

July 27, 1954

E. ROTHWELL
APPARATUS FOR PACKING LOOSE MATERIALS, PARTICULARLY
FIBROUS MATERIALS

2,684,802

Filed Sept. 14, 1951

2 Sheets-Sheet 1

FIG. 2.

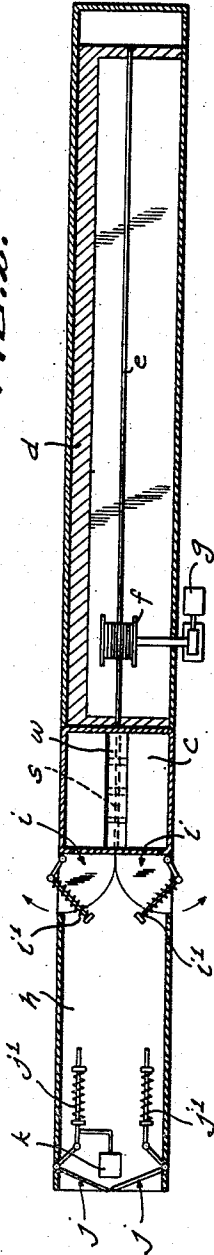
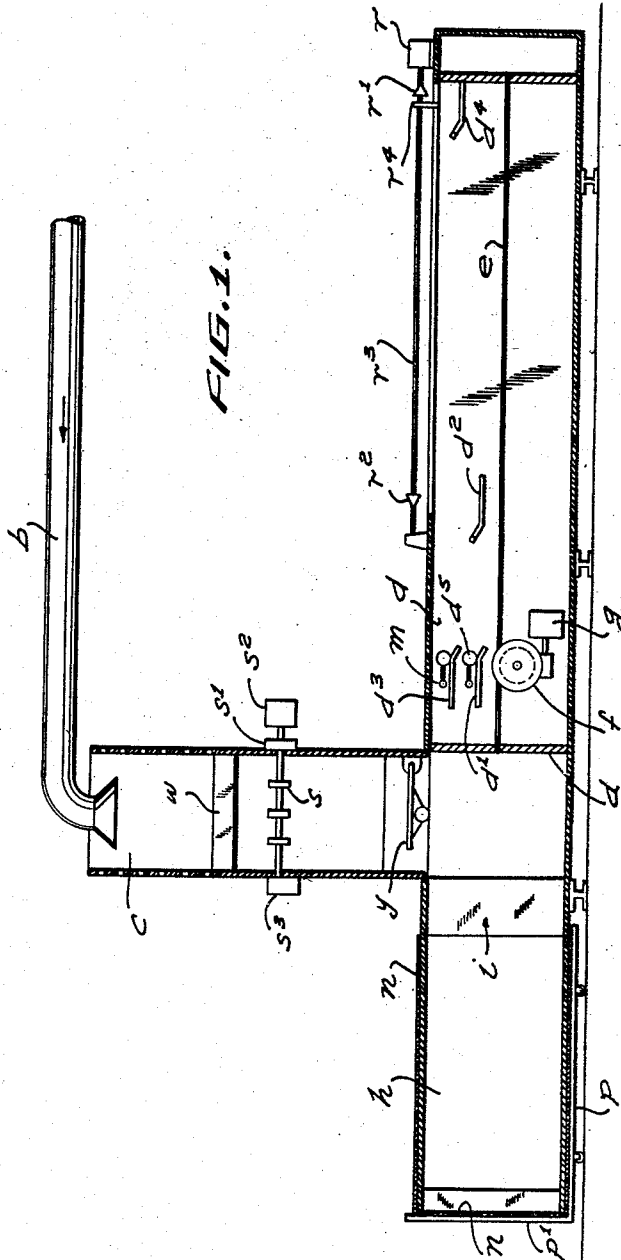


FIG. 1.



INVENTOR
ERNEST ROTHWELL
BY *[Signature]*

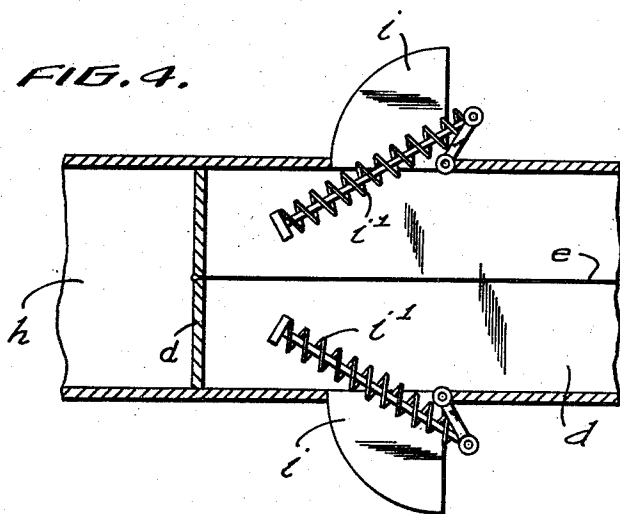
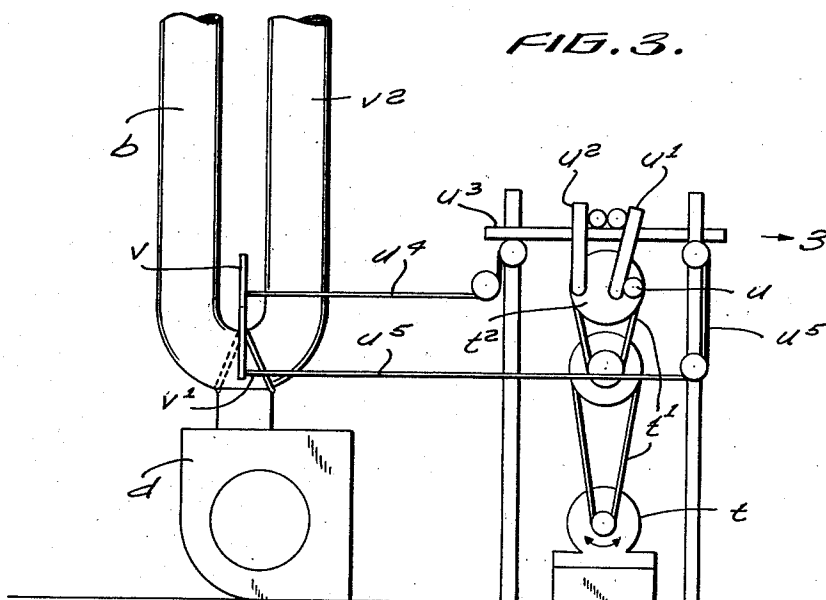
July 27, 1954

E. ROTHWELL
APPARATUS FOR PACKING LOOSE MATERIALS, PARTICULARLY
FIBROUS MATERIALS

2,684,802

Filed Sept. 14, 1951

2 Sheets-Sheet 2



INVENTOR
ERNEST ROTHWELL
BY

Michael J. [Signature]
att

UNITED STATES PATENT OFFICE

2,684,802

APPARATUS FOR PACKING LOOSE MATERIALS, PARTICULARLY FIBROUS MATERIALS

Ernest Rothwell, Manchester, England, assignor
to Henry Wheatley & Sons, Limited, Mirfield,
England

Application September 14, 1951, Serial No. 246,695

Claims priority, application Great Britain
September 23, 1950

10 Claims. (Cl. 226—19)

1

The invention relates to apparatus for use in packing loose materials, particularly fibrous materials.

In the production of woolen yarns, for instance, it is customary to make blends of the various colours of loose wool required to produce yarns of the desired colour or shade.

The mixed or blended wools are then packed into sheets or containers until required for use, and it is with the packing or consolidation of the material into the sheets or containers with which the invention is primarily concerned, though the apparatus constituting the invention will or may find useful application in other directions for packing or consolidating loose fibrous or other material into containers.

The invention will be described with reference to the accompanying sheet of drawings, in which Fig. 1 is a side elevation partly in cross-section; and

Fig. 2 is a plan view, partly in cross-section of packing apparatus embodying the invention;

Fig. 3 is an elevation of means for enabling material fed to the machine to be diverted to any other point of delivery either at will or automatically as will be described later.

Fig. 4 shows in an open position doors which are shown in a closed position in Fig. 2, Fig. 4 being a fragmentary partly sectional view of part of the apparatus of Fig. 2.

Referring to the drawings, material to be packed is conveyed by a suitably impelled air current along a feed conduit *b* to the upper end of an open-topped hopper or receiving chamber *c* having suitably perforated walls. The lower end of the hopper *c* opens into the path of a reciprocating ram *d*, shown as being operated by a cable *e* passed about a winch *f* driven by a reversing electric motor *g*.

Loose fibrous material delivered into the hopper *c* falls into the path of movement of the ram *d* by which it is forced into a packing chamber *h* at the entrance to which there are provided two pivoted doors *i, i*, loaded by respective springs *i', i'*.

As will be seen from Fig. 2, the doors *i, i*, are in the form of quarter circles the reason for this being to prevent trapping of material behind them when being opened, as would occur if the doors were in the form of flaps or plates. The springs *i', i'*, have merely the function of closing the doors as the ram *d* recedes. Fig. 4 shows the doors *i, i* in their open position, to which they are moved when the ram *d* has moved into the tubular portion *h*.

2

Suitably mounted on the ram *d* are four ramps *d', d', d', d'*. The ramps *d'* and *d'* are arranged to operate a two-way switch *d⁵* controlling, through the motor *g*, what may be referred to as the short-stroke reciprocation of the ram *d*, the length of which is indicated in Fig. 1 by the disposition of the ramp *d'* in relation to the ramp *d'*.

At the delivery end of the packing chamber *h* there are provided two pivoted doors *j, j*, loaded by respective springs *j', j'*, the action of which is adjustable.

The loading imposed on the doors *j, j*, determines, as will be understood, the amount of compression exerted on the material forced into the packing chamber *h* by the ram *d*.

When the compression of material in the packing chamber reaches the pre-determined value it causes the doors *j, j*, to be opened and at a determined point in the opening movement of the doors a switch *k* is closed against the action of a spring. The closing of this switch *k* is arranged to change over from the switch *d⁵* to a switch *m* operable by the ramps *d³* and *d⁴* on the ram *d*, the ramp *d⁴* being so located in relation to the ramp *d³*, as shown in Fig. 1, that the ram *d* is now given a long stroke of reciprocation, such that the compressed mass of material in the packing chamber *h* is ejected past the doors *j, j*.

Before each compressing operation commences, the open end of a tubular bag or container *n* is passed over the discharge end of the packing chamber *h*. When the compressed mass of material in the packing chamber is discharged by the long-stroke movement of the ram *d*, it enters and carries with it the bag *n* which thus becomes filled, and is thereby pushed off the delivery end of the packing chamber. As the filled bag moves away from the packing chamber it is deposited upon a wheeled trolley *p* positioned beneath it, the forward end of such trolley having an upwardly projecting part *p'*, the abutment against which of the end of the forwardly moving bag *n* causes the trolley to travel forwardly along with the bag and thus to support the full length of the bag as it passes off the packing chamber.

An adjustable stop, not shown, is provided to arrest the movement of the trolley *p* away from the packing chamber a predetermined time before the ram *d* completes its ejecting stroke, so that the portion of material near the mouth of the bag *n* receives what may be termed a final compressing action to cause it to move fully into the open end of the bag *n*.

As the ram *d* arrives at the forward end of

its "long-stroke" or ejecting movement, the ramp d^4 opens the switch m . This interrupts the electric circuit and operates a relay, not shown, to change over the ram movement from "long-stroke" back to "short stroke."

When the loaded bag has been carried clear of the packing chamber and the ram has moved sufficiently far in its movement of withdrawal the springs acting on the doors j, j , close the said doors.

An ultimate limit switch r is adapted to be brought into operation to shut off the supply of electric current to the motor g and prevent over-running of the ram d in either direction in the event of failure of the control means above described. As is shown in Fig. 1, the ram d carries an extension r^4 which moves in the space between the contacts r' and r^2 which are adjustably located on the rod r^3 . When the ram d overruns its stroke in either direction, the member r^4 contacts either member r^2 or member r' to cut off the current to the motor g and thereby prevent the occurrence of an accident.

In order to obviate the possibility of damage or blocking of the feed conduit b due to material piling up in the hopper c , there may be provided in the lower part of the hopper a roller s driven frictionally through a centrifugal clutch s' from an electric motor s^2 . This roller controls a switch s^3 which, when the rotation of the roller s is arrested by accumulation of material in the hopper, is adapted to reverse the direction of rotation of an electric motor t (Fig. 3). This motor is connected by belt or chain gearing t' to a rotatable disc t^2 . This disc carries a pin u which is adapted, according to the direction of its rotation to engage either one or the other of two fingers u' and u^2 , depending from a horizontally slidable bar u^3 . This bar is connected by flexible connectors u^4 and u^5 to a centrally pivoted lever v carrying a diverting plate v' adapted to control the entrance to a relief passage v^2 . So long as the roller s is free to rotate, the bar u^3 is caused to occupy a position in which the plate v' closes the relief passage v^2 , but if the rotation of the roller s is arrested the switch s^3 causes the direction of rotation of the motor t to be reversed, with the result that the bar u^3 is moved longitudinally in the direction of the arrow 3 in Fig. 3, causing the lever v to be rocked in a direction to swing the plate over from the position in which it closes the relief passage v^2 to that in which it opens up the entrance to such passage and closes the entrance to the feed conduit b . The material approaching through the supply conduit a is thus diverted from the feed conduit b into the relief passage v^2 , through which it is conveyed to any desired delivery point.

Above the roller s there is provided in the hopper c a deflector w by which material entering the hopper from the feed conduit is prevented from falling on to the roller s .

At the lower end of the hopper c , above the path of reciprocation of the ram d , there is provided a freely-pivoted lever y which rises and falls as the ram reciprocates and the function of which is to prevent the material "packing" or filling the lower end of the hopper above the ram.

The switch s^3 may be arranged, in addition to actuating the diverting plate v' , to operate an electrically-operated valve controlling a supply of oil to the material being dealt with, and to cut off such supply during diversion of the material through the relief passage v^2 .

In connection with the switch k there may be

provided a push-button control to enable the contents of the packing chamber to be discharged at any time independently of the automatic opening of the doors j, j , by the action of the compressed material in the packing chamber h .

It will be noted that by varying the action of the springs controlling the opening of the doors j, j , the amount of compression applied to the material before entering the bag n can be regulated as desired.

Provision will or may be made to give audible and/or visual signals prior to discharge of material into or from the packing chamber h .

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Baling apparatus for loose fibrous materials comprising a conduit along which the material is impelled by an air current, a hopper having perforated walls and into which the material is delivered, a ram reciprocable beneath the lower end of the hopper, a packing chamber into which the material is forced by the ram, a pair of spring-loaded delivery doors at the entrance of and opening into said chamber, a pair of spring-loaded doors at the opposite end of said packing chamber adapted to be opened by the material in the chamber when such material attains a degree of compression determined by the spring-loading of said delivery doors, an open-ended bag passed over the delivery end of the packing chamber to receive the compressed material as it leaves the packing chamber, a wheeled trolley to receive the filled bag as it is forced off the end of the packing chamber by the filling of it with compressed material, and means to vary the length of stroke of the ram, when the material has been compressed in the packing chamber to the predetermined degree, from one adapted to compress the material within the packing chamber to one adapted to discharge the compressed material from the packing chamber into the bag positioned over the delivery end of said chamber.

2. Baling apparatus according to claim 1, further characterised by the provision of means to divert the supply of material from the hopper in the event of the hopper becoming choked.

3. Baling apparatus according to claim 1, further characterised by the provision in the hopper of a diverting plate having two angularly related positions, one to divert material and the other to retain material in the hopper, and a frictionally-driven roller the arrest of rotation of which by undue accumulation of material within the hopper is adapted to alter the angular position of said diverting plate and thereby to divert the supply of material from the hopper to any other desired delivery point.

4. Baling apparatus according to claim 3, further characterised by the provision of a deflector device in the hopper above said frictionally-driven roller to prevent material entering the hopper from falling directly onto said frictionally-driven roller.

5. Baling apparatus according to claim 1 further characterised by the provision at the lower end of the hopper of a freely pivoted lever adapted to swing down into a position in front of the ram when the latter is withdrawn from the packing chamber and to be moved upwardly when the ram moves towards the packing chamber.

6. Packing apparatus comprising, in combination, elongated guide means; an elongated ram movably mounted on said guide means for reciprocation therealong; an elongated tubular

5

portion connected to said guide means and forming an extension thereof, said tubular portion having opposite open ends so that said ram moves into and out of said tubular portion; conduit means communicating with said tubular portion between said ends thereof for supplying material to be packed thereto; reciprocating means operatively connected to said ram for reciprocating same along said guide means so as to move said ram into and out of said tubular portion to move material supplied to the latter to the free open end thereof distant from said ram and into a bag or the like located about said distant free open end of said tubular portion; door means turnably mounted on said tubular portion between said ends thereof and extending into said tubular portion to be engaged by material ahead of said ram to be moved out of said tubular portion so that the material is moved past said door means and toward said distant free end of said tubular portion; and spring means operatively connected to said door means for urging the latter into said tubular portion to a closed position so as to thereby prevent movement of material being packed past said door means back toward said ram.

7. Packing apparatus comprising, in combination, elongated guide means; an elongated ram movably mounted on said guide means for reciprocation therealong; an elongated tubular portion connected to said guide means and forming an extension thereof, said tubular portion having opposite open ends so that said ram moves into and out of said tubular portion; conduit means communicating with said tubular portion between said ends thereof for supplying material to be packed thereto; electrical reciprocating means operatively connected to said ram for reciprocating same along said guide means so as to move said ram into and out of said tubular portion to move material supplied to the latter to the free open end thereof distant from said ram and into a bag or the like located about said distant free open end of said tubular portion; door means turnably mounted on said tubular portion between said ends thereof and extending into said tubular portion to be engaged by material ahead of said ram to be moved out of said tubular portion so that the material is moved past said door means and toward said distant free end of said tubular portion; spring means operatively connected to said door means for urging the latter into said tubular portion to a closed position so as to thereby prevent movement of material being packed past said door means back toward said ram; a plurality of switch operating members fixed to said ram for movement therewith; and a plurality of switches operatively connected to said electrical reciprocating means for controlling the latter and being located in the path of said switch operating members to be operated thereby.

8. Packing apparatus comprising, in combination, elongated guide means; an elongated ram movably mounted on said guide means for reciprocation therealong; an elongated tubular portion connected to said guide means and forming an extension thereof, said tubular portion having opposite open ends so that said ram moves into and out of said tubular portion; conduit means communicating with said tubular portion between said ends thereof for supplying material to be packed thereto; reciprocating means operatively connected to said ram for reciprocating same along said guide means so as

6

to move said ram into and out of said tubular portion to move material supplied to the latter to the free open end thereof distant from said ram and into a bag or the like located about said distant free open end of said tubular portion; first door means turnably mounted on said tubular portion between said ends thereof and extending into said tubular portion to be engaged by material ahead of said ram to be moved out of said tubular portion so that the material is moved past said first door means and toward said distant free end of said tubular portion; first spring means operatively connected to said first door means for urging the latter into said tubular portion to a closed position so as to thereby prevent movement of material being packed past said first door means back toward said ram; second door means located at said distant free end of said tubular portion; second spring means operatively connected to said second door means for holding the latter in a closed position within said tubular portion so as to prevent movement of material being packed out of said tubular portion until the force of said ram is greater than the force of said second spring means; and electrical operating means operatively connected to said reciprocating means and said second door means for controlling said reciprocating means to move said ram to a greater extent into said tubular portion when said second door means is moved by a predetermined distance against the action of said second spring means away from the closed position thereof.

9. Packing apparatus comprising, in combination, elongated guide means; an elongated ram movably mounted on said guide means for reciprocation therealong; an elongated tubular portion connected to said guide means and forming an extension thereof, said tubular portion having opposite open ends so that said ram moves into and out of said tubular portion; conduit means communicating with said tubular portion between said ends thereof for supplying material to be packed thereto; reciprocating means operatively connected to said ram for reciprocating same along said guide means so as to move said ram into and out of said tubular portion to move material supplied to the latter to the free open end thereof distant from said ram and into a bag or the like located about said distant free open end of said tubular portion; door means turnably mounted on said tubular portion between said ends thereof and extending into said tubular portion to be engaged by material ahead of said ram to be moved out of said tubular portion so that the material is moved past said door means and toward said distant free end of said tubular portion; spring means operatively connected to said door means for urging the latter into said tubular portion to a closed position so as to thereby prevent movement of material being packed past said door means back toward said ram; supply means operatively connected to said conduit means for supplying material to be packed thereto; and control means located in said conduit means and being operatively connected to said supply means for preventing the latter from supplying material to said conduit means when the material becomes accumulated beyond a predetermined extent in said conduit means.

10. Packing apparatus comprising, in combination, elongated guide means; an elongated ram movably mounted on said guide means for

reciprocation therealong; an elongated tubular portion connected to said guide means and forming an extension thereof, said tubular portion having opposite open ends so that said ram moves into and out of said tubular portion; conduit means communicating with said tubular portion between said ends thereof for supplying material to be packed thereto; reciprocating means operatively connected to said ram for reciprocating same along said guide means so as to move said ram into and out of said tubular portion to move material supplied to the latter to the free open end thereof distant from said ram and into a bag or the like located about said distant free open end of said tubular portion; door means turnably mounted on said tubular portion between said ends thereof and extending into said tubular portion to be engaged by material ahead of said ram to be moved out of said tubular portion so that the material is moved past said door means and toward said distant free end of said tubular portion; spring means operatively connected to said door means for urging the latter into said tubular portion to a closed position so as to thereby prevent movement of material being packed past said door means back toward said ram; supply means operatively connected to said conduit means for supplying material to be packed thereto; and control means located in said conduit means and

being operatively connected to said supply means for preventing the latter from supplying material to said conduit means when the material becomes accumulated beyond a predetermined extent in said conduit means, said control means being in the form of a toothed shaft turnably mounted in said conduit means, a slip clutch connected to said shaft, turning means connected to said slip clutch to drive said shaft through said slip clutch, a valve member located over said conduit means for closing and opening the latter, electrical moving means connected to said valve member for moving the same between open and closed positions respectively opening and closing said conduit means, and a switch connected to said electrical moving means and said shaft for actuating said electrical moving means to move said valve from the open to the closed position thereof when said shaft is prevented from turning by material accumulated in said conduit means.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
942,257	Hansen	Dec. 7, 1909
1,045,391	Graf	Nov. 26, 1912
2,476,475	Baum	July 19, 1949