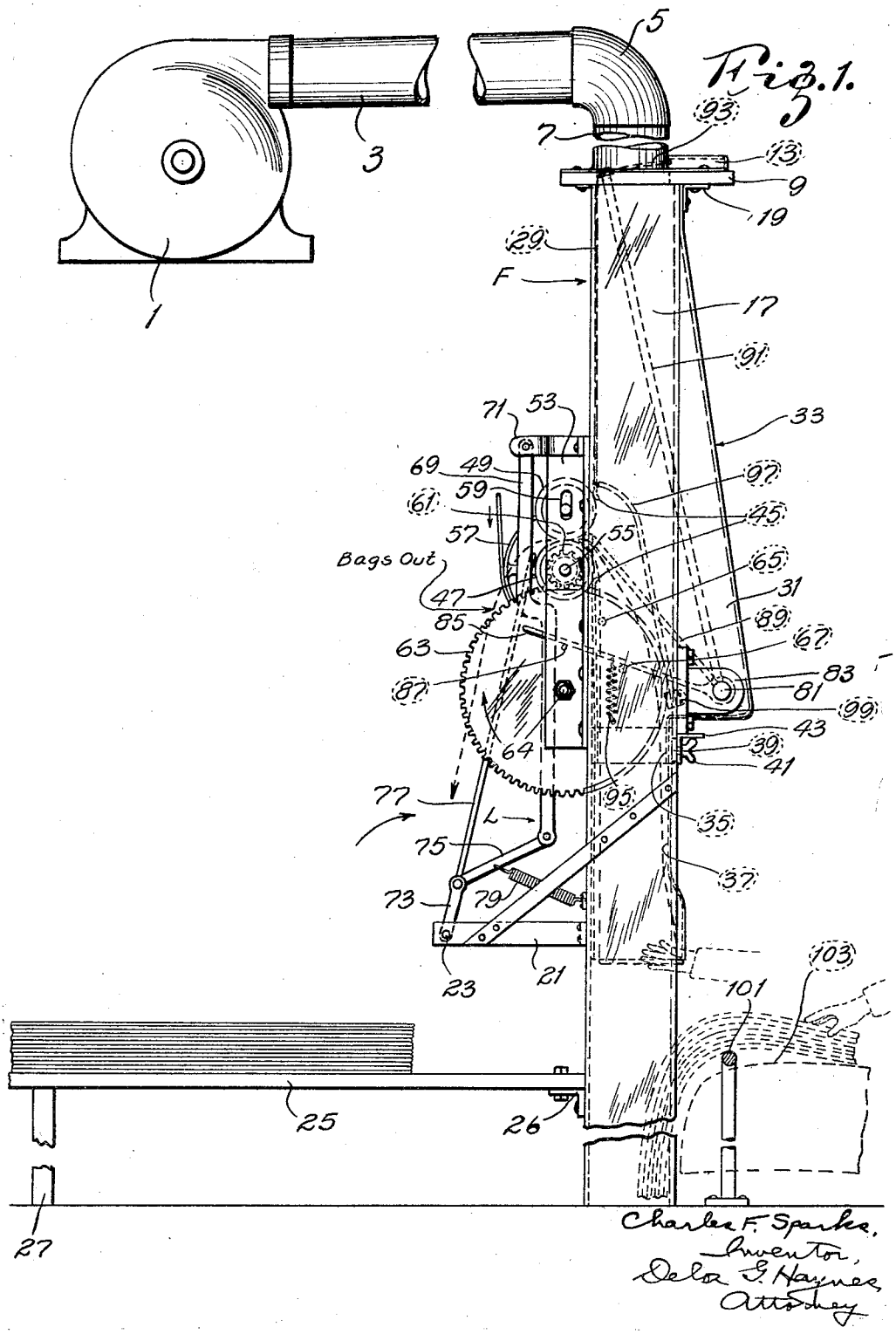
May 12, 1931. C. F. SPARKS 1,805,111

BAG TURNING APPARATUS

Filed June 7, 1926 4 Sheets-Sheet 1



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BAG TURNING APPARATUS

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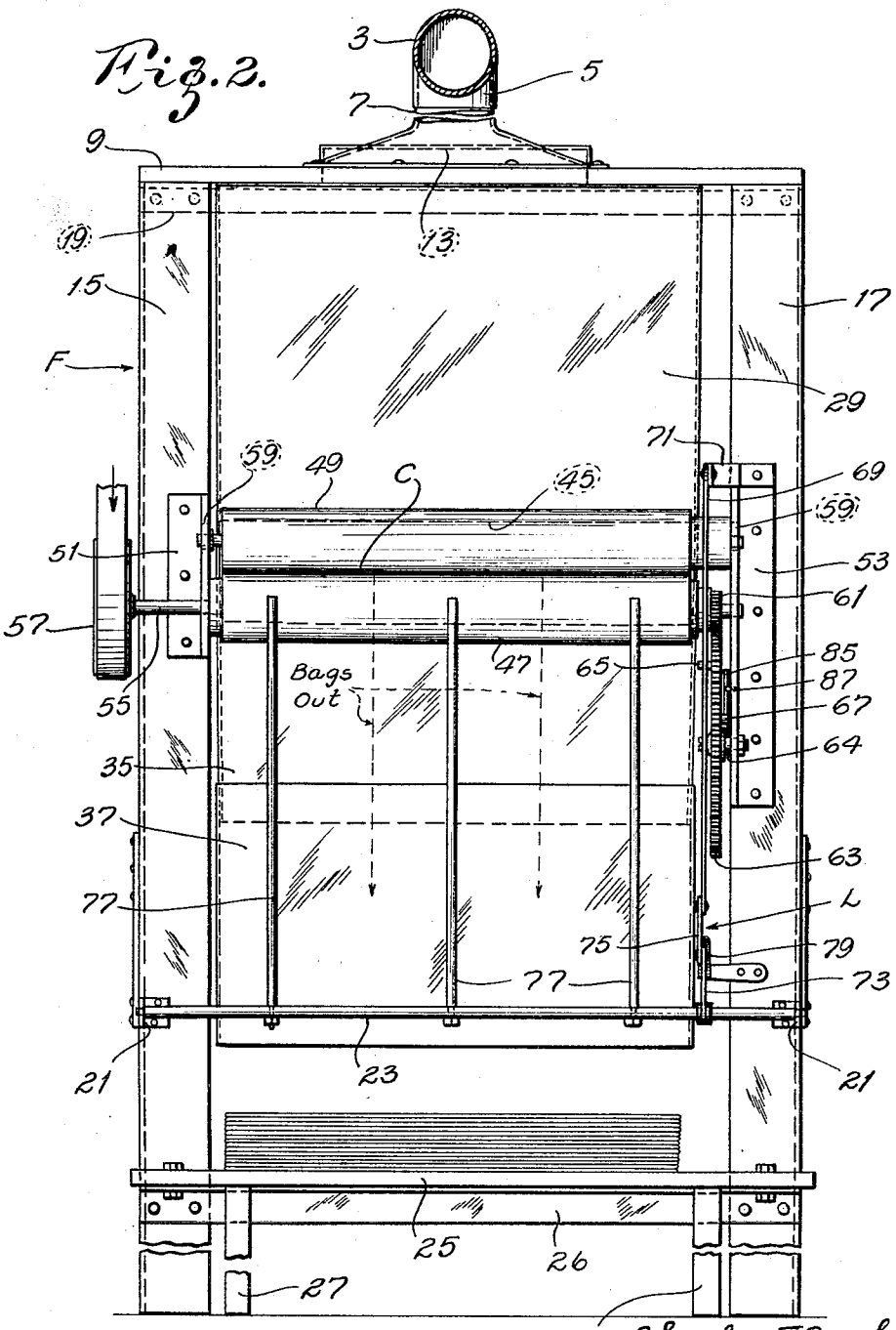
Fig. 2.



Charles F. Sparks,
Inventor,
Delos G. Haynes,
Attorney

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BAG TURNING APPARATUS

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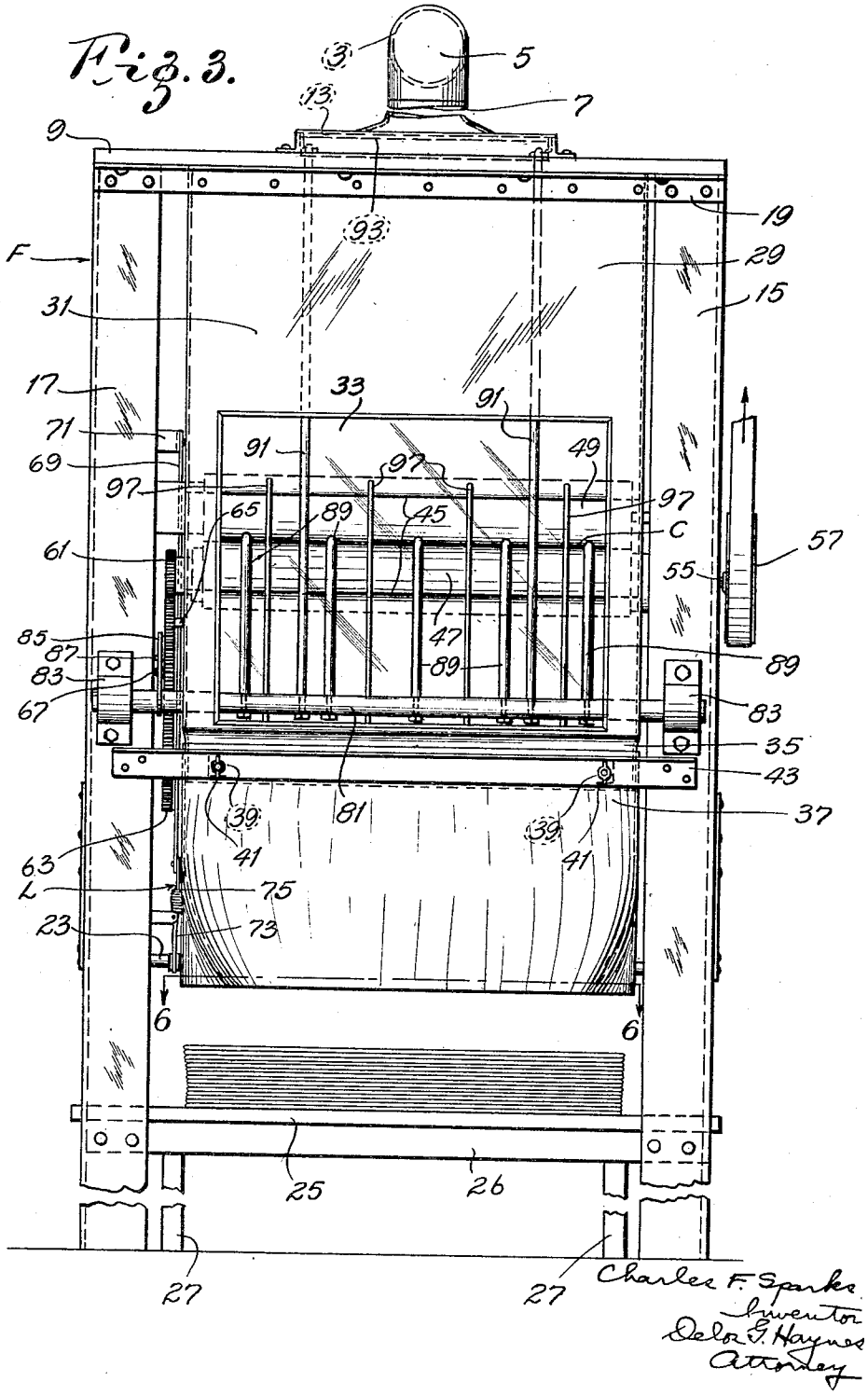
Fig. 3.



Charles F. Sparks
Inventor
Delos G. Haynes
Attorney

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Fig. 5.

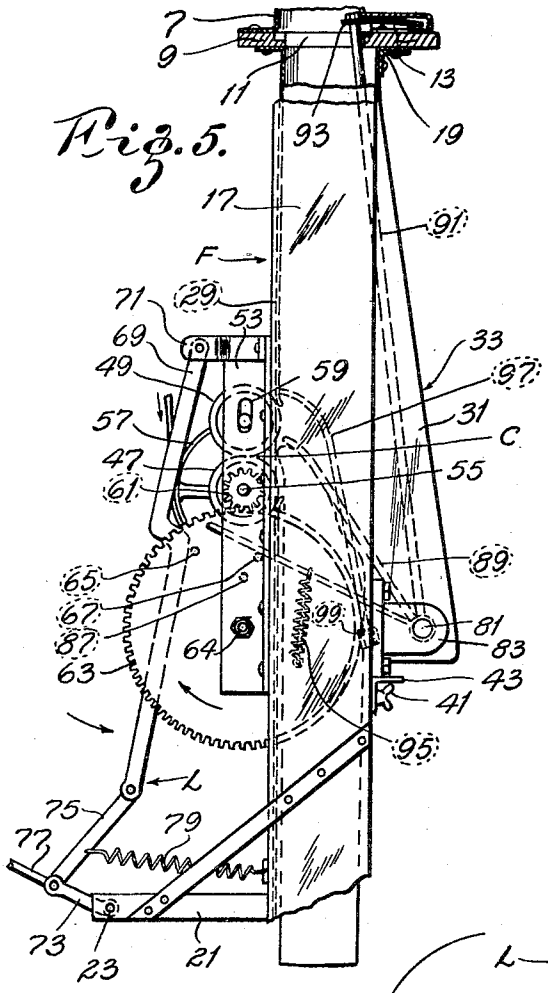


Fig. 4.

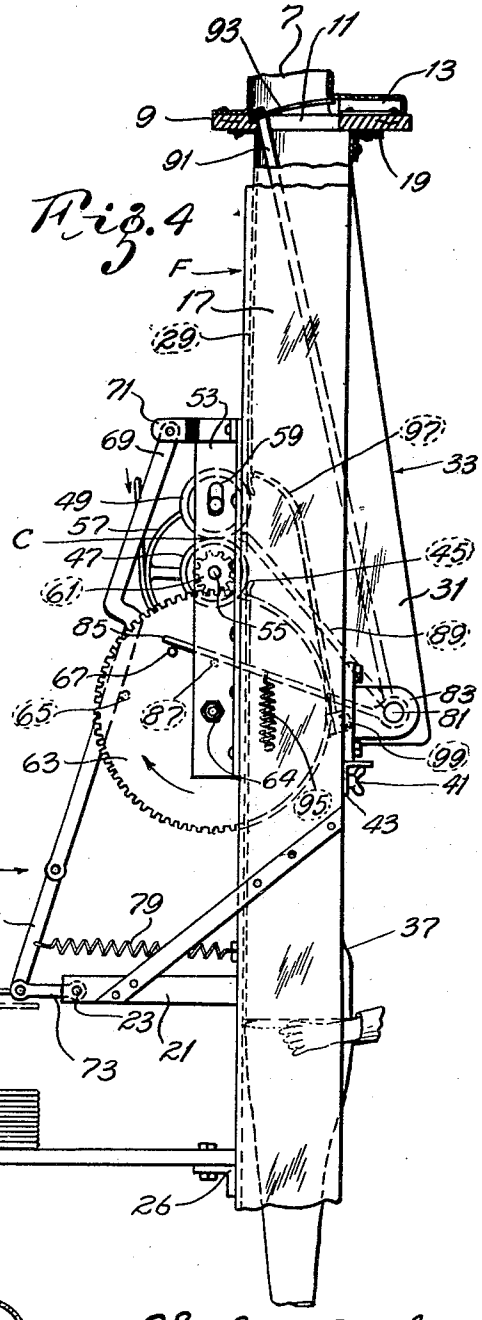
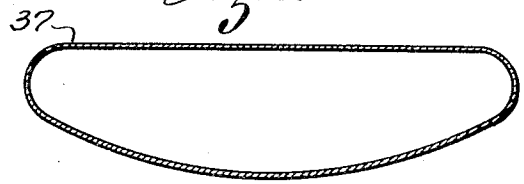
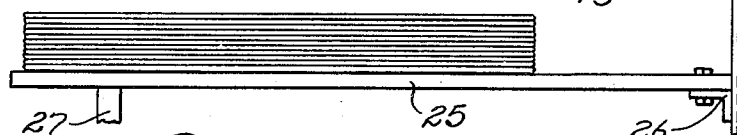


Fig. 6.





Charles F. Sparks,
Inventor,
Delos F. Haynes
Attorney

Patented May 12, 1931

1,805,111

UNITED STATES PATENT OFFICE

CHARLES F. SPARKS, OF ST. LOUIS, MISSOURI

BAG TURNING APPARATUS

Application filed June 7, 1926. Serial No. 114,285.

This invention relates to a method of, and apparatus for turning bags, and with regard to certain more specific features, to pneumatically operable bag turning apparatus.

Among the several objects of the invention may be noted the provision of a bag turning apparatus adapted to turn and deliver bags at a high rate of speed, by reducing the time required to feed and remove the bags; the provision of apparatus of the class described which is highly economical of the air required for its operation; the provision of an improved bag turning method requiring the combination of relatively few mechanical elements for its successful operation; and the provision of apparatus of the class described which may be easily and readily operated by comparatively unskilled operators. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combination of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a left side elevation of the apparatus, certain portions being broken away, and shows a turned bag being tucked into delivery rolls;

Fig. 2 is a rear elevation of Fig. 1 and shows a stack of delivered bags;

Fig. 3 is a front elevation of Fig. 1;

Fig. 4 is a fragmentary side elevation similar to Fig. 1, but shows the bag being delivered to a stack, after having passed through the delivery rolls, and shows another bag about to be turned;

Fig. 5 is a view similar to Fig. 4 and shows the apparatus repositioning itself just as another bag is being turned therein; and

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 3, and shows the shape of the mouth of the suction casing.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a suction blower adapted to induce an air flow from a length of preferably sheet iron piping 3, attached to a sheet iron or like elbow 5. The elbow 5 is in turn attached to a length of vertical, preferably sheet iron piping 7. This vertical piping 7 passes downwardly to a valve board 9 and is flanged to engage a valve passage 11 therein. The opening or passage 11 is rectilinear in shape, with its long side positioned laterally of the machine. A valve pocket 13 is formed above said board 9, just ahead of the pipe 7 and joining with the interior of the pipe 7. The joints between the pipes 7, pocket 13 and board 9 are nominally air tight. The purpose of the pocket 13 will be hereinafter described.

The valve board 9 rests upon the frame F of the machine, which frame comprises right and left uprights 15 and 17 respectively. These uprights comprise channel irons which carry a laterally positioned upper angle iron 19 adapted to aid in the support of the valve board 9. Braced to the rear of the frame F are two fly shaft supports 21 adapted to rotatably support a fly shaft 23. A receiving table 25 is supported at the rear of the frame F and below said fly shaft. This table is supported on an angle-iron bracket 26 and a pair of legs 27.

Positioned between the uprights 15 and 17 is an upper air casing 29 which is fastened to said valve board 9 and registers with the opening 11, so that air may be drawn therefrom by the suction blower 1. This casing 29 has a sloping and forwardly projecting portion 31, into which is set a panel of glass 33 for purposes of viewing the interior. A lower extension 35 of said upper air casing 29 is telescoped by a lower casing 37. The upper and lower casings, 29 and 37 respectively may be clamped together at the telescoping portions in any of their relatively adjustable positions by means of a clamp block 39, which is pressed up against the telescopic joint by means of adjustable fly bolts 41, passing through a laterally supported angle iron 43.

The iron 43 is held to said uprights 15, 17. The purpose of this adjustment as will be seen later, is to provide means for adjusting the machine to accommodate particular lengths of bags.

The lower end of the lower air casing 37 is rounded more or less elliptically on one side, as illustrated in Fig. 6. This is for the purpose of more easily fitting a bag mouth to the lower end of the air casing.

Rearwardly, in the upper air casing 29, is formed a rectangularly formed lateral opening 45 with which two rollers 47 and 49 are adapted to more or less completely register. These rollers are rotatably supported in side brackets 51 and 53 fastened to the rear of said uprights 15 and 17 respectively. They have substantially continuous and uninterrupted surfaces, by which is meant that the rolls do not function as air valves themselves. The lower roller 47 is gudgeoned in a rotatable manner but is positively held in one position as far as any linear movement is concerned. It is mounted on a shaft 55 which carries a driving pulley 57 adapted to be rotated counter-clockwise (Figs. 1, 4 and 5). By this means the lower roller 47 rotates counter-clockwise. It is adapted to snugly engage the resilient lower lip of the opening 45 as it rotates, and also engages the ends of the opening.

The upper roller 49 is rotatably gudgeoned in substantially vertically formed slots 59 of the brackets 51 and 53. It rests on and contacts with the lower roller 47 by gravity and is therefore driven thereby in a clockwise manner. It may be downwardly spring pressed, if desired. This upper roller 49 movably engages the upper resilient lip of the opening 45 in various vertical positions of said roller and also engages the ends of said opening. End play in both rollers is conventionally prevented. The lower roller shaft 55 is provided with a pinion 61 at the end opposite its pulley end. This pinion 61 is adapted to engage with and drive a main cam gear 63 rotatably held on a stud 64, which stud 64 is made fast to the said brackets 53. It is evident from the above that the cam gear 63 will rotate in a clockwise direction. The gear ratio between the pinion 61 and the cam gear 63 is approximately six to one.

The cam gear 63 carries an inside cam stud 65 for the purpose of operating a fly shaft mechanism, to be described; and an outside camming stud 67 for the purpose of operating a valve gear and tucking mechanism, also to be described. The inside stud 65 is located at a greater radius on the gear 63 than the outside stud 67.

The fly shaft mechanism which is operated by the stud 65 comprises a four bar linkage L having a pendulous crank 69 suspended from an overhanging bracket 71 (the bracket being formed with the said bracket 53). This crank 69 is adapted to be swung rearwardly by engagement of the stud 65 during approximately one-half of one revolution of said stud. While not engaged by the stud 65, the crank 69 tends to hang downwardly and rest against the outer end of the said stud 64 which supports the gear 63.

The remainder of the four bar linkage L comprises a second crank 73 fastened to said fly shaft 23 and a connecting rod 75 joining the cranks 69 and 73. The fly shaft 23 is provided with a plurality of radially extending fly fingers 77, which lie horizontally when the four bar linkage L is swung into its outermost position by the pin 65. When the said linkage L is in its innermost position, with the pendulous crank 69 resting against the stationary stud 64, then the outer ends of the fly fingers 77 are adapted to be positioned at a point just beneath the line of contact C between the rolls 47 and 49. A return spring 79 is provided for normally holding the four bar linkage L in its retracted position with the pendulous crank 69 resting against the stationary stud 64. It is evident from the above that the 180 degree upward movement of the pin 65 results in the fly fingers 77 moving from their more or less upright sloping position, down to their horizontal position and back up to said upright sloping position. The movement of the fly shaft is consequently of a high velocity, which serves useful purposes hereinafter to be made clear. It should be noted that the fly fingers reach out horizontally over the delivery table 25 when swung downwardly.

Laterally formed across, and inside of the lower end of the casing 29, is a rock shaft 81. This shaft 81 passes from the interior of the casing 29 at suitable openings on each side, adapted to prevent excessive leakage of air, and is rotatably borne in bearings 83 located on the uprights 15 and 17. At a point outside of the casing 29, and to the left of the cam gear 63 in forward projection, the rock shaft 81 is provided with a crank 85, adapted to normally rest upon a pin 87 projecting inwardly from the bracket 53. During about 90 degrees of movement of the pin 67, the crank 85 is engaged by said pin 67, whereby the rock shaft 81 is oscillated through a suitable angle. On the interior of the casing 29 the rock shaft 81 is provided with preferably five forwardly sloping tucking fingers 89, the ends of which are adapted to be closely juxtapositioned to the line of contact C of the rolls 47, 49, when the crank 85 rests on the pin 87. When the crank is in its uppermost position, due to the action of the revolving pin 67, then the ends of the tucking fingers are withdrawn from their position near the line of contact C of the rolls 47, 49.

The rock shaft 81 is also provided in the casing 29 with two upwardly extending supporting rods 91, which carry a more or less

arcuate, preferably aluminum valve plate 93. This valve plate 93 is of a length adapted to span and close the opening 11, and of a width adapted to also laterally close said opening. The oscillations of the rock shaft 81 are such as to move the tucking fingers as described, and to move the valve plate 93 into and out of register with the opening 11. When the tucking fingers 89 are in forward position, then the valve plate 93 is adapted to obstruct the passage 11, and when said tucking fingers are in their rearward position, then said valve plate 93 is adapted to move from its obstructing position. When the valve plate 93 moves from its obstructing position, it is adapted to move into the recess or pocket 13. The described valve is adapted primarily to obstruct the passage of air, rather than to positively and completely shut off its flow. This means that the described rugged type of valve may be used. A spring 95 is adapted to normally draw the crank 85 down against the stop 87, that is, when the cam stud 67 is not engaging therewith. This closes the air valve and puts the fingers 89 into tucking position.

A grating, comprising fingers 97, fastened to a cross bracket 99, is provided to obstruct the passage through the casing 29 at regions above the rollers 47, 49. The plurality of fingers 97 are arranged in staggered relationship with respect to the tucking fingers 89 (in an end elevation). They are curved and reached from a point just above the rolls 47, 49, and slope downwardly and forwardly to a point somewhat within said bulged portion 31, and below said rolls. In sideward projection the grating fingers 97 are intersected by the movable staggered tucking fingers 89. The grating fingers 97 are adapted to obstruct the upward passage of objects, tending to feed them toward the rolls 47, 49, and yet permitting a free and unobstructed passage of air.

In order to conveniently juxtaposition the mouth of bags to the lower mouth of the air casing 37, there is provided a horizontal bar 101, beneath which, the knees 103 of an operator are positioned. A supply of bags are slid over the operator's knees along the bar 101 from which position the bags may be picked up one at a time to be fed to the machine.

The timing of the machine is as follows:

For each revolution of the control or cam gear 63 one bag is delivered on to the table 25. The longest length permissible for the bags with the present embodiment will be approximately three times the girth of the lower roller 47. The widths of the bags are limited to the widths of the rollers but may be less. The fly fingers will make a complete cycle or oscillation while the gear 63 turns through one-half of one revolution. The rocker shaft 81 oscillates through one valve operating and tucking cycle, while the gear 63 turns through 90 degrees. The cyclic actions of the fly fingers and of the rock shaft mechanism are phased at approximately 40 degree intervals on the gear 63, the rock shaft mechanism being adapted to open the air valve at a suitable period ahead of the turning operation of the fingers 77.

The operation of the machines is as follows:

The operator picks the bag up from the rod 101, grasping it at its corners, and positions its mouth next to and around the lower mouth of the casing 37. The air valve is then opened as illustrated in Fig. 5, and the tucking fingers 89 are in their non-tucking forward positions. The driving pulley 57 is rotating as described. The fly fingers are just returning from their delivery positions. The draft of air up through the casings 37, 29 and pipe 7 quickly turns or snaps the bag inside out, up into the casings 29, 37. The casings 29 and 37 have been predeterminately adjusted so that under these conditions the now upper edge of the bag is positioned just under the ends of the tucking fingers. The upper end of the bag is somewhat pressed up against the rolls 47, 49 because of the rearwardly slanting grating fingers 97 and the tucking fingers 89. Fig. 5 indicates that the pin 65 is permitting the last portion of the return action of the four bar linkage L, while the pin 67 has about reached the maximum with regard to its effect on the rock shaft 81.

The next critical point of operation is illustrated in Fig. 1, in which the pin 67 has permitted the rock shaft 81 to cause closing of the air valve and the ends of the tucking fingers to approach the line of contact of the rollers 47, 49. The result of this is, that the upper edge of the bag is positively fed in toward the line of contact C so that the rollers grip it and deliver it out over the fly fingers 77 as illustrated by the dotted arrow in Fig. 1. The bag is flattened. The pin 65 has gone out of cooperation with the crank 69. The rock shaft 81 will not be cyclically operable again for some 270 degrees from the Fig. 1 position, while the four bar linkage will be operated within about 150 degrees of operation of the gear 63. This, in view of the six to one ratio between the pinion 61 and gear 63 means that within about two and one-half revolutions of the rolls 47, 49, the bag will be completely fed out of the rolls 47, 49, to a position on and above the sloping fly fingers 77. At this latter instant the pin 65 re-engages the crank 69, whereby the fly fingers are suddenly swung downwardly, carrying the bag with them. About two revolutions of the roller 47 are used in causing the fingers 77 to descend. The fingers stop shortly at their horizontal position whereat the bag descends to a stack on the table 25. The resistance of the air holds the bags tightly to the fingers as they swing.

At the time that the fly fingers 77 are about

horizontally positioned, the pin 67 re-engages the crank 85 to oscillate the rock shaft 81 to a position corresponding to the one finally reached in Fig. 5. It may be noted that by turning the air valve shut as the bag is fed through the rolls 47, 49, that all danger is avoided of crumpling the bag by a current of air from below as the bag is held at the rolls.

It is evident that the operator may view the entire turning and delivering process through the glass 33 and make proper manipulations when trouble is encountered. It should be noted, that after the operator has once brought the mouth of the bag up to the mouth of the lower casing 87, that she reaches for another bag with the other hand. By the time the first-named bag has been drawn into the rolls 47, 49, the second-named bag has been manipulated by the free hand for rapid delivery by both hands to the mouth of the casing. The machine action is entirely automatic as the operator feeds bags to the device, but should the operator miss in delivering the bag to the mouth of the apparatus, no harm is done as the next suction event will take place as usual when the operator does deliver a bag. It should also be noted that the slidable upper roller 49 tends to always keep the slot closed out of which the bag emerges. It may be spring pressed against the roller 47, if desired. The rollers 47, 49, feed out the bag, and at the same time function as an air trap. When the bag widths are less than the widths of the rolls, the possible leakage is negligible and of no particular consequence as the upper air valve 93 is shut when the bags feed out of the machine.

The time required for sucking air through the casing is of short duration, so that by timing several machines out of step and connecting their air lines in parallel to the suction line, a blower of sufficient power for intermittent operation on one machine, may be used for continuously operating several of them.

The use of a vertical casing for the draft of air for turning is of great value as regards ease of operation of the machine. By this means of vertically holding upturned bags, they may be placed directly in front of the operator, with the line of openings squarely to the line of movement of the operator's arms while feeding them to the casing, which is located at a convenient level and close up to the unturned bags. The importance of thus holding the unturned bags in connection with the vertical casing comprises permitting feeding with the least and quickest movement of the operator's arms and hands without the added useless motion of other parts of her body. It permits a comfortable sitting position tending to rapidity and ease of work.

The unturned and turned bags may be supplied to the rod 101, and removed from the table 25, respectively in suitable batches. A neat stack of bags is had on said table 25.

It will be seen from the above that means including the valve 93 are had beyond the predetermined point at which the rolls 47, 49 are located for intermittently drawing air past the roll surfaces.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A bag turning machine comprising a substantially vertical casing, valved means for intermittently drawing air upwardly in the casing to turn a bag therein, and discharge rolls forming a portion of the wall of the casing at an upward point adapted to feed bags from said casing, said means for intermittently drawing air being operable independently of the roll surfaces.

2. A bag turning machine comprising a substantially vertical casing, means for drawing air upwardly in the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing at an upward point, adapted to feed bags from said casing, and a valve above the rolls adapted to intercept the flow of air when the rolls are discharging a bag.

3. A bag turning machine comprising a substantially vertical casing, means for intermittently drawing air upwardly in the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing at an upward point, adapted to feed bags from said casing, and tucking means adapted to feed turned bags into said rolls, the said air-drawing and tucking means being operable independently of the roll surfaces.

4. A bag turning machine comprising a substantially vertical casing, means including a valve for drawing air upwardly in the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing at an upward point adapted to feed bags from said casing, and tucking means adapted to feed turned bags into said rolls, said tucking means being synchronized with the valve to be operable when the valve is in closed position.

5. A bag turning machine comprising a substantially vertical casing, means including a valve for drawing air upwardly in the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing at an upward point adapted to feed bags from said casing by a plurality of revolutions, and tucking means adapted to feed turned

bags into said rolls, said tucking means being synchronized with said valve to be operable when the valve is in closed position, and means for stacking the bags as they are fed out from said rolls.

6. A bag turning machine comprising a casing, means for drawing air through the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing, adapted to feed bags from the casing by a plurality of revolutions for each bag, valved means for interrupting the flow of air, and a tucking mechanism adapted to divert bags to the rolls when the said flow is interrupted.

7. A bag turning machine comprising a casing, means for drawing air through the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing adapted to feed bags from the casing, valved means for interrupting the flow of air, and a tucking mechanism adapted to divert bags to the rolls when the said flow is interrupted, and means for stacking the bags as they emerge from the rolls comprising synchronized positively operating fly fingers adapted to receive and remove the bags as they are fed from said rolls.

8. A bag turning machine comprising a casing, means for drawing air through the casing to turn a bag therein, discharge rolls forming a portion of the wall of the casing adapted to feed bags from the casing by a plurality of revolutions for each bag, valved means for interrupting the flow of air, and a tucking mechanism adapted to divert bags to the rolls when the said flow is interrupted, and means for stacking the bags as they emerge from the rolls, said valved means, tucking means, and stacking means being synchronized to function in the said order.

9. In bag turning apparatus a casing, means for drawing air through the casing to turn a bag therein, a plurality of bag ejecting rolls cooperating with the casing and turning in contact with the turned bags, means for positively pressing the bags into contact with the rollers whereby said rollers automatically feed them from the casing, and a grating in the casing beyond the rolls adapted to prevent passage of the bags from the casing except through the rolls and tending to force the turned bags toward the rolls.

10. In a bag turning apparatus, a vertical casing, means for producing an upward draft of air therethrough to turn a bag therein, a plurality of ejecting rolls whose circumferences are substantially less than the length of a bag to be turned, said rolls cooperating with said casing and adapted to feed bags from said casing.

11. In bag turning apparatus, a vertical casing, means for producing an upward draft of air therethrough to turn a bag therein, a plurality of ejecting rolls whose circumferences are substantially less than the length of a bag to be turned, said rolls cooperating with said casing and adapted to feed bags from said casing and means associated with the said ejecting means adapted to horizontally stack the ejected bags.

12. A bag turning machine comprising a casing, means for inducing an intermittent flow of air through said casing, said flow of air being adapted to turn a bag into the casing at one end thereof, a pair of rolls forming a part of the casing adapted to eject said bag from said casing, substantially uninterrupted surfaces on said rolls and coordinated automatic means adapted to direct the closed end of the bag to said rolls whereupon the bag is fed between said rolls and out of said casing.

13. A bag turning machine comprising a casing, means for intermittently drawing air through the casing to turn bags therein and discharge rolls having substantially uninterrupted surfaces, said rolls forming a portion of the wall of the casing and being adapted to feed bags therefrom, said means for intermittently drawing air, drawing air past the roll surfaces.

14. A bag turning machine comprising a casing, means for intermittently drawing air through the casing to turn bags therein, discharge rolls having substantially uninterrupted surfaces, said rolls forming a portion of the walls of the casing and being adapted to feed bags therefrom, said means for intermittently drawing air, drawing air past the roll surfaces and automatic means for tucking the ends of the bags between said rolls.

In testimony whereof, I have signed my name to this specification this 5th day of June, 1926.

CHARLES F. SPARKS.