitudinally extending bar 23 mounted on the cross members 3 over which the adjacent end of the blanks slide in their advance travel to the sewing machines. Said guide 22 has the form of a vertically elongated wire-formed eye, as shown in Fig. 6, and the tape is received flatwise against the inner face of the outer upright member of said eye, as shown in dotted lines in said figure. From said eye 22, the tape extends forwardly parallel to the path of travel of the tube lengths to a second guide 24 which, as shown in Fig. 7, is of substantially semi-circular form and into the open side of which extends a bow shaped longitudinal flange 25 formed on the adjacent edge of the adjacent bar 23. In passing between said guide 24 and said flange 25, the tape is progressively bowed outward; and in passing thence through a guide 26 located adjacent to and rearward of the position of the presser foot (not shown) of the sewing machine, the tape is caused to be folded or doubled along a median line, as shown in Fig. 8. Said guide 26 is made substantially U-shape in cross section and has the terminal edges 26^a of its parallel members turned back between the latter, thereby to dispose the substantially parallel members of the longitudinally folded tape upon opposite sides of the adjacent ends of the blanks 27 which, in approaching the sewing machine, travel through the space between the terminal edges 26^a, as shown in Fig. 8.

After the blanks have been closed by passing their ends through the sewing machines 14, as hereinbefore explained, it becomes nec-

essary to sever the tapes 21 which connect the opposite ends of adjacent bags. For this purpose automatically actuated shears are provided at opposite sides of the path of travel of the bags. Each of said shears comprises a blade 28 which is fixed to a stationary part of the frame structure beneath the path of travel of the bags, as shown in Fig. 10, and a rotary blade 29 adapted to cooperate with said stationary blade 28 at timed intervals which slightly exceed the time required for the passage of a bag over the blade 28.

The blade 29 is rigidly carried by a disk 30 fixed upon a short shaft 31 which is journaled in a supporting frame 32 mounted upon a suitable part of the conveyor frame, as is best shown in Fig. 2. Said shafts 31 are driven through worm gears 33 fixed thereon by means of worms 34 carried by a transverse driven shaft 35 which is suitably journaled in bearings provided at opposite sides of the conveyor frame, as in the frame 32. Rotation of the disk 30 is timed to effect shearing of the opposite tapes between successively advanced bags.

As herein shown for illustrative purposes, the mechanism hereinbefore described is driven by an electric motor 37 connected by a drive belt 38 to a pulley 39 borne by an end of a transverse shaft 40 which constitutes the drive for the sewing machines. A pinion 41 mounted on said shaft occupies driving relation to a gear 47 carried by a countershaft 42 which, in turn, carries a small sprocket wheel connected by a sprocket chain 44 to a large sprocket wheel 45 fixed on a suitably journaled shaft 46. A small sprocket wheel fixed on said shaft 46 is connected by a drive chain 48 to a larger sprocket wheel 49 fixed on the shaft 35 for driving the latter. As is obvious, the required reduction of speed for driving the shears is effected through the drive gearing described. Power for driving the conveyor chains 12 and the lower belts 7 is transmitted to the shaft 4 at the front end of the machine by means of a sprocket chain 50 connecting sprocket wheels borne by the shafts 46 and 4. The shafts 8 for the upper conveyor belts 10 are driven through engaged gears 51 and 52 carried by the shafts 4 and 8, respectively, located at the front end of the machine.

For the purpose of providing slight adjustments of the timing of the shears, so that the same may operate to sever the tapes at the proper points, the shaft 35 is made in two sections, as shown in Fig. 13. Each of the meeting ends of said shaft sections has fixed thereon a disk 53 having therein a plurality of arcuate slots 54. The sprocket wheel 49 through which power is transmitted for driving said shaft sections is interposed between said disks, and bolts 55 directed through said wheel and through the slots 54

of said disks serve to maintain said sprocket wheel in adjusted position.

Manifestly, when said bolts have been loosened, said disks with their shaft sections, may be rotated slightly either in a forward or a rearward direction relative to said sprocket wheel for advancing or retarding the time at which the shears may operate, as required.

It will be manifest that the tubular bag blanks which are to be advanced on the conveyor may be positioned on the conveyor by hand. However, an automatic feed mechanism is herein shown. Referring to Figs. 1, 2 and 3, it will be noted that the shaft 8 located at the front end of the machine has fixed thereon two feed disks 56, each of which carries upon its periphery a claw 57. Carried by a part of the conveyor frame over said disks is a rigid upright member 58 against which abut the foremost lateral edges of blanks 27 arranged in a pile or pack upon a suitably located feed table 59 and which project forwardly a suitable distance from the forward edge of said table. Foot members 60 formed on the lower ends of said members 58 are adapted to support the forward edge of the pack, as shown in Fig. 3.

As the claws 57 of the disks 56 engage the foremost edge of the lowermost of the blanks 27, the latter is pushed rearwardly off the supporting foot members 60 and is carried downward, as indicated in dotted lines in Fig. 3, and, at the proper time, is engaged between said disks and pressure-exerting rollers 61 which are fixed on a shaft 62 having its ends suitably journaled in bearings 64 provided on the upper ends of rocker bars 63 which are mounted intermediate their ends upon a shaft 5 journaled on the conveyor frame members 1.

The lower ends of said rocker bars 63 carry a shaft 65 upon which are mounted anti-friction rollers 66 which are constantly maintained in seated relation to the peripheral surfaces of cams 67 which are fixed on the adjacent shaft 4 of the conveyor. Said cams are so shaped and so disposed upon said shaft 4 that the rocker bars 63 are swung forward and back at the proper times for causing their rollers 61 to be actuated into cooperative feeding relation to the feed disks 56, to remain in said relation throughout the time required to enter the forward edges of the blanks between the conveyor belts, and to move to an out-of-the-way position for the reception of the forward edge of the next blank carried downward by the claws of the feed disks. A suitable guide member 68 is arranged for directing the blanks to entering position with respect to said belts.

Suitable tension means is provided for the pressure exerting rollers 61, said means com-

prising tension springs 69 interposed between the bearings for the shaft 62 and adjusting bolts 70, as shown in Figs. 3 and 5.

A retractile coil spring 71 interposed between the shaft 65 and a fixed member of the conveyor frame normally holds the rocker bars 64 in the full line position shown in Fig. 3.

In the modified form of automatic feeding mechanism illustrated in Fig. 14, the foremost edge of the lowermost blank in the pack mounted upon the feed table 59 is separated from the overlying blank 27 by means of a shiftable pin 72 which is actuated to push said edge rearwardly to a point at which it may be engaged by claws 57' carried on the peripheries of rollers 73 which are fixed on a shaft 74 located above the disks 56. Said claws serve to carry said forward edge portion of the lowermost blank rearwardly such a distance that it will gravitate to a point at which it may be gripped between the rollers 61 and the disks 56 whereby the blank is advanced and, directed by the guide 68', is entered between the conveyor belts. The shaft 74 is rotated by means of a sprocket chain 75 connecting sprockets carried by said shaft and by the shaft 8, respectively.

The pin 72 is normally held in a retracted position by a compression spring 76. A pivoted arm 77 is disposed in seated relation to the outer end of said pin, and a cam 78 carried by a suitably journaled shaft 79 is designed to thrust said arm rearwardly for actuating said pin at the required intervals. Said shaft 79 is suitably driven from the shaft 8, as by a sprocket chain 80. Also driven from said shaft 8, as by a chain 81, is a cam 82 which operates against an arm 83 of a bell crank lever for maintaining the latter in a position wherein, during the time that the pin 72 acts to dislodge the adjacent end of the foremost blank, its other arm 84 occupies supporting relation to the pack of blanks at a point intermediate the forward edge of the feed table and the supporting feet 60'. Following such dislodgment, said bell crank is permitted to swing back by gravity to a position wherein its said arm 84 is withdrawn from supporting relation to the pack.

It will be understood from the foregoing description that the paper blanks are successively deposited upon the conveyor chains with their rear edges resting against the lugs 13 thereof and are advanced by said chains, assisted by the conveyor belts, to and through the position at which the sewing machines apply to said blanks end-closing rows of stitches; also that folded reinforcing tapes are properly positioned relative to and are stitched upon the ends of said blanks in the closing operation. From said sewing machines, the blanks are advanced past shear mechanisms whereby the tapes are severed

midway between successive bags, thus separating the latter.

While I have herein shown and described the shears as driven through the intermediacy of the sprocket chain 48, it will be obvious that shears driven by other means, as by an air, or other form of power, cylinder may be provided. In such case, the air control valve of such power cylinder may be so arranged that it will be tripped at the proper times by means of the successively advanced lugs 13 carried by the conveyor chains.

Further, it will be noted that the various operations required, as aforesaid, are performed automatically in properly timed relation, thus wholly obviating both manual handling of the bags and manual actuation of any parts of the mechanism.

What is claimed is—

1. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced relation, are advanced for presenting their ends in operative relation to said sewing machines, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, means for separating and feeding said blanks to the conveyor, means cooperating with said last named means to support the blanks during the separation and feeding thereof, and automatic means operating at timed intervals for severing the tapes between successively advanced bags.

2. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced relation, are advanced for presenting their ends in operative relation to said sewing machines, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, means for feeding said blanks to the conveyor, rockable means cooperating with the feeding means to support the blanks during the feeding thereof, and means actuated in timed relation to the rate of travel of said conveyor whereby are severed the tapes connecting successively advanced closed bags.

3. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular

form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced relation, are advanced for presenting their ends in operative relation to said sewing machines, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, and shears located forwardly with respect to said sewing machines and on opposite sides of the path of travel of the closed bags whereby the tapes connecting the latter are severed, each of said shears embodying a rotary blade.

4. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks are advanced relative to said sewing machines, means maintaining said blanks in spaced parallel relation on said conveyor, means maintaining the ends of said blanks in flattened form, tape-carrying reels arranged at opposite sides of the path of travel of said tubes, means for folding said tapes longitudinally and for disposing the same in enclosing relation to the ends of said blanks during the advance travel of the latter, means to drive said sewing machines for stitching the positioned tapes in closing relation to said bag ends, and automatic means actuated at timed intervals for severing the tapes between successively advanced bags.

5. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced relation, are advanced for presenting their ends in operative relation to said sewing machines, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, and means actuated in timed relation to the travel of said conveyor whereby are severed the tapes connecting successively advanced closed bags, means for feeding blanks to said conveyor, and means cooperating with the last named means for intermittently supporting the blanks during the feeding thereof.

6. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced

relation, are advanced for presenting their ends in operative relation to said sewing machines, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, and means actuated in timed relation to the travel of said conveyor whereby are severed the tapes connecting successively advanced closed bags, and means for successively feeding blanks to said conveyor from the bottom of a stack of such blanks.

7. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced relation, are advanced for presenting their ends in operative relation to said sewing machines, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, and means actuated in timed relation to the travel of said conveyor whereby are severed the tapes connecting successively advanced closed bags, and means for successively separating blanks from the bottom of a stack thereof and feeding said blanks to the conveyor.

8. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced relation, are advanced for presenting their ends in operative relation to said sewing machines, endless traveling belts associated with said conveyor in overlying and underlying relation to the opposite ends of said blanks whereby the latter are maintained against buckling, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, and automatic means operating at timed intervals for severing the tapes between successively advanced bags.

9. Automatic mechanism for closing the opposite ends of paper bag blanks of tubular form, comprising oppositely disposed sewing machines, a conveyor whereon said blanks, disposed transversely and in parallel spaced

relation, are advanced for presenting their ends in operative relation to said sewing machines, endless traveling belts associated with said conveyor in overlying and underlying relation to the opposite ends of said blanks, rollers arranged to seat upon the overlying belt for preventing buckling of said ends, tape-carrying reels, means located on opposite sides of the path of travel of said blanks whereby tapes drawn from said reels are doubled longitudinally and are positioned in enclosing relation to the ends of said blanks, means to drive said sewing machines for stitching the positioned tapes in closing relation to said ends of the blanks, and automatic means operating at timed intervals for severing the tapes between successively advanced bags.

10. An apparatus for simultaneously closing the ends of tubular bag blanks including opposed sewing machines, a conveyor adapted to support said bag blanks beneath the sewing machines, means for automatically feeding blanks to the conveyor from the bottom of a stack of said blanks, and cutting means disposed rearwardly of the sewing machines whereby the threads connecting each of the bags are severed.

11. An apparatus for simultaneously sewing the ends of tubular bag blanks including opposed sewing machines, spaced pairs of cooperating conveyors adapted to move and support the bag blanks beneath the sewing machines, automatic means for feeding the bag blanks from the bottom of a stack of said blanks, and cutting means arranged whereby severing of the connecting threads between each of the bag blanks is facilitated.

12. An apparatus for automatically closing the opposite ends of tubular bag blanks, including opposed sewing machines, pairs of spaced cooperating conveyor members adapted to move and support the bag blanks beneath the sewing machines, blank feeding mechanism for the conveyor member arranged to feed a blank from the bottom of a stack of said blanks, tape carrying and folding means disposed parallel to each of said pairs of conveyors, and means for simultaneously folding the tape about the bags and feeding the bag and tape beneath the sewing machine.

13. An apparatus for stitching the ends of bag blanks including opposed sewing machines, a conveyor for the blanks, means for separating and feeding said blanks to the conveyor, means cooperating with said last named means to intermittently support one end of said blanks during the separation thereof and cutting means for severing the thread connection between each of the successive bag blanks, said last named means including a stationary cutter and a rotary blade.

14. An apparatus for simultaneously bind-

ing and stitching the ends of tubular bag
blanks, including a pair of opposed sewing
machines, a conveyor cooperating with said
sewing machines, means for automatically
5 separating and feeding said blanks to said
conveyor from the bottom of a stack of said
blanks, presser means cooperating with said
conveyor whereby to aline said blanks with
said sewing machines, tape feeding and fold-
10 ing mechanism disposed on opposite sides of
said conveyor and cutting means arranged
rearwardly of the sewing machines whereby
separation of the successively stitched and
bound bag blanks is facilitated.

15 In testimony whereof, I affix my signature.
HARRY HAMMOND CRAWFORD.

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