

May 5, 1942.

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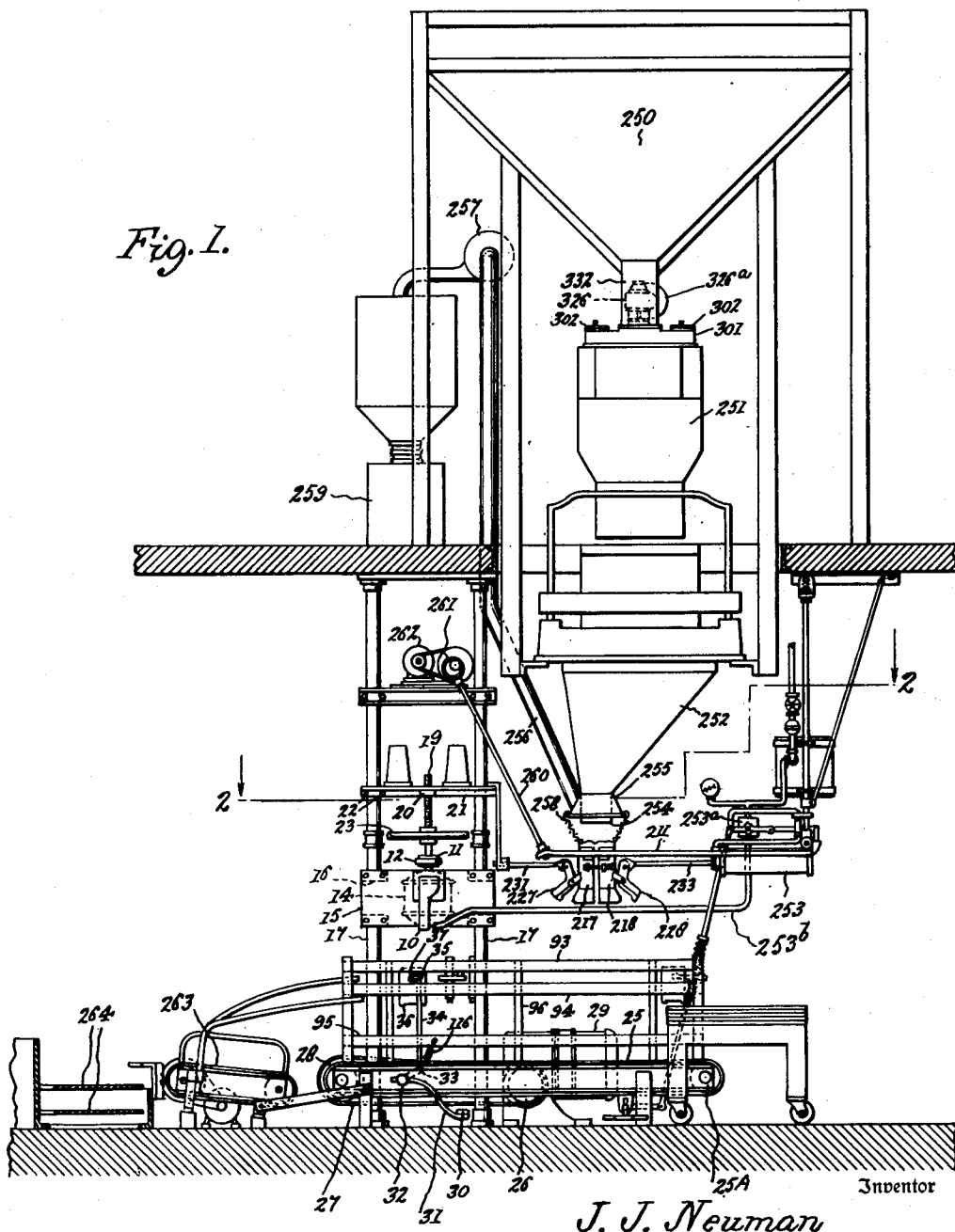
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BAG FILLING AND CLOSING APPARATUS

Filed Dec. 17, 1938

8 Sheets-Sheet 1

Fig. 1.



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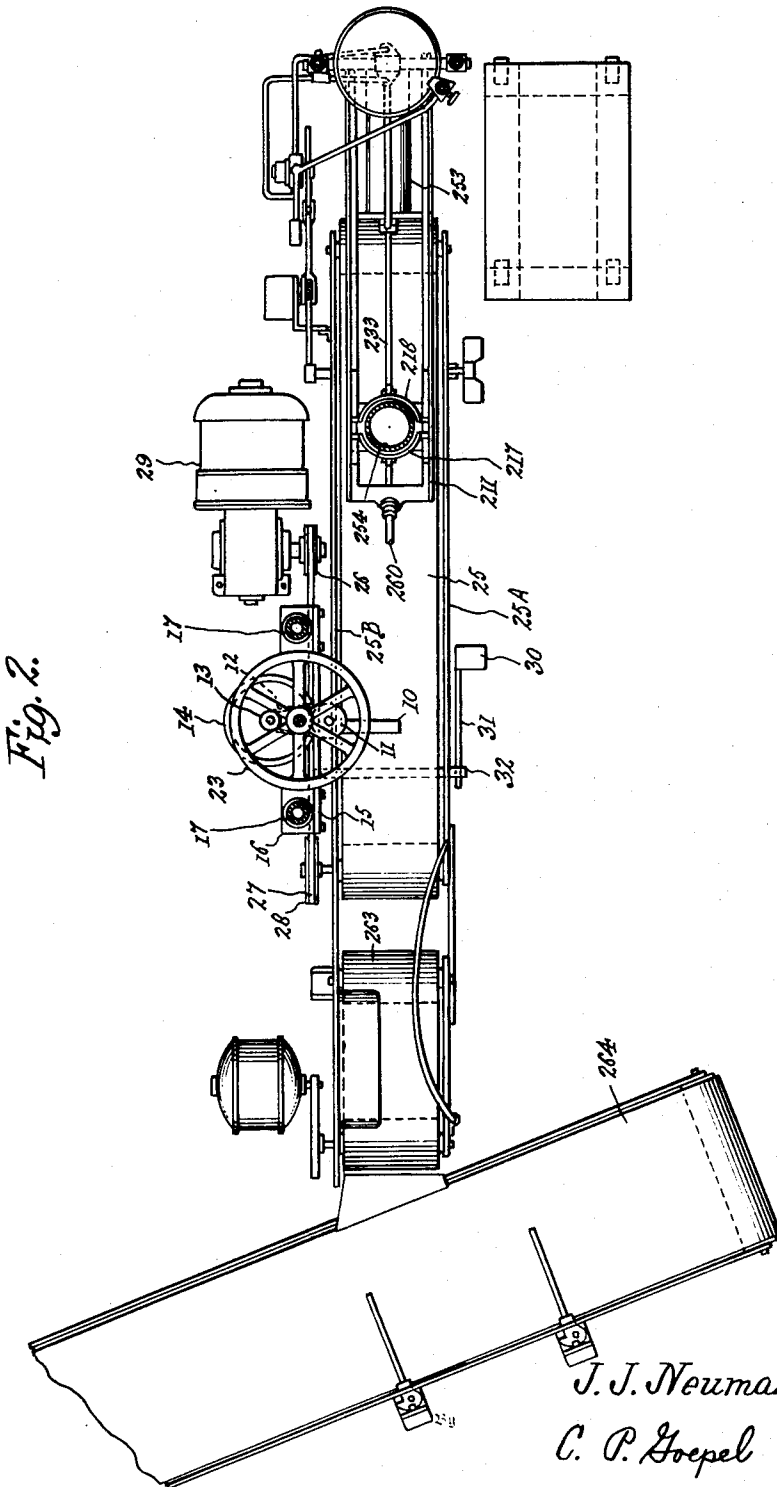
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BAG FILLING AND CLOSING APPARATUS

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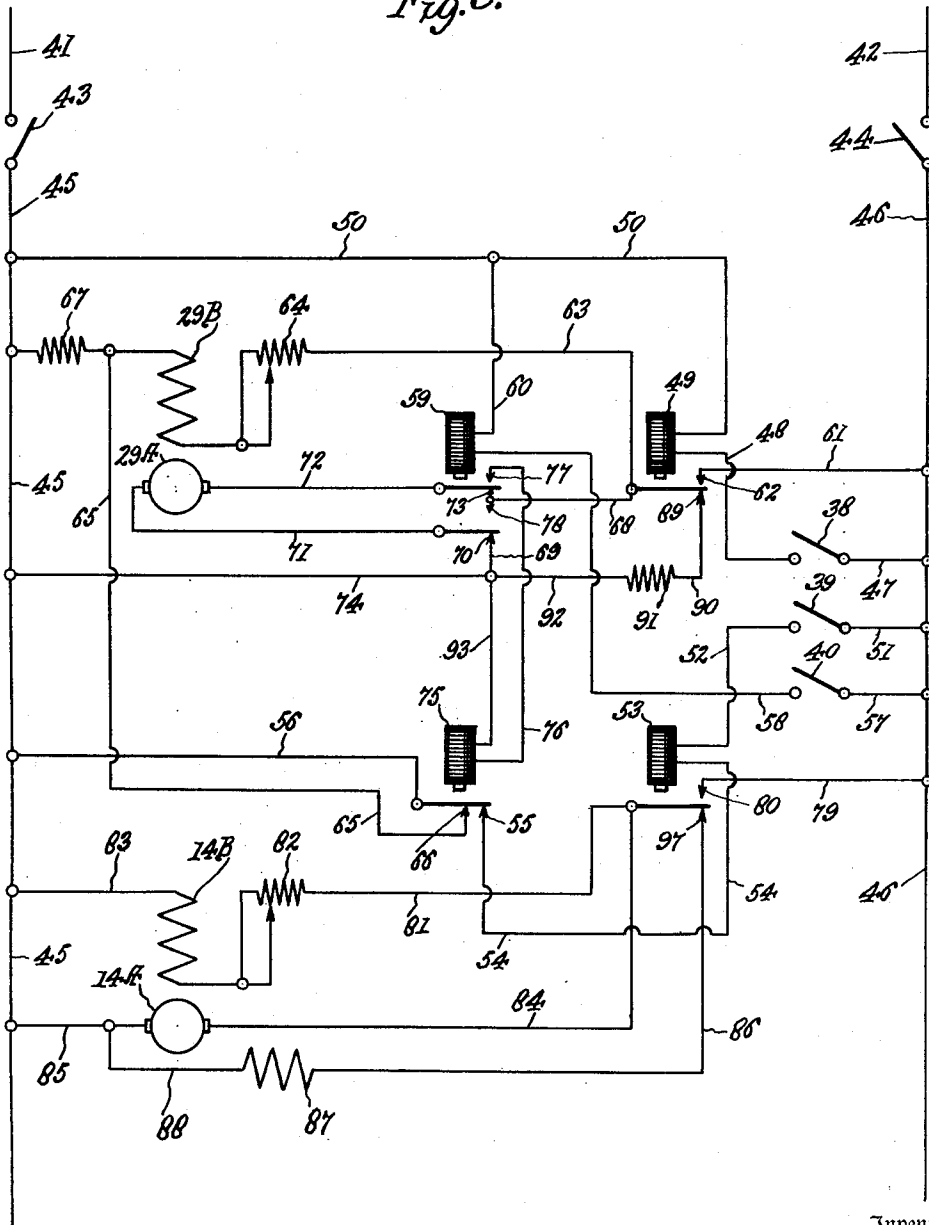
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BAG FILLING AND CLOSING APPARATUS

Filed Dec. 17, 1938

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Fig. 3.



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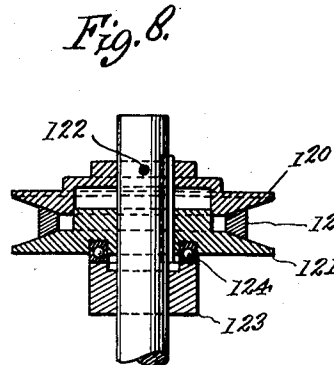
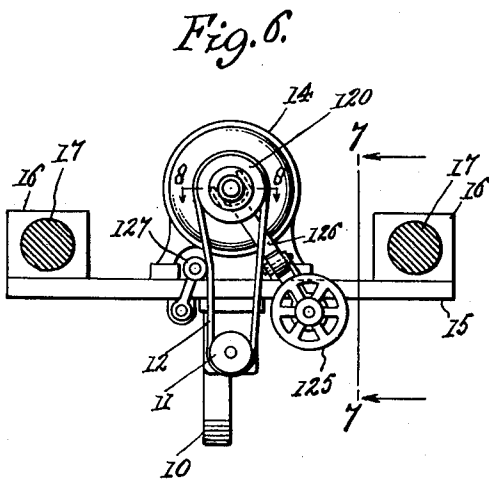
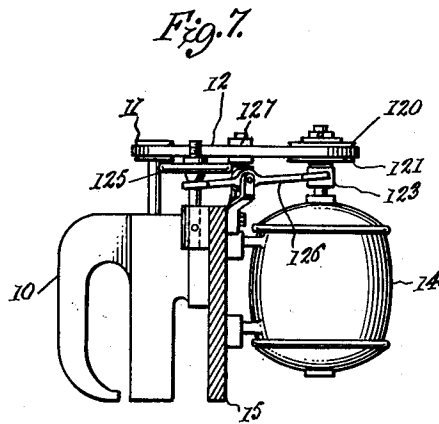
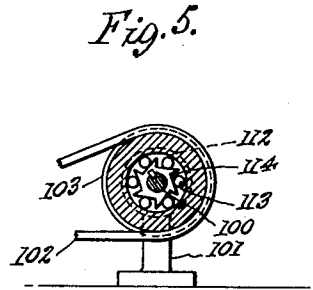
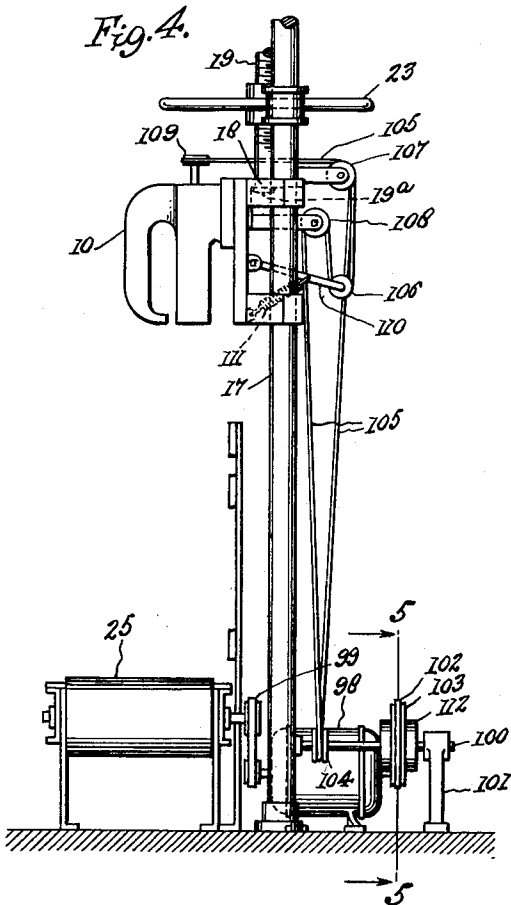
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BAG FILLING AND CLOSING APPARATUS

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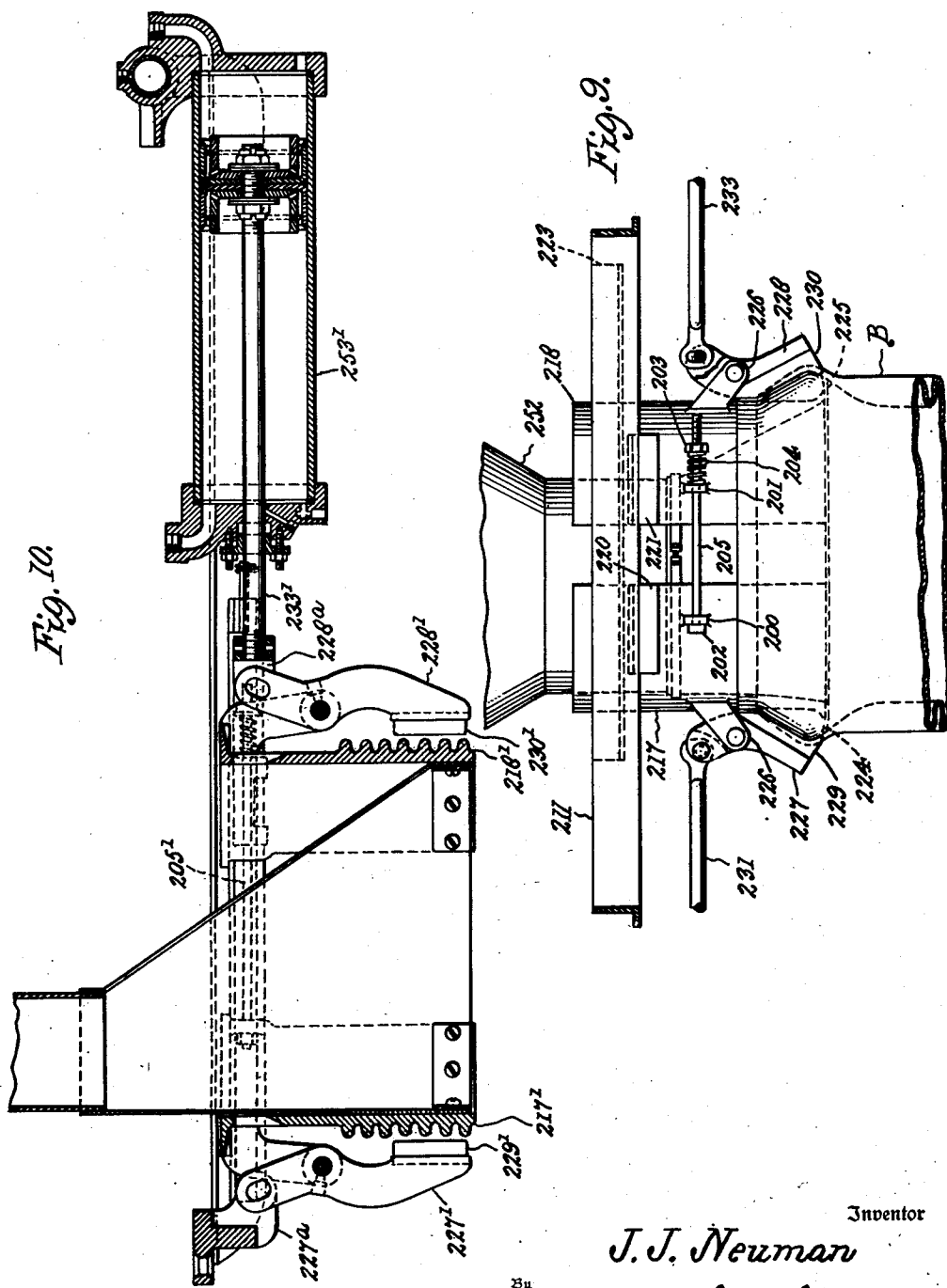
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BAG FILLING AND CLOSING APPARATUS

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2,282,199

BAG FILLING AND CLOSING APPARATUS

Filed Dec. 17, 1938

8 Sheets-Sheet 6

Fig. 12.

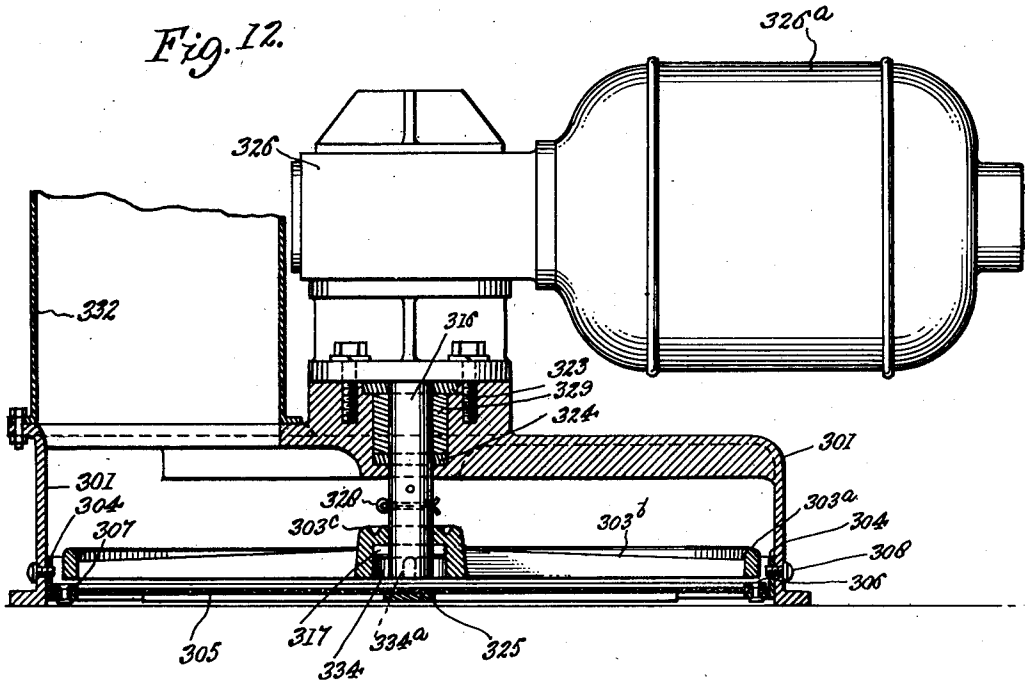
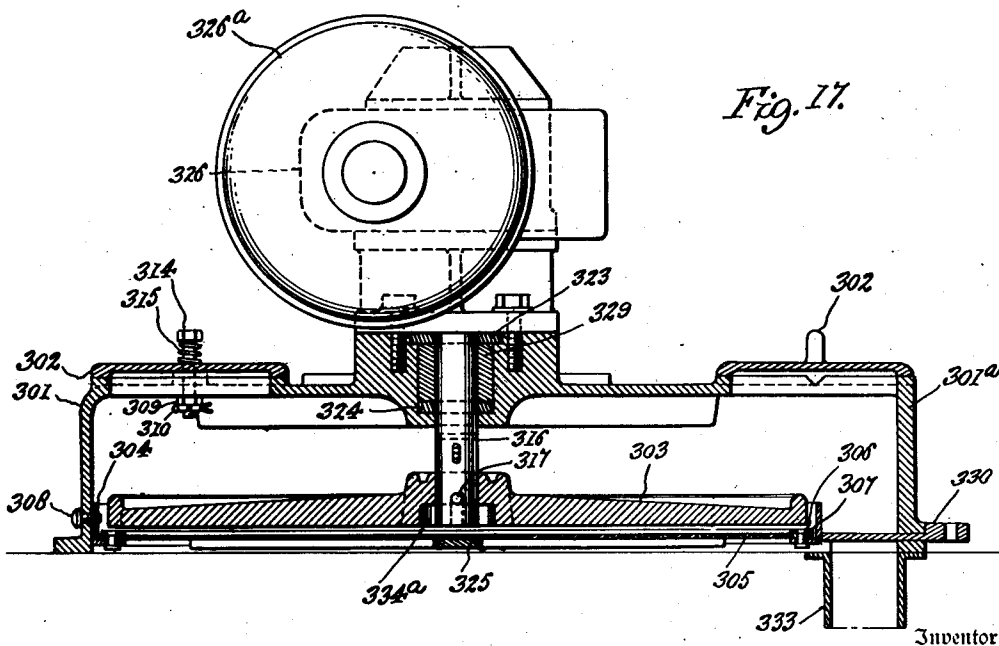


Fig. 17.



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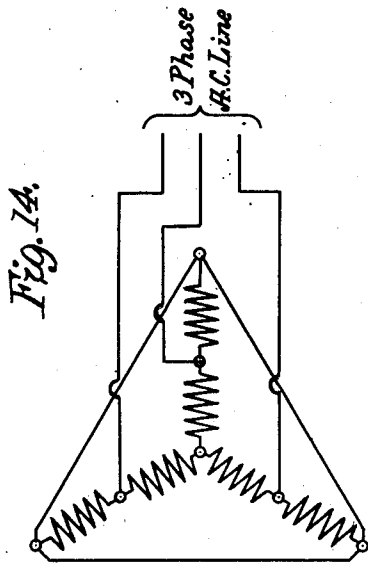
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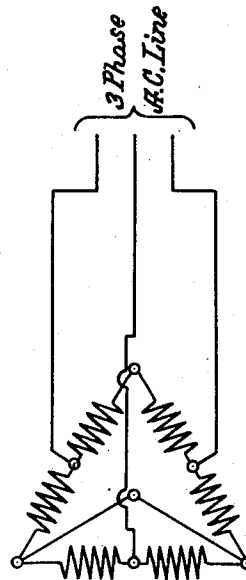
BAG FILLING AND CLOSING APPARATUS

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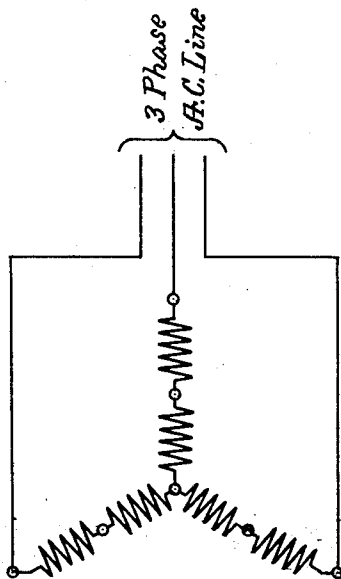
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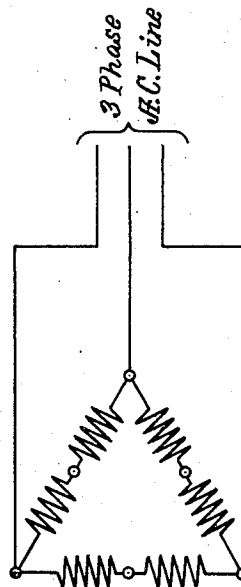
Star Connection
Parallel or Low Speed



Delta Connection
Parallel or Low Speed



Star Connection
Series or High Speed



Delta Connection
Series or High Speed

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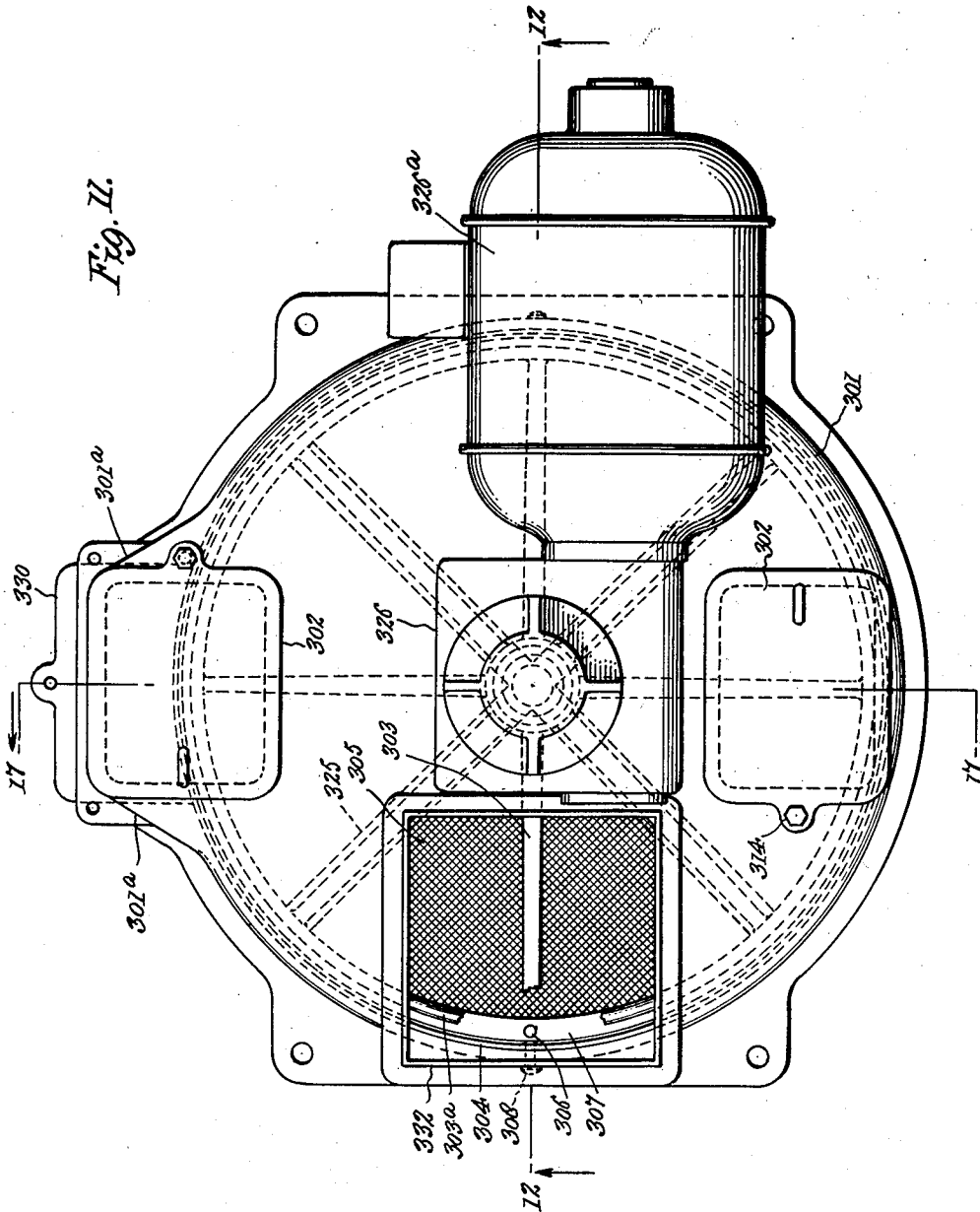
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BAG FILLING AND CLOSING APPARATUS

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8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE

2,282,199

BAG FILLING AND CLOSING APPARATUS

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Application December 17, 1938, Serial No. 246,445

4 Claims. (Cl. 226—55)

This invention relates to bag filling and closing apparatus and more especially to auxiliary equipment for use with a bag filling and sewing machine as will be more fully pointed out below and comprises additions and improvements to the disclosures of my Patent Number 1,823,283 and copending application, Serial Number 157,480, filed August 5, 1937, now Patent Number 2,159,858.

A primary object of the invention is to provide a compact system of bag filling and closing apparatus which may be installed in limited space and the several units of which are so disposed and combined that they may be conveniently operated at maximum efficiency by a single operator.

One other object of the invention is to provide a simplified means for raising and lowering the sewing head to accommodate various sizes of bags.

Another object is to provide a conveyor for moving the bag through the sewing head during the stitching operation, and means for reversing it when a bag consisting of an inner liner and an outer jacket is used so that the liner and jacket may be sewed separately on the same sewing machine, thus reducing the amount of equipment needed and speeding up the operation as the operator need not shift from one machine to another to perform the two operations.

A further object is to provide means for synchronizing the speed of the sewing machine with the speed of the conveyor so that the conveyor does not move the bag through the machine either faster or slower than the bag is being sewed and to provide means for maintaining this synchronism when it is desired to change the length of the stitch.

Another object is to provide a bag holder for the bag filler embodying improvements over the bag filling machine disclosed in my above mentioned copending application, said improvements embodying means to allow the bag to be clamped more securely without rupturing the material of the bag.

A still further object is to provide an efficient and compact screening device for screening the material fed to an automatic scale from a bin or other reservoir which device embodies means for continuously cleaning the screen for the purpose of preventing clogging and for reducing lumps to a size which will readily pass through the screen.

Another object is to provide a dust collecting system for the bag filling machine which serves

to separate dust or other very finely divided material from the product being loaded into the bag.

The invention is particularly applicable to bag filling and sewing devices for use in handling granular or pulverulent substances. Such devices are useful in packaging sugar, for example, into sacks or bags. The sugar is fed from a suitable reservoir to a weighing device. Charges of the proper weight are delivered from the weighing device into the mouth of a bag supported over a filling chute. When the full charge is placed in the bag, the bag is removed to a sewing machine which closes the mouth of the bag. The sewing machine is adjusted to engage the bag at the proper height to sew the correct portion of the bag. Since bags of different sizes and heights are used, the sewing machine must have some provision for vertical adjustability.

Furthermore, the sewing machine must be motor driven and provision must be made to render the drive mobile with the machine.

The heavy, filled bags are carried through the sewing machine on a conveyor which must, of course, be synchronized in speed with the sewing machine. In addition to this, some bags require closer stitches than others to close them effectively and so the conveyor and sewing machine must be variable as to speed.

Another feature to be considered is that, for certain purposes, double walled bags are used and the two walls must be sewed separately. Formerly two separate sewing operations were requisite and two machines were usually employed. The present invention, however, provides means for controlling the conveyor and sewing machine to sew single or double walled bags at one sewing station and without removing the bags from the conveyor. This effect is accomplished by employing a control for reversing the conveyor and rendering the sewing machine inoperative. A double walled bag is run through the machine in normal course and the inner walls sewed. Then, the conveyor is reversed and the sewing machine stopped to return the bag to the starting point. Thereafter, the bag is run through the sewing machine again and the outer walls sewed. The control for this operation enables a single operator to work the machine from one position.

Since the conveyors and sewing machines are customarily electric motor driven, electrical controls are provided for performing the various functions. The drives are made subject to var-

lations as to speed. Means for braking the motors is also provided.

The present invention also contemplates improved bag filling structure. In the first place, sugar, or other subdivided solid, is fed from the bin to the scales through a screen of improved structure. In this screen lumps are broken and foreign matter of large particle size is discarded. The screen is adjustable to handle various grades of solids. Furthermore, the screen part itself is protected against breakage by the movable construction of the other parts.

A second feature of the bag filling part of the machine is the provision in the bag filling chute of means for removing the dust which inevitably remains after a bag is filled. The dust is, therefore, prevented from spreading through the room and the danger and waste attendant thereon are eliminated.

A third feature resides in the construction of the bag holding clamps. The clamps are of the construction shown in my copending application Serial Number 157,480 and rely for their clamping force on the reaction to a stretching tension put on the bag being filled. The clamping force in the construction shown in said application is therefore dependent upon the bag wall strength and the full clamping force had necessarily to be applied to the stretching of the bag wall. The present improvement consists in relieving the bag of part of the clamping force by interposing a mechanical spring resistance to augment the normal resistance of the bag wall alone. The clamping force is therefore the reaction to the two resistances instead of the bag wall resistance alone. This makes it possible to increase the clamping force without danger of rupturing the bag.

In the drawings wherein like characters of reference refer to the same parts throughout the several views:

Figure 1 is a front elevation showing the invention applied to a complete bag weighing, filling and sewing installation.

Figure 2 is a horizontal section on the line 2—2 of Figure 1.

Figure 3 is a wiring diagram showing the circuits controlling the conveyor and sewing machine motors.

Figure 4 is a fragmentary end elevation of an alternate embodiment showing the sewing machine and conveyor both driven from the same motor.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is a horizontal section showing an alternate embodiment of the sewing machine drive consisting of a variable speed device.

Figure 7 is a vertical section on the line 7—7 of Figure 6.

Figure 8 is a section on the line 8—8 of Figure 6 showing the details of the variable pitch sheave.

Figure 9 is a detailed elevation of the improved bag holder showing one embodiment of the improvement.

Figure 10 is a detailed vertical section showing the improved bag holder in a further embodiment.

Figure 11 is a plan view of the screen cleaner and drive therefor.

Figure 12 is a vertical section taken on the line 12—12 of Fig. 11.

Figure 13 is a diagram of the star connection for the consequent pole motor on high speed.

Figure 14 is a diagram of the star connection for the consequent pole motor at low speed.

Figure 15 is a diagram of the delta connection for the consequent pole motor at high speed.

Figure 16 is a diagram of the delta connection for low speed.

Figure 17 is vertical section taken on the line 17—17 of Figure 11.

Referring to Figure 1 of the drawings, the arrangement of the complete system is shown. A bin 250 is disposed on the floor above the filling and sewing equipment. This bin 250 may be sufficiently large to extend over several units of bag filling and sewing machines or may be associated with a single unit. Said bin 250 feeds the material through the duct 332 to the casing 301 of the screening device which is described in detail below. After the material has been screened it is measured out in bag lots by the automatic scales 251 which are of standard construction and need not be described in detail herein, it being sufficient to say that they may be set to deliver bag lots periodically, of the desired weight and at spaced time intervals, to the hopper 252 without attention or further manipulation by the operator. From said hopper 252 the material is loaded into sacks or bags on the expansible bag holding members 217 and 218 which are operated by the air cylinder 253. In the embodiment shown the tubular connection 254 of the hopper 252 has the conical portion 255 fitted thereto to which the duct 256 is connected. This leads to the intake of the small blower 257 which serves to create a partial vacuum or low pressure area in the flexible sleeve connection 258 to the bag holding members 217 and 218, for the purpose of collecting any dust or very finely divided material, which remains suspended in the sleeve connection 258 after the bag is filled. Such dust would normally seep out of the machine when the bag is removed and make frequent cleaning necessary. The exhaust of the blower 257 delivers the dust to the collecting device 259, where it is periodically disposed of. The bag while being filled is shaken or agitated by the rod 260 connected to the eccentric 261, driven by the motor 262 for the purpose of compacting the material in the bag. After being filled, the bag is removed to the conveyor 25 which moves it to the sewing machine 10 where it is sewed and subsequently disposed of on the conveyors 264 and 263, all of which will be described in detail below.

The cylinder 253 operating the bag holding members is supplied with air through a valve 253a. The exhaust port of the valve 253a is connected to a pipe 253b which carries the periodically discharged air to the sewing machine 10 where the current of air is directed onto the needle to clean and cool it.

Referring to Figures 1 to 3, I have shown a sewing head 10, which may be any one of several standard models now in common use for sewing bags, and which has the pulley 11 driven through the belt 12 from the pulley 13 of the motor 14. The sewing head 10 and the motor 14 are mounted on the plate 15 which is slidingly mounted on the columns 17 through the bearings 16. The plate 15 has an angle bracket 18 (Figure 4) fastened thereto and the shank of a bolt 19 passes through a hole in the bracket 18, the head 19a of the bolt 19 engaging the bracket 18. The upper portion of the bolt 19 is threaded into a nut 20 which is in turn fastened to the horizontal cross member 21 secured to the col-

umns 17 by U-bolts 22. A handwheel 23 is secured to the shank of the bolt 19 for manual rotation thereof. Since the bearings 16 of the plate 15 are free to slide vertically on the columns 17, the plate 15 with the motor 14 and the sewing head 10 will be raised or lowered as the handwheel 23 is turned to screw the bolt 19 in the nut 20. This then forms a very simple and compact method for mounting a sewing machine and provides means for the raising and lowering of the machine so as to compensate for the variation in the height of the various types of bags which it may be desired to sew. This simple structure constitutes a great improvement over the complicated mechanisms and mounting structures now in general use for this same purpose.

Mounted on the floor below the sewing head 10 is the horizontally disposed conveyor belt 25 driven by the motor 29 through a suitable reduction drive such as the pulley 26, the belt 27 and the pulley 28. A bag guiding fence or support is built along the belt 25 to hold the bags upright without additional support as they are conveyed to the sewing machine. This fence is composed of vertical posts 96 secured at their lower ends to the side members 25B of the conveyor and horizontal rails 93, 94 and 95. The control for the conveyor and sewing machine has a foot pedal 30 mounted on the lever arm 31 which is supported by the shaft 32 passing through and journaled in the members 25A and 25B of the conveyor 25. Mounted on the opposite end of the shaft 32 is the lever 33 pin connected at its outer extremity to the rod 34 linking it with the operating arm 35 of the switch box 36. The operating arm 35 is fastened to the shaft 37 operating three switches 38, 39 and 40, shown in diagram in Fig. 3, that may be any standard kind such as the tiltable mercury type. They are so disposed in angular relation to each other that they will close and open in sequence as the pedal 30 is depressed, the switch 38 closing first, the switch 39 second and the switch 40 third. The lever arm 31 and pedal 30 are returned to the original position by the spring 116 thus opening the switches 40, 39 and 38 in sequence.

As seen in Fig. 3, the circuits for the control of the motor 29 driving the conveyor 25 and the motor 14 driving the sewing head 10 are supplied with energy from the line wires 41 and 42 through the circuit breakers 43 and 44 to the supply conductors 45 and 46. The switch 38 controlled by the foot pedal 30 is interposed between the wire 47 connected to the supply conductor 46 and the wire 48 connected to one terminal of the relay coil 49. The wire 50 leads from the other terminal of the relay coil 49 completing the circuit to the opposite supply line 45. The switch 39 connects the wire 51 from the supply line 46 to the wire 52, the relay coil 53, the wire 54, the relay contact 55 and thence through the conductor 56 to the supply conductor 45. The switch 40 controls the circuit from the supply conductor 46 through the wire 57, the wire 58, to the relay coil 59 and thence through the wires 60 and 50 to the supply conductor 45.

The relay coil 49 when energized operates to close the circuit from the supply line 46 to both the armature 29A and the shunt field 29B of the conveyor motor 29. The field circuit is energized from the supply conductor 46 through the wire 61, the relay contact 62, the wire 63, the

variable resistor 64, to the field coils 29B of the motor 29 and thence through the wire 65, the relay contact 66 and the wire 56 to the supply conductor 45. An auxiliary circuit which the current takes when the relay contact 66 opens is provided from the motor field coils 29B through the resistor 67 to the supply conductor 45. When the relay coil 59 is not energized the circuit through the motor armature 29A is formed from the supply conductor 46, by the wire 61, the relay contact 62, the wire 63, the relay contact 73, and the wire 72 to said motor armature 29A, thence through the wire 71, the relay contact 70, and the wires 69 and 74 to the supply conductor 45. When the relay coil 59 is energized the direction of flow of current in the armature 29A is reversed the circuit now being formed from the supply conductor 46, through the wire 61, the relay contact 62, the wire 63, the relay contact 78 and the wire 71 to the armature 29A, thence through the wire 72, the contact 77, the wire 76, the relay coil 75 and the wires 93 and 74 to the supply conductor 45.

When the relay coil 49 is deenergized an auxiliary circuit or shunt across the armature 29A is closed from said armature 29A through the wire 72, the relay contact 73, the wire 68, the relay contact 89, the wire 90, the resistor 91, the wire 92, the wire 69, the relay contact 70 and the wire 71 back to the armature 29A.

The relay coil 53 when energized operates to close the circuit from the supply line to both the armature 14A and the shunt field 14B of the sewing machine motor 14. The field circuit is energized from the supply conductor 46 through the wire 79, the relay contact 80, the wire 81, and the variable resistor 82 to the field coils 14B and thence through the wire 83 to the supply conductor 45. The armature circuit is formed from the supply conductor 46, through the wire 79, the relay contact 80, and the wire 84 to the motor armature 14A and thence through the wire 85 to the supply conductor 45. When the relay coil 53 is deenergized an auxiliary circuit or shunt across the armature 14A is formed through the wire 84, the contact 97, the wire 86, the resistor 87 and the wires 88 and 85 back to the armature 14A.

In use, assuming that a bag has been filled and placed on the right hand end of the conveyor 25, the operator depresses the foot pedal 30, against the bias of the spring 116, by an amount sufficient to tilt the switch 38 to circuit closing position but not far enough to close the switches 39 and 40, thus starting the conveyor motor 29 and moving the bag up to the sewing head 10. When the switch 38 is closed a circuit is formed from the supply conductor 46 through the relay coil 49 to the supply line 45 thereby energizing said coil 49 which opens the contact 89 and closes the contact 62. Closing of the contact 62 completes the circuit from the supply line 46 through both the motor armature 29A and the field coil 29B to the supply conductor 45. Assuming that the polarity of the supply conductors 45 and 46 is such that current tends to flow from the supply conductor 46 to the supply conductor 45, it is thus seen that the direction of the current in the armature 29A will be from the wire 72 to the wire 71, and the motor 29 starts in such a direction as to drive the conveyor belt 25 from right to left. The operator holds the pedal 30 in this position until the bag reaches the sewing head 10. He now depresses said pedal 30 by an addi-

tional amount sufficient to close the switch 38 but not the switch 40, the switch 38 merely being tilted by an additional amount which has no effect and it remains in closed position. A circuit is now completed from the supply conductor 46 through the switch 39 and the wires 51 and 52 to the relay coil 53 and from the supply line 45 through the relay contact 55, the wires 56 and 54, thus energizing said coil 53 and causing the contact 80 to close which, in turn, closes the circuits through both the armature 14A and the field coils 14B. The motor 14 thus starts and operates the sewing head 10. Since the conveyor 25 is still moving the bag from right to left, the bag is moved through the sewing head 10 and is sewed.

If the bag consists of a single thickness of material the operator now releases the foot pedal 30 to the first position thus opening the switch 39 and stopping the sewing machine 10. The conveyor 25 continues to operate carrying the bag away for subsequent disposal and moving another bag up to the sewing head 10. If, however, the bag consists of a paper or closely woven cloth liner with a heavier outer bag or jacket, it is advantageous to sew each one separately and after the liner has been sewed the operator depresses the pedal 30 by a further amount, to third position, thus closing the switch 40, as well as the switches 38 and 39 which were previously closed. An additional circuit is thus closed from the supply line 46 through the wires 57, 58 and the switch 40 to the relay coil 59 and from the supply conductor 45 through the wires 50 and 60, thereby energizing said coil 59 which thereby opens the contacts 69 and 73 and closes the contacts 77 and 78. Current now flows through the field coils 29B in the same direction but in the armature circuit current now flows from the conductor 46 through the wire 61, the contact 62, the wire 68, the contact 78, the wire 71 and through the armature 29A to the wire 72, the contact 77, the wire 76, the relay coil 75, the wires 93 and 74 to the supply conductor 45. Since the direction of current flow is now through the armature 29A from the wire 71 to 72 instead of from 72 to 71 as before the direction of rotation is thus reversed and the motor 29 drives the conveyor 25 from left to right. Also since the relay coil 75 is now in series with the armature 29A, it is energized and opens the contacts 55 and 66. Opening the contact 55 deenergizes the relay coil 53 and stops the sewing machine 10. At the same time, the shunt is removed from the resistor 67 by the opening of contact 66 thereby allowing less current to flow in the field 29B of the motor 29 which, since it is a direct current shunt motor, thus speeds up and quickly returns the bag to the right hand side of the sewing head 10, as viewed in Fig. 1. The operator now releases the pedal 30 to the second position where switches 38 and 39 are closed and 40 is open thus returning the circuits to their former condition with the conveyor motor 29 operating the conveyor 25 from right to left and the sewing machine 10 sewing the outer bag. The pedal 30 is then released to the number one position where the conveyor 25 runs but not the sewing machine 10 and the bag moves on for subsequent disposal and a new bag is brought up to be sewed.

In order that the motors 14 and 29 will stop quickly, it is desirable that they have brakes. These may be of the standard solenoid oper-

ated type with a mechanical brake on the shaft of each motor or may be of the dynamic type which I have shown. When the relay coil 49 is deenergized, opening the circuit to the armature 29A and the field 29B of the motor 29, the contact 89 closes thereby shunting the resistor 91 across the armature 29A, which quickly dissipates the energy stored therein and stops said motor 29. Likewise when the relay coil 53 is deenergized the contact 87 shunts the resistor 87 across the armature 14A thereby bringing the motor 14 to a quick stop in a like manner.

The speed of both motors 14 and 29 may be controlled individually by means of the variable resistors 82 and 84. In the past, it has been the practice to drive both the conveyor 25 carrying the bag and the sewing head 10 from a single motor, the gears or belts having the proper ratio to drive the conveyor 25 at such speed that it will match the speed of the sewing machine 10, the bag thus neither getting ahead of or behind the progress of the stitching. This system however, does not provide for the case where the length of the stitch must be altered, which is often the case when several types of bags are to be sewed. Also it has the disadvantage of using a complicated drive for the sewing machine 10 since provision must be made for raising and lowering the sewing head 10 without disconnecting the drive in order to accommodate bags of varying heights and the conveyor must be operable independently of the sewing machine. However, by using the two motors 14 and 29 the drive is very simple and therefore more reliable and the speed of the conveyor 25 may be adjusted by the rheostat 84 to match any length of stitch or speed of sewing which may be used. Furthermore, it is because of this feature that it is easily possible to back up the bag after the liner has been sewed and sew the outer covering on the same machine.

Where constant speed motors are used for driving the sewing machine 10 and the conveyor 25 field rheostat control cannot be used and I have shown, referring to Figures 6, 7 and 8, an alternate method of varying the speed of the sewing machine 10. The motor sheave in this case is of the variable pitch type and consists of the two halves 120 and 121 keyed to the motor shaft the part 120 being fixed, in relation to the shaft by the pin 122 and the part 121 being free to slide up and down on said motor shaft. The collar 123 bears against the thrust bearing 124 which is seated in the sheave piece 121 and, when the handwheel 125 is turned actuating the lever 126, the collar 123 moves the movable half 121 of the sheave nearer or further from the half 120 thus varying the pitch diameter of said sheave. An idler pulley 127 is provided to keep the belt 12 taut at all times.

Although the speed of alternating current motors cannot be varied by field rheostat control it is however possible if induction motors are used to obtain a speed variation by use of the consequent pole principle. The stator windings of A. C. induction motors are conventionally wound so that the coils are alternately north and south poles. However, if the direction of current flow in the adjacent coils can be reversed so that all the coils become either north or south poles, as the case may be, a condition will be created where consequent poles will be formed between each of the coils, of the opposite polarity to said coil poles and the number of poles

is in effect doubled. However, since the speed of an induction motor varies inversely as the number of poles, it will be seen that the speed is thereby reduced to a value of one half the former speed. This result can be accomplished by bringing out the end connections of the coils and reversing the direction of current flow in the alternate coils by a suitable switching mechanism.

Figure 13 shows the connection of the windings of a star connected three phase motor to a three phase line so as to place alternate coils in opposite signs or poles. Figure 14 shows the connection of the same type of motor to give all of the coils the same polarity so as to produce consequent poles therebetween and in effect double the number of poles of the motor. It will be understood that both types of connections will be present in each motor and any type of electric switch employed to change from one connection to the other accordingly as high or low speed is required. Figures 15 and 16 correspond to Figures 13 and 14 respectively and show the same type of connections in a delta connected three phase motor.

Due to the fact that so many existing machines have the single motor drive I have devised an alternate method of reversing the conveyor 25, without running the sewing machine 10, by mechanical means as shown in Figs. 4 and 5. The motor 98 drives the conveyor 25 through the belt 99 and also drives the countershaft 100 supported on the bearings 101 through the belt 102 and the pulley 103. The countershaft 100 also has thereon the pulley 104 with which the belt 105 engages and drives the sewing machine head 10 through the pulleys 106, 107, 108 and 109. The pulley 106 is mounted on the pivoted arm 110 to which is fastened a take-up spring 111 which keeps the belt 105 taut regardless of the height to which the sewing head 10 is moved on the columns 17. The pulley 103 (Fig. 5) embodies a free wheeling clutch and has a hollow hub 112 in which are the rollers 113 and the ratchet shaped piece 114 keyed to the shaft 100. When the shaft 100 turns counterclockwise as viewed in Fig. 5 the rollers 113 wedge between the ratchet planes and the inside surface of the hub 112 and the pulley 104 turns and drives the sewing machine head 10 through the belt 105. When the shaft 100 turns clockwise the rollers 113 cannot wedge and the shaft 100, the ratchet 114, and the rollers 113 turn freely within the hub 112 of the pulley 104 and the sewing machine 10 is not driven. The sewing machine 10 therefore operates only when the motor 98 is driving the conveyor 25 in a forward direction and if the motor 98 is reversed the bag may therefore be returned for the second sewing operation, the sewing machine being automatically disengaged.

Passing now to the bag holder, Figure 1 shows the general organization in working relation and Figure 9 shows in detail the bag clamps. The general construction is described in my application Serial Number 157,480, previously mentioned, and will only be indicated broadly herein. The extremity of the delivery spout is formed by the two holders 217 and 218. As shown in Figure 9, the holders 217, 218 are slidably mounted for motion towards and away from each other. Lugs 226 are secured to the holders. Clamping jaws 227 and 228 are pivotally mounted on the lugs. The jaw 227 carries a pad 229 at its inner side adapted to clamp the upper

edge of a bag B against the beading 224 of the holder 217. Similarly the jaw 228 carries a pad 230 for clamping against the beading 225 of the holder 218. An arm 231 is pivotally connected to the upper end of the jaw 227 and has its other end fixed to an immovable part of the machine. The operating rod 233 is connected to the jaw 228 at one of its ends and has its other end connected to the piston in the pneumatic cylinder 253. A valve 253a controls the admission of air to the cylinder 253 and so controls the movement of the rod 233. It will be apparent that movement of the rod 233 to the right in Figure 1 causes the holder 218 to move away from the holder 217. When a bag is over the holders the holder 217 is put under tension to follow the other holder. Since the arm 231 is anchored the reaction will tighten the jaw 227. The direct pull of rod 233 causes a tightening of the jaw 228. So much of the structure is shown in my copending application.

Referring now to Figure 9 showing the bag holder, in the present device I have added the rods 205 there being two, one on each side of the holders 217 and 218. Said rods 205 pass through the lugs 200 and 201 which are cast integrally with the holders 217 and 218. One end of each of the rods 205 has the head 202 and the other end is threaded to receive the nut 203 which retains the spring 204.

In operation the nut 203 is adjusted to such a position on the rod 205 that as the holders 217 and 218 are expanded the spring 204 is compressed slightly before the walls of the bag B are put in tension. This differs from the disclosure of my copending application Serial Number 157,480 in that instead of the entire tension being transmitted through the material of the bag B as is the case without the rods 205, the greater part of it is now transmitted through the rods 205. This allows higher tension to be used thus clamping the members 227 and 228 more tightly against the bag without additional strain on the material of the bag.

Referring to Figure 10, I have shown another embodiment of the bag holders in which instead of the rubber beadings 224 and 225 as shown in Figure 9 the metal of the bag holders 217' and 218' is itself corrugated as shown. This type of holder is applicable to most types of bags except those of very light weight material. In this form the jaw 227' has the pad 229' to bear against the corrugated face of the holder 217'. The upper end of the jaw 227' is pivoted to the lug 227a anchored to the frame. The jaw 228' has the pad 230' to bear against the corrugated face of the holder 218'. A coupling 228a connects the upper end of the jaw 228' with the free end of the operating rod 233'. The operation is the same as in the form of Figure 9.

Referring to the drawings in Figures 11, 12 and 17 I have shown the details of the screening device which consists of the substantially round casing or housing 301 to the lower side of which the screen 305 is secured between the clamping ring 307 and the angular supporting ring 304 which is fastened to said housing by the screws 308. Members 325, welded to the angular supporting ring 304, extend crosswise under the screen 305 to support and stiffen it further against bending stresses due to the weight of sugar above and the wedging action of small lumps. The rotating spider member 303 positioned slightly above the screen 305 consists of the rim 303a, the spokes 303b and the hub 303c,

the bottom surfaces of said rim and spokes being flat and in the same plane. The spider member 303 is secured to the shaft 316 by the pin 317, said shaft extending up through the center of the housing 301 into the gear reduction unit 326 and being driven by the motor 328a. The pin 317 fits in the slot 334 of the hub 303c of the spider 303. Other slots of varying depths such as the slot 334a are provided in the hub and form a means of adjusting the clearance between the bottom of the spider 303 and the screen 305 the clearance used depending on the material being screened. When it is desired to change the clearance the cotter pin 328 is removed and the spider 303 is raised up until the pin 317 disengages the slot 334. The spider 303 is then turned on the shaft 316 the proper number of degrees until the slot of the desired depth is opposite the pin 317 and is then dropped down and the cotter pin 328 replaced. Another feature of this is that, since the spider 303 is free to slide up the shaft 316 as far as the cotter pin 328, if any particularly unyielding lumps or foreign objects get wedged between the spokes 303b or the rim 303a of the spider 303, said spider 303 will yield by sliding up the shaft 316 instead of rupturing the screen 305.

The housing 301 has a recess formed around the shaft 316 containing the grease retaining packing rings 323, 324 and 329 to prevent lubricant from leaking down from the gear reducer unit 326 above.

The housing 301 also has the top thereof provided with two diametrically opposite openings for inspection purposes, said openings being closed by the covers 302 retained by means of the springs 315 held by the nuts 309 and bolts 314. Cotter pins 310 hold the nuts 309 in adjustment.

In operation material to be screened is fed through the duct 332 into the top of the housing 301 where the material which is sufficiently fine passes through the screen 305 immediately. The lumps are carried or rolled around on the screen 305 by the spokes 303b of the rotating spider 303 until they are sufficiently broken up to pass through said screen 305. In the event that the lumps become so numerous that they pile up above the rim 303a of the spider 303 they are thrown off by centrifugal force into the extended portion 301a of the housing 301 and may be permitted to fall through the duct 333 into any suitable receptacle by opening the gate 330.

From the foregoing description, taken in connection with the accompanying drawings, the several objects and advantages of my invention and the method of their accomplishment will be clearly manifest, it being understood that the particular constructions set forth are susceptible of modification in various ways without departing from the spirit or scope of the invention as claimed.

What is claimed is:

1. In a bag filling machine, a hopper for feeding the filling material to the bag, a delivery tube forming the lower end of said hopper to guide the material into the bag, a pair of separable bag holding members positioned below said delivery tube and adapted to receive a bag mouth portion thereover, a bag clamp pivotally mounted on each of the bag holding members, a fixed member pivotally connected to one end of one of said bag clamps, a movable member pivotally

connected to one end of the other bag clamp, a resilient connection between the bag holding members, operating means for said movable member to move one bag holding member away from the other against the reaction of the resilient connection whereby the bag clamps are tightened on the bag without undue stress on the bag mouth, vibrating means connected to said bag holding members to settle the contents of the bag, a downwardly flaring skirt about said delivery tube, flexible connecting means between the skirt and bag holding members to permit displacement upon agitation and to prevent escape of dust, a blower, a conduit between the skirt and the intake of said blower to remove said dust, and a dust collector connected to the exhaust of the blower.

2. In a bag filling machine, the combination of a hopper for feeding the filling material to the bag, a delivery tube forming the lower end of said hopper for guiding the material into the bag, means for holding the bag below said delivery tube for filling, a downwardly flaring skirt about the delivery tube, vibrating means connected to said bag holding means to settle the contents of the bag, flexible connecting means between said skirt and the bag holding means to allow displacement of the holding means upon vibration and to prevent escape of dust, a blower, a conduit between said skirt and the intake of the blower to remove the dust and fine foreign particles.

3. A bag filling machine having in combination a holder for the filling material, a pair of relatively slidably mounted members for insertion into the mouth of the bag to be filled, vibrating means for said members to settle the contents of the bag held thereby, a flexible sleeve connecting the holder and the said members to allow displacement of the bag and the members upon vibration and to provide a closed chute for the filling material, a bag clamp pivoted on each one of said members, a fixed connection for one end of the first of said clamps whereby on movement of the first member in the direction of the second member the clamp tightens on a bag over said member, operating means connected to the second of said clamps whereby the clamp is tightened and the second member is adapted to be moved away from the said first member, the first member being entrained with the second member in part by the wall of a bag positioned over said members, and a resilient connection between said members to remove part of the stress from the bag wall when the said members are moved apart and to permit increasing the clamping tension without rupturing the bag wall.

4. A bag filling machine having in combination a holder for the filling material, a pair of relatively slidably mounted members for insertion into the mouth of a bag to be filled, vibrating means for said members to settle the contents of the bag held thereby, a flexible sleeve connecting the holder and the said members to allow displacement of the bag and the members upon vibration and to provide a closed chute for the filling material, a bag clamp pivoted on each one of said members, said members having corrugated bag engaging surfaces, pressure pads on said clamps adapted to engage a bag against said corrugated surfaces, and means for operating said clamps.

JACOB J. NEUMAN.