

Dec. 13, 1960

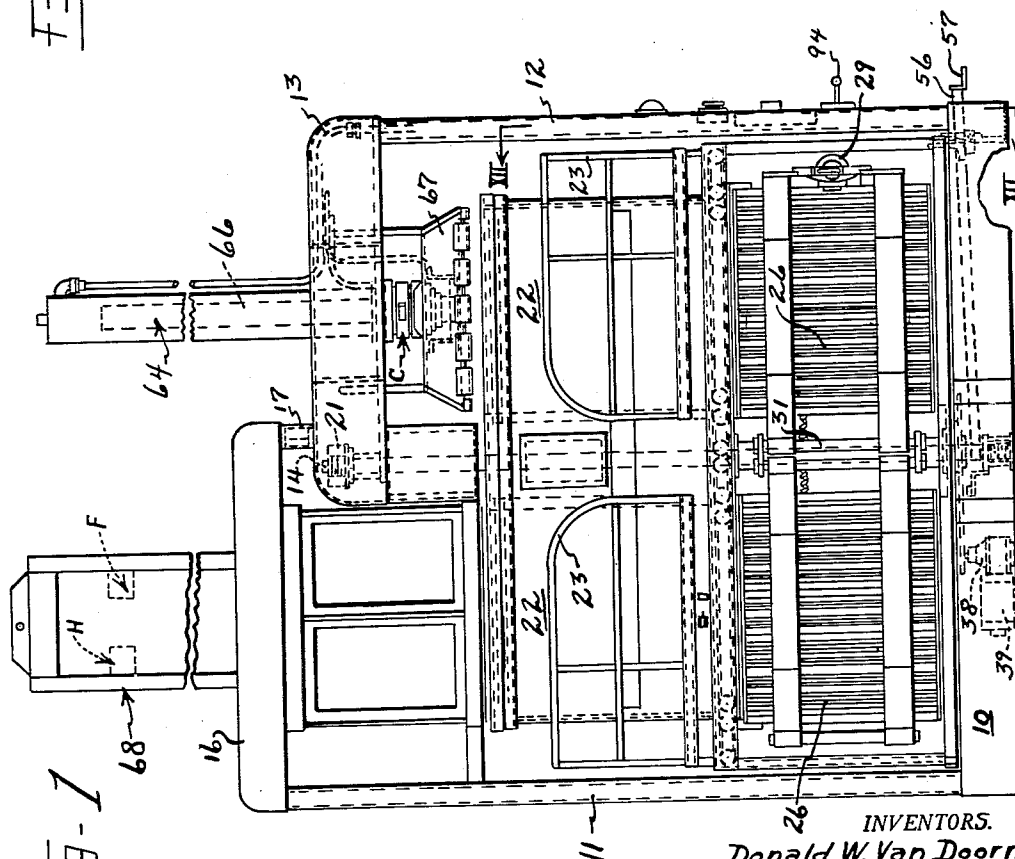
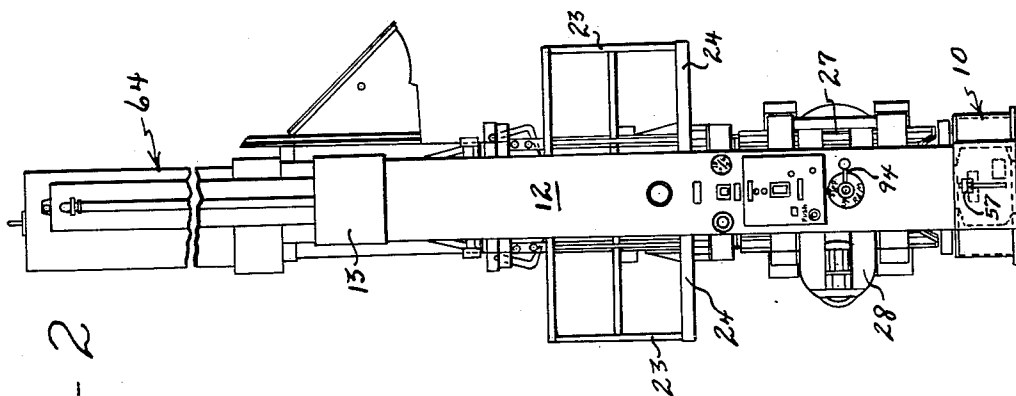
D. W. VAN DOORN ET AL

2,963,959

APPARATUS FOR BALING FIBERS

Filed July 3, 1958

6 Sheets-Sheet 1



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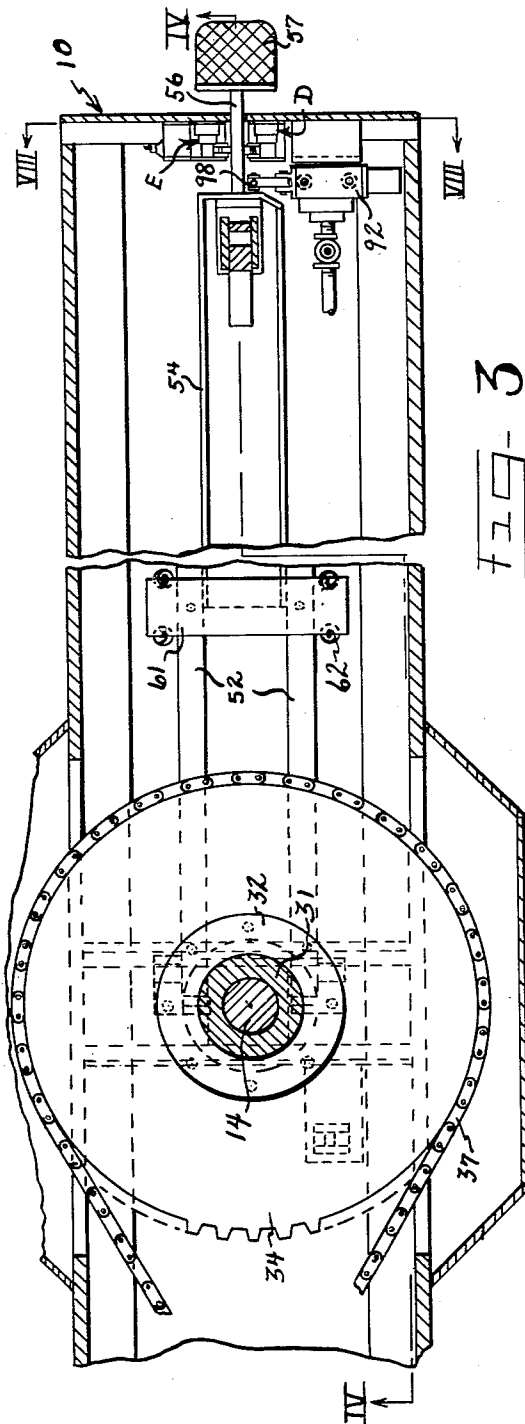


FIG-3

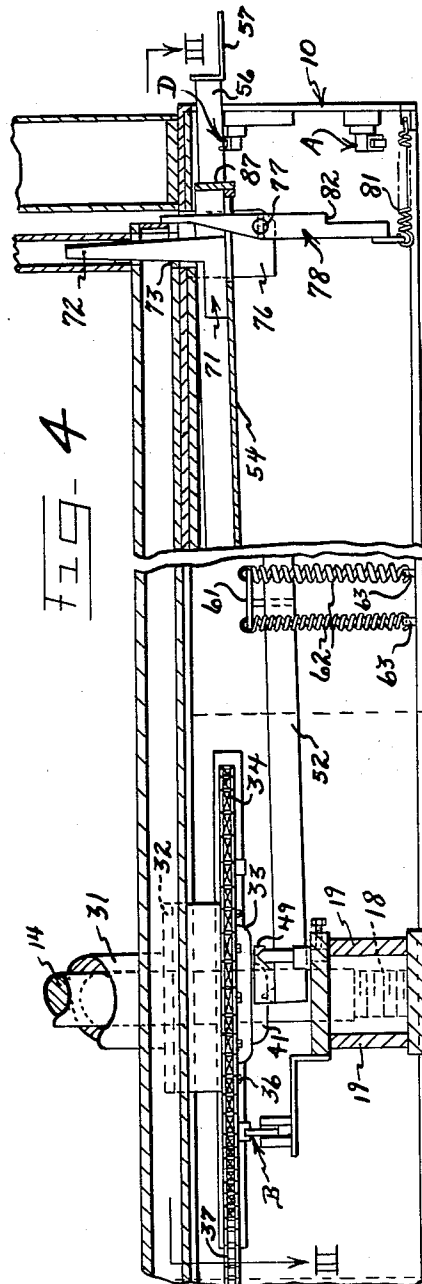


FIG-4

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6 Sheets-Sheet 3

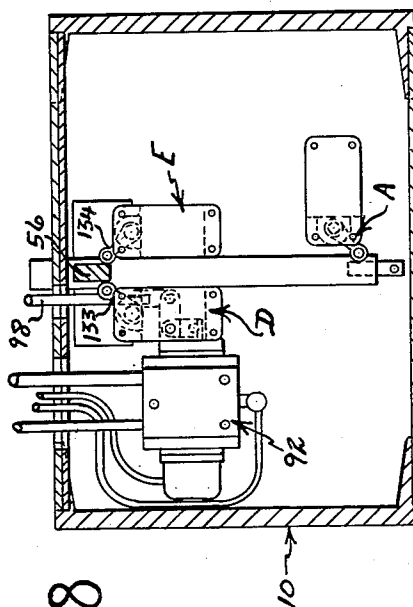
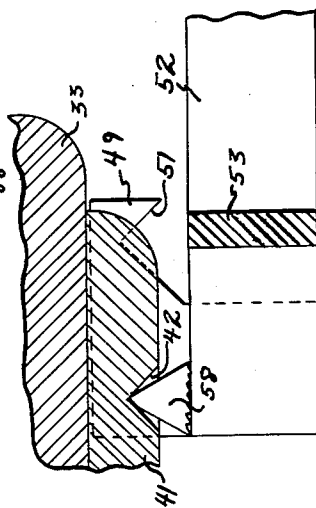
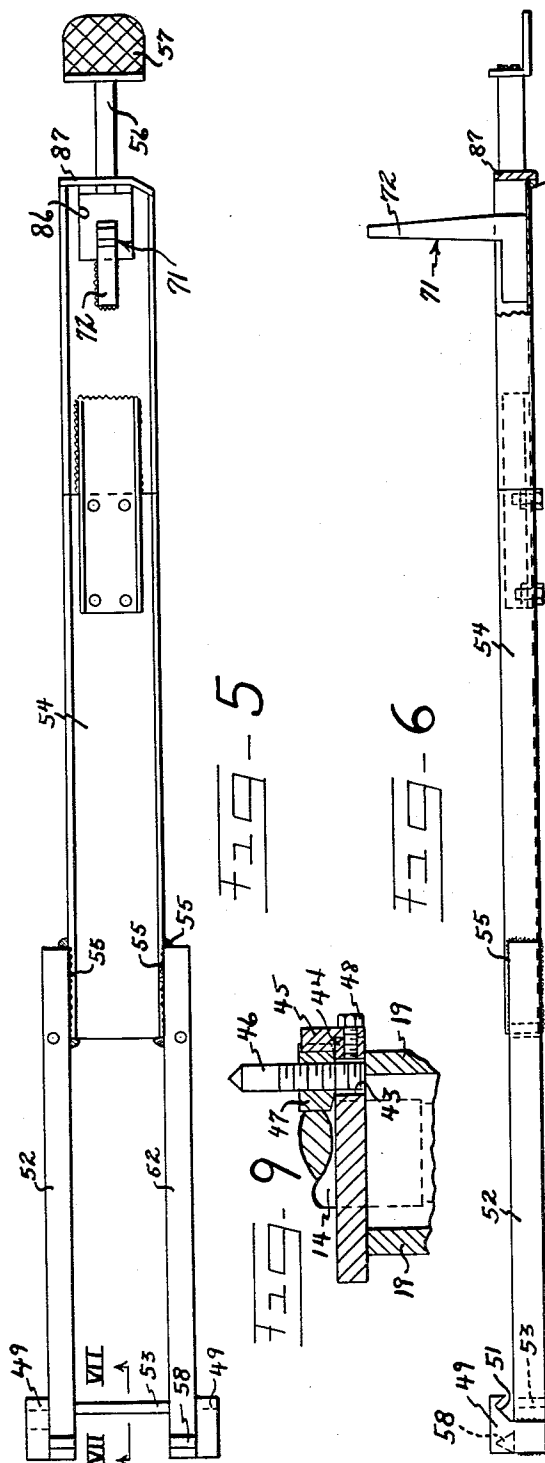


Fig. 8
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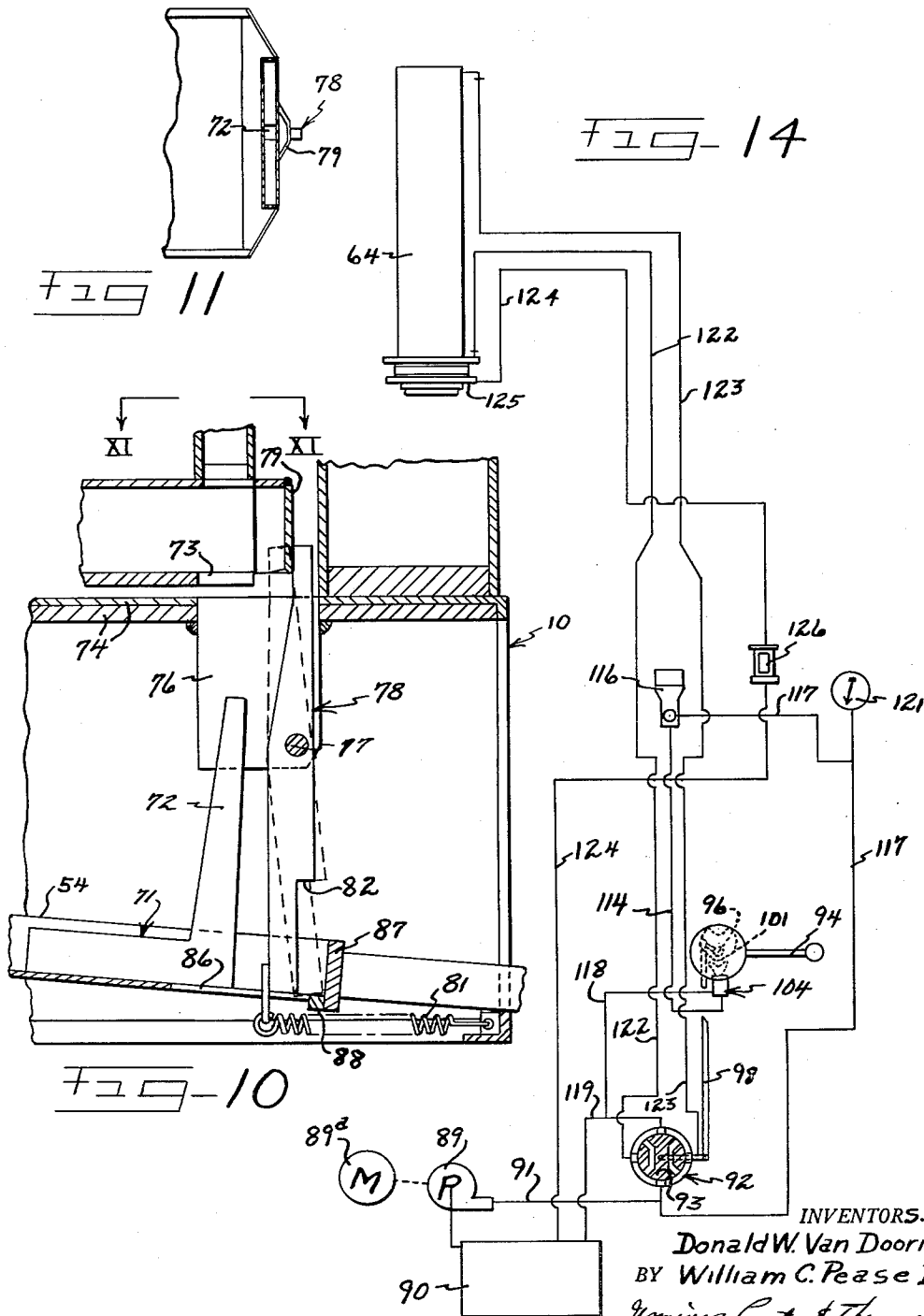
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APPARATUS FOR BALING FIBERS

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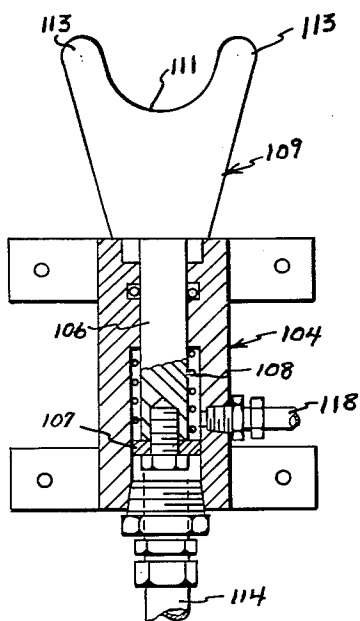


Fig-13

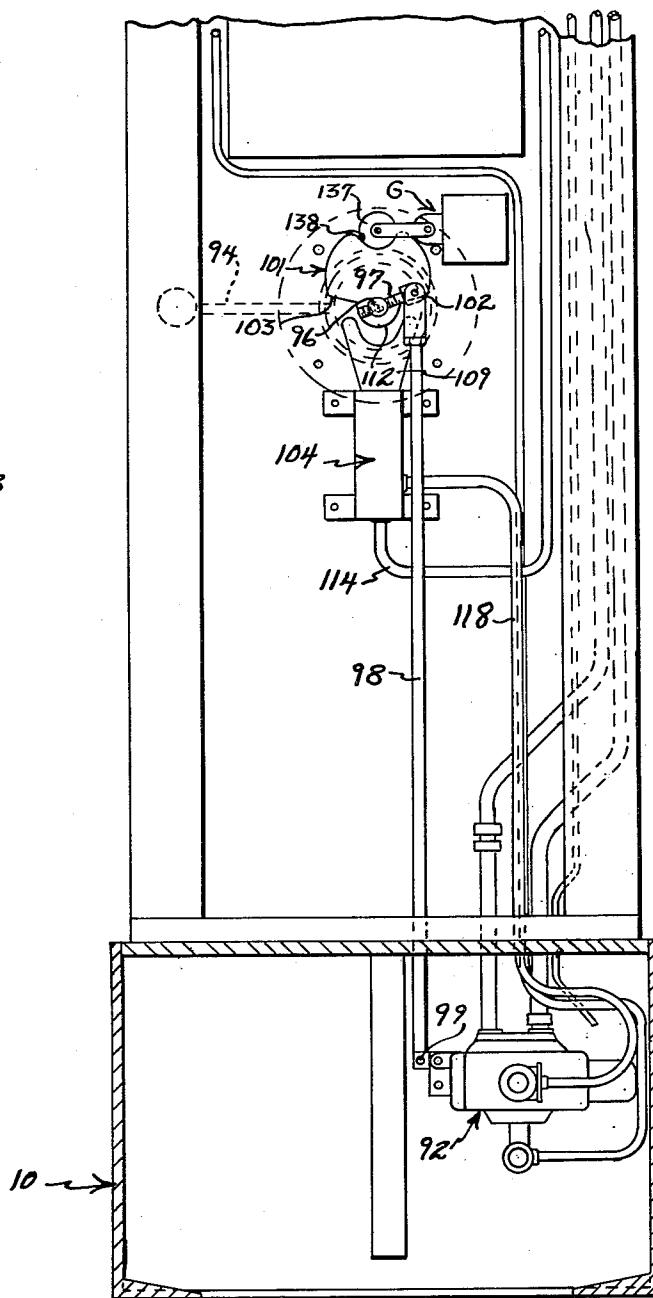


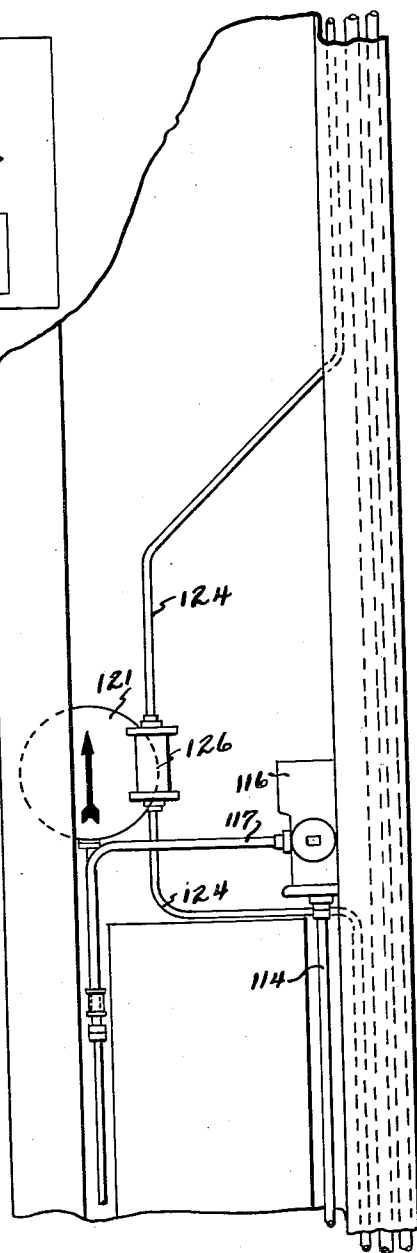
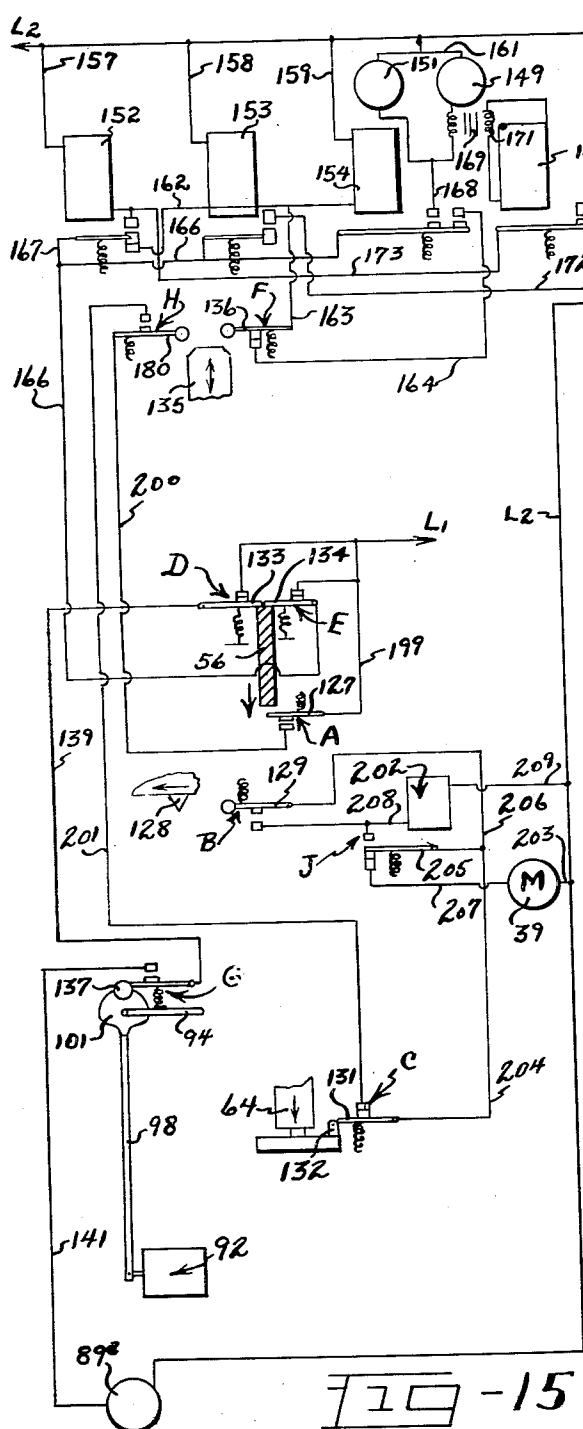
Fig-12

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2,963,959

APPARATUS FOR BALING FIBERS

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Filed July 3, 1958, Ser. No. 746,553

25 Claims. (Cl. 100—50)

Our invention relates to apparatus for baling fibers, particularly to cotton baling presses adapted for use in baling cotton in the gin house as the same comes from a battery condenser which in turn receives cotton directly from the gin stands.

A principal object of our invention is to provide a baling press, preferably of the double box type, which shall be more easily operated and which shall automatically go through several of its functions upon actuation by the operator of a single manual control.

A more definite object of our invention is to provide a double box fiber baling press which embodies a single foot pedal or other manual control, which when actuated sets in motion the following operations which take place automatically:

(1) The tramper which at the moment may be packing cotton into the box of the press box not under the ram is stopped with the packing element removed from the box;

(2) The pump for actuating the hydraulic ram is locked out of operation;

(3) The press boxes are raised off the base preparatory to rotating the same;

(4) A mechanical latch which heretofore was engaged is disengaged;

(5) The power turning mechanism is set in motion turning the press to its new position and stopping it with the full box under the ram, ready for compaction;

(6) The latch above mentioned automatically re-engages;

(7) The press is lowered;

(8) The tramper is restarted and a pump is free to be energized; thus to lower the ram presser foot into the box which has just been placed thereunder.

A further object of our invention is to provide apparatus of the character designated and which has the features set out above and in which the details of construction of the raising, latching and unlatching mechanisms are improved over presses heretofore known to us, all to the end that the press is more easily operated, is more positive in operation, and operates automatically once the same is set in motion.

Another object of our invention is to provide a pressure responsive control means which is effective upon the exertion of a predetermined amount of pressure upon the cotton in the box by the ram to shut off the supply of fluid under pressure from the pump, thus automatically stopping the ram at the desired density of the bale, thus producing bales of extremely uniform weight and size.

A further object of our invention is to provide the above mentioned hydraulic control mechanism which is effective to close the conduits leading both to the upper and lower ends of the hydraulic ram whereby the ram is locked positively in position to prevent downward or upward creeping movement of the ram during the time that the bale of cotton in the press is being tied out.

Apparatus illustrating features of our invention is

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shown in the accompanying drawings forming a part of this application in which:

Fig. 1 is a front elevational view drawn to a somewhat small scale, partly broken away, and showing a double box baling press to which our invention has been applied;

Fig. 2 is an end elevational view of the press shown in Fig. 1;

Fig. 3 is a view taken generally along line III—III of Fig. 4 and illustrating portions of the press raising and power turning mechanism;

Fig. 4 is a detail sectional view taken generally along line IV—IV of Fig. 3;

Fig. 5 is a plan view of the press lifting beam detached from the remainder of the apparatus;

Fig. 6 is a side elevational view of the lifting beam shown in Fig. 5;

Fig. 7 is an enlarged detail sectional view taken generally along line VII—VII of Fig. 5 and showing portions of the lower race of the press supporting ball bearing;

Fig. 8 is an enlarged detail sectional view taken generally along line VIII—VIII of Fig. 3;

Fig. 9 is a fragmental sectional view showing one of the fulcrum supports for the inner end of the lifting beam, the support illustrated being one of the ones carried by the base on which the press rests;

Fig. 10 is an enlarged detail sectional view of the right hand most end of the apparatus as viewed in Fig. 4 and showing the lifting beam in lowered position and showing the latch completely withdrawn, readying the press for rotation; the view further showing the trigger in full lines in the position that it occupies immediately prior to the rotation of the press and in dotted lines the position that the same occupies after the press has moved a few inches;

Fig. 11 is a detail fragmental sectional view taken generally along line XI—XI of Fig. 10 and drawn to a smaller scale;

Fig. 12 and Fig. 12^a are enlarged detail sectional views taken generally along line XII—XII of Fig. 1 and showing, respectively, the four-way hydraulic control valve for the ram and the pressure responsive control means for returning the manually operated four-way valve control to neutral position in response to predetermined pressure in the ram cylinder;

Fig. 13 is a detail sectional view through the pressure responsive control means;

Fig. 14 is a wholly diagrammatic piping diagram for the hydraulic system; and,

Fig. 15 is a wholly diagrammatic wiring diagram.

Referring now to the drawings for a better understanding of our invention, our improved press comprises a base frame indicated generally by the numeral 10. See Figs. 1 and 2. At the end of the frame are vertical members 11 and 12. A heavy cross-member 13 is connected to the top of the member 12 and supported on its inner end by a vertically directed shaft 14 secured at its lower end in the base 10 in a suitable manner. The vertical member 11 carries a cross-piece 16 which is supported at its inner end on a member 17 in turn resting on top of the member 13. The entire frame of the press structure is suitably secured as by welding to form a rigid framework. The shaft 14 is threaded at its lower end as indicated in Fig. 4 at 18 and fits into a heavy block held in place by members 19 forming a part of the base frame 10. The upper end of the shaft 14 likewise is threaded and is secured to the member 13 by means of a large nut 21. (See Fig. 1.)

The press boxes for our improved press are indicated generally by the numerals 22. Each of them may be provided with a hand railing 23 surrounding a platform 24, both located above the press box doors. Each of the press boxes has side doors 26 and end doors 27.

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The doors are held in locked position by means of a yoke 28 and a hydraulic locking mechanism 29, the details of which form no part of the present invention.

The press boxes are mounted on a sleeve 31 which is rotatably mounted on shaft 14 and which also is mounted for slight upward sliding motion thereon. As best shown in Figs. 3 and 4, the lower end of the sleeve 31 is secured to the upper race 32 of a large ball bearing which has a lower race 33. As shown in the drawings the races 32 and 33 of the ball bearing are horizontally disposed whereby in effect, as later will appear, the bearing acts as a thrust bearing for supporting the press boxes 22 and permitting them to be rotated without undue friction.

Secured to the upper race 32 of the ball bearing is a sprocket 34, the sprocket being secured by means of bolts 36 to the underside of the race 32. Trained over the sprocket 34 is a chain 37. Chain 37 is in turn trained over a sprocket mounted on the output shaft of the reduction gear box portion 38 of a ratio or turning motor 39. See Figures 1 and 3. It will thus be apparent that whenever the turning motor 39 is energized sprocket 34 is driven, thus rotating the press boxes.

The lower race 33 of the ball bearing has an extension portion 41 on its lower surface. Cut into the under surface of the extension portion 41 are notches 42 (see Fig. 7). These notches are located substantially diametrically apart whereby when force is applied through them to the underside of the race the press boxes are raised upwardly, the sleeve 31 sliding on rod 14.

Loosely mounted in holes 43 on a plate 44 which is, in turn, mounted across the plates 19, are upstanding threaded pins 46. The pins 46 are wedge shaped on their upper ends (see Fig. 9) and rest in the holes 43 for rocking movement therein. An adjusting nut 47 is screwed onto the pins 46 for adjusting the height of the pins 46 above plate 44. Nut 47 has a vertical slot therein and a retaining bracket 45 fits in the vertical slot to prevent nut 47 from turning. A cap screw 48 secures bracket 45 to plate 44. The upper ends of the pins 46 in effect form knife edged fulcrums as will appear.

Fitting over the knife edged upper ends of the pins 46 are blocks 49 having V-shaped grooves 51 cut into the bottom of an overhanging section thereof. See Fig. 6. The blocks 49 are secured to the sides of the pair of arms 52. A cross piece 53 secures the arms 52 together at their outer ends. The other end of the arms are welded as at 55 to the sides of a channel 54. An extension 56 on the end of the channel 54 projects through a vertical slot in an end plate of the main base frame 10. A foot pedal 57 is provided by means of which the operator may press downwardly on the outer end of the member 54. Thus, members 52, 54, 56 and 57 together form a foot operated lifting beam for the press as presently will appear.

Mounted on the ends of the members 52, just inwardly of the apices of the notches 51 are a pair of wedges 58. The wedges 58 fit in the notches 42 of the lower race extension 41. Therefore, when the outer end of the lifting beam is moved downwardly by the operator placing his foot on the pedal 57, the fulcrum action between the pins 46 and notches 51 and the wedges 58 and notches 42 is such that the press boxes 22 are raised upwardly slightly, thus to lift them from the base frame 10, in position to be rotated as will presently appear.

In view of the weight of the press boxes and even though the force exerted on the pedal 57 is greatly multiplied due to the close spacing of the fulcrum points, it still is necessary to counterbalance a part of the weight of the press. To this end we provide a plate 61 which spans the members 52 (see Figs. 3 and 4). A plurality of coiled tension springs 62 are anchored at their upper ends to the overhanging end of the plate 61 and at their lower ends to a part of the base frame as indicated at 63. Thus counterweighted, the operator may quite easily

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raise the entire press box by stepping down on the foot pedal 57.

As is customary, there is mounted above the press box on the cross-member 13 a hydraulic ram indicated generally by the numeral 64. Projecting from the ram cylinder is a piston rod 66 which carries on its lower end a presser block 67. As is well understood, when fluid is admitted to the upper end of the ram 64 the presser block 67 moves downwardly, compacting the cotton in the press box under the ram.

Mounted on the cross-piece 16, and indicated diagrammatically thereon, is a trampler 68. The trampler 68 has a vertically reciprocating part which enters into the upper part of the press box thereunder. As will be understood, cotton from the battery condenser or otherwise is fed into the trampler to be packed by it into the box presently beneath the trampler.

In order to assure that the press boxes 22 are not rotated either while the presser block 67 or part of the trampler is in the boxes our improved press is provided with mechanical and electrical means for locking the boxes 22 in proper position and holding them there until the trampler mechanism and the ram mechanism are clear of the press boxes.

By reference particularly to Figs. 4 and 10 it will be seen that the member 54 forming a part of the lifting beam is provided adjacent its outer end with an L-shaped tongue 71. The tongue 71 has a vertically extending part 72 which, when the lifting beam is raised upwardly, enters into a notch 73. The notch 73 is provided in the end of one of the main bottom members of the press boxes. It will be understood that there are two of the notches 73, one at the outer end of each press box, for a purpose later to appear. Whenever the tongue 71 is in the notch 73 it will be apparent that the press boxes are locked against rotation, the locked position being indicated in Fig. 4 and the unlocked position in Fig. 10.

Secured to an upper plate member 74 forming a part of the base 10 are two spaced depending plates 76 between which the tongue 71 is guided. Pivotaly mounted as at 77 on the plate 76 is a latch or trigger 78. The upper end of the latch 78 projects through an opening in the plates 74 whereby it may be in position to be struck by cams 79 carried on the ends of the lower part of the frame of the press boxes. A spring 81 biases the latch in a counter-clockwise direction as viewed in Figs. 4 and 10.

On the right side of the latch 78, as viewed in Figs. 4 and 10, is a notch 82. It will be understood that the channel member 54 forming the outer end of the lifting beam is notched at 86 and that the trigger or latch 78 is free to project therethrough as clearly shown in the several figures.

Connecting the notched end of the beam 54 is a plate member 87. Welded to the inner lower surface of the member 87 is a bar 88 adapted for engaging the lower end of latch 78.

From what has just been described it will be apparent that whenever the operator presses downwardly on the foot piece 57 and lowers the beam, the rotatable press boxes are raised off the base 10 in position for rotation. As soon as the press boxes rotate sufficiently for the cams 79 to move from engagement with the upper end of the latch 78, spring 81 rocks the latch to the dotted line position shown in Fig. 10 with the lower end thereof over the bar 88. When the operator removes his foot from the lifting beam the same moves upwardly slightly, seating the lower end of the latch 78 on top of the bar 88 as just explained. The press thus is free for rotation until the oncoming cam 79 on the opposite end strikes the upper end of latch 78, rocking it to the full line position of Fig. 10, permitting the lifting beam to rise upwardly to the position of Fig. 4, again lowering the press and inserting the tongue in the opening 73 in the other end of the press box framework. Thus, the press is se-

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curely latched in position, automatically, as the boxes rotate and as the oncoming cam 79 moves the latch pin lower end out of contact with the bar 88 on the lifting beam.

The purpose of the notch 82 is to provide a safety latch in the event the press boxes are rotated too fast, causing the cam 79 to move at too great a speed into contact with the upper end of the latch pin 78 and then going on past. In this case the notch 82 will engage over the bar 88 inasmuch as the inertia of the parts will give ample time for the spring 81 to pull the lower end of latch 78 into locking position with the bar 88 in those cases where the press boxes are rotated at too great a speed.

Our improved hydraulic control system especially adapted for use with our improved press will now be described. Referring particularly to Fig. 14 it will be seen that the system comprises a pump 89 and a reservoir 90, the pump being driven by a motor 89^a. A main pressure line 91 leads from the pump to a four-way valve indicated generally by the numeral 92. The valve 92 may preferably be located in the stationary base 10 of the press. The valve 92 is of the type in which all four ports are closed in neutral position. The valve 92 has a rotary plug portion 93.

Located in suitable bearings in the vertical frame member 12, in position to be readily accessible to the operator of the press is a handle 94 for selecting the position of the valve 92. The handle 94 may be mounted on a shaft 96. Passing through the shaft 96 is a pin 97 (see Fig. 12 also) to which is pivotally connected the upper end of a pull-push rod 98. The lower end of the push rod 98 is operatively connected at 99 to the operating member of the valve 92.

Non-rotatably mounted on the shaft 96 is a cam member 101. As best shown in Fig. 12 of the drawing, cam 101 has two shouldered parts 102 and 103 on its lower surface. As will later appear, by moving the handle 94 to the proper position the operator can cause the ram 64 to be energized either to move on the fiber compaction stroke or to move upwardly. Therefore, the handle 94, and the valve 92 controlled thereby serve the purpose of admitting hydraulic fluid, selectively, to the upper and lower ends of the ram 64.

The means for automatically returning the handle 94 and hence valve 92 to the neutral position at the proper time, and mechanism incidental thereto, will now be described. Secured in suitable manner to the stationary frame work of the press is a ram operating handle cylinder 104. See Figs. 12 and 13. The hydraulic cylinder 104 includes a piston rod 106 having a piston 107 on the lower end thereof. A spring 108 urges the piston 107 and hence the rod downwardly as shown in Figure 13. The piston rod 106 carries on its upper end a yoke 109 having a rounded or cut-out portion 111 adapted to receive a similarly rounded portion 112 on the cam member 101. Also, the yoke 109 has arms 113 which are adapted to engage the shoulder portions 102 and 103 of the cam 101. Whenever the yoke moves upwardly, the cam 101 returns to its center position as shown in Fig. 12, thereby returning the valve 92 to cut-off position through the instrumentality of rod 98. Also, and as will later appear, the cam 101 actuates an electric switch G which later will be described.

The cylinder 104 has connected to its lower end a hydraulic line 114. The line 114 leads to a pressure relief valve 116 which in turn leads through a line 117 to the pressure line 91 coming directly from the pump 89. A drain line 118 is connected to the bore of the cylinder 104 above the piston 107 and this line is connected to a line 119 leading from the valve 92 to return fluid from the entire system to the reservoir 90. A pressure gauge 121 may be placed in the line 117.

From what has just been described, it will be seen

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that by suitably adjusting the pressure relief valve 116 yoke 109 will be moved upwardly, thus returning cam 101, lever 94, and valve 92 to neutral position, automatically, whenever pressure in line 114 reaches the amount predetermined by the setting of valve 116. Thus, we provide means for automatically shutting off pressure to the ram 64 when the bale reaches the correct density. Furthermore, and as presently will appear, this return of the hydraulic system valve 92 to its neutral position also is utilized to effectuate the actuation of certain electrical circuits, all for reasons to be described in detail.

The ram 64 is connected through the lines 122 and 123 to the housing of valve 92. It will be understood that by suitable actuation of handle 94 either line 122 or line 123 may be connected to the pressure line 91 while the other is simultaneously connected to the return or drain line 119.

A line 124 is connected below the main gland 125 of the ram 64. Inserted in the line 124 is a visual leakage gauge 126, the line 124 leading back to the reservoir. Thus, leakage past the gland 125 may be seen in the gauge 126 and such fluid is returned to the reservoir 88. As has before been stated, whenever the valve 92 is in its neutral position, namely, as shown in Fig. 14, fluid is locked in both ends of the ram 64, assuring that the ram does not move either up or down.

The electrical circuits for controlling our improved press and for interlocking the operation of the same with the tramping mechanism located above the press will now be explained.

First, and concerning the tramping mechanism control circuits, attention is called to Patent 2,764,932, dated October 2, 1956, issued to William C. Pease III, "Automatic Bale Density Mechanism for Fiber Presses and the Like." This patent shows a circuit which is effective automatically to stop the trampler mechanism after a certain weight of cotton has been placed in the empty press box. Further, this patent discloses control circuits for the trampler which is effective to stop the trampler with the pressure foot thereof completely withdrawn from the press box.

Referring particularly to Fig. 15 of the drawings, it will be seen that located in the base 10 of the apparatus in position to be closed by the lifting beam 54 when it is pressed downwardly, is a normally open electric switch A. The switch A has a switch arm 127 in position to be engaged by the downwardly moved lifting beam 54 when the beam is in its extreme lower position, whereby the switch is closed.

Mounted on the rotating press box structure are cams 128. See Fig. 15. A switch B, biased toward open position, has a switch arm 129 which is adapted to be engaged by the cams 128 as the press boxes move to cotton receiving and cotton packing position, thereby momentarily closing switch B. It will be understood that there are two of the cams 128, thus to actuate switch B each time the press is rotated.

A switch C, normally biased toward open position, has a switch arm 131 in position to be engaged by a lug 132 on the lower end of the ram, whereby the switch B is closed only when the ram presser foot is withdrawn from the press box.

A switch D (also see Fig. 8) biased toward open position, has a switch arm 133 adapted to be engaged by the lifting beam 54, thus to close the switch D when the beam is raised. In similar manner, a switch E, also biased toward open position, has a switch arm 134 adapted similarly to be engaged by the beam 54, when raised, thus to close switch E.

A switch F, normally biased toward closed position, is mounted for its switch arm 136 to be held open by an upwardly moving guide rod 135 mounted on a vertically reciprocating part of the trampler mechanism.

A switch G, biased toward normally open position,

has a switch arm 137, which falls into a notch 138 in the cam 101 whenever the handle 94 is moved to neutral position, that is, to position closing valve 92, thus opening switch G.

A switch H, biased toward normally open position, is mounted with its switch arm 180 to be held in closed position upon upward movement of the tramper guide rod 135 on the tramper mechanism.

One power line L¹ may be connected to one contact of the switches E and D as indicated. The other contact of switch D leads through a line 139 to a contact of switch G. The other contact of switch G is connected by line 141 to one side of the pump motor 89a driving the main hydraulic pump 89. Power line L² leads to the other side of pump motor 89a. One contact of switch A is connected to a contact of switch H through line 200 and the other contact of switch A is connected to the power line L¹ through line 199. One contact of switch C is connected by line 201 to the other contact of switch H. The other contact of switch C is connected by line 204 to a double pole switch J having a switch arm 205, and through line 206 to switch B. The turning motor 39 is connected to power line L² through line 203 and to one contact of switch J through line 207. A relay 202 is connected to another contact of switch J through line 208 and to power line L² through line 209. Switch J is biased toward normally closed position with respect to the turning motor 39 and normally open position with respect to the relay 202.

The tramper motor is indicated at 149 and a magnetically releasable, spring set brake is indicated at 151. Relays 152, 153, 154 and 156 are provided as shown.

Relay 152 has a double set of contacts, one set being biased to closed position by a spring when the coil of relay 152 is deenergized. Relay 153 has a single set of contacts, biased toward open position. Relay 154 has two sets of contacts, both of which are biased toward open position. Relay 156 has a single set of contacts biased toward open position.

As shown, the line L² is connected through the branch lines 157, 158 and 159 to one connection of the relays 152, 153 and 154, respectively. Also, L² is connected by a branch line 161 to one terminal of the tramper motor 149 and the magnetically releasable brake 151.

The normally closed contacts of relay 152 are connected by a line 162 to the other terminals of the coils of the relays 153 and 154, and by a line 163 to one of the contacts of the switch F. The other contact of the switch F is connected by a line 164 to one of the open sets of contacts controlled by relay 154. The other contacts of relays 153 and 154 are connected by a line 166 to one of the contacts of switch E. A branch line 167 connects the closed set of contacts of relay 152 to line 166. The other set of contacts of relay 154 is connected by a line 168 to the other sides of the brake 151 and motor 149.

Interposed in the line leading to the motor 149, between motor 149 and the switch controlled by 154, is an overload current transformer indicated generally by the numeral 169. The secondary 171 of this transformer is the source from which the coil of relay 156 is energized.

The switch controlled by relay 156 has one side connected by a line 172 to one side of the switch controlled by relay 153. The other contact of relay 156 is connected by a line 173 both to the open contact of relay 152 and to the other connection of the coil of relay 152.

The description just given will be recognized as describing the circuit shown in Patent 2,764,932 for controlling the operation of the tramper. It is through the line 166 and switch E that the tramper control mechanism is incorporated as an integral part of our improved, automatic baling press apparatus.

From the foregoing the method of constructing and

using our improved press may now be readily explained and understood.

Starting with the press in the position of Figs. 1 and 2, and assuming that the tramper mechanism 68 has just completed filling the press box therebeneath and, as will later appear, has its packing portions withdrawn from the press box; and further assuming that the bale has just been removed from the right-hand press box as the apparatus is viewed in Fig. 1 and that the ram of the hydraulic cylinder is at its top position as shown, the operator now steps down on the pedal 57 of the lifting beam 54. Lowering of the outer end of the beam 54 opens switches E and D, and further lowering of beam 54 closes switch A. Furthermore, this withdraws the tongue portion 72 of the latch 71 from the opening 73, freeing the press for rotation. Still further, the press is raised due to the arrangement already described whereby it is supported for rotation on the ball bearings at the center. After the press has rotated a few inches, the operator removes his foot. The lower end of the trigger 78, under the influence of spring 81, now comes to rest on member 88, holding the lifting beam down. Due to the circuit shown and through L¹, 199, switch A, 200, switch H, 201, switch C, switch J, motor 39 is energized. It will be noted that if the tramper is not out of the box, switch H will be open and hence the press turning motor 39 cannot be started. Likewise if the ram is not completely withdrawn from the press box, switch C will be open and hence the press turning motor 39 cannot be started. However, assuming the tramper and the ram to be withdrawn from the press box whereby switches H and C, respectively, are closed, motor 39 starts, rotating the press box. As the rotation continues, cam 128 engages the switch arm of switch B, momentarily closing switch B thereby energizing relay 202. Relay 202 remains energized through its contacts which are normally biased open. When relay 202 is energized the normally closed contacts of relay 202 are opened. This opens line 207 to motor 39 thus stopping the motor. The cam 128 is so located that the apparatus "coasts" to proper stopping position. At this position the cam 79 engages the top of trigger 78. The latter action rocks the trigger, permitting the beam to rise again. When the beam rises, switch A opens its contacts 127 which in turn deenergizes relay 202 completing the cycle.

With the now unpacked cotton in place beneath the ram, the operator moves the handle 94 upwardly, closing switch G. If switch D is closed, which it can be only when and if the lifting beam 54 is in its upper position, pump motor 89a is energized and fluid is supplied to the upper end of the ram through line 123. It will be noted that by moving the lever 94 downwardly, the setting of the valve 92 is such that fluid is admitted to the lower end of the ram cylinder through line 122, thus to raise the piston of the ram 64.

The circuits herein described which control the tramper motor 149 are such that when the switch E is closed, after having been opened, the tramper is again reactivated and continues to operate until such time as the motor 149 draws more than a predetermined amount of current, which is a function of the density of the cotton being packed, whereupon relay 156 is momentarily energized sufficient to close its contacts, thereby energizing relay 152 and readying the system for deenergization upon the next opening of the switch F by the tramper guide rod 135.

It might be noted that relay 153 is a time delay relay set for about 5 seconds to prevent the motor starting current from energizing relay 152. After relay 152 is energized and the tramper is stopped, it is apparent that the limit switch E must be opened and reclosed to start the tramper.

It is to be particularly noted that our improved hydraulic and electrical system assures a complete outlocking of all inappropriate parts of the apparatus during the entire cycle. Thus, the ram cannot be lowered unless

the lifting beam 54 is in its upper position; the turning motor 39 cannot be started if the ram or trumper foot is in the box; and the trumper cannot be started unless the lifting beam is in its upper position.

From the foregoing it will be apparent that we have devised an improved automatic baling press. In using the press the operator need only step on the foot lever to assure complete rotation and automatic stopping of the press. The operator need only manipulate the handle 94 to assure that the cotton is compressed to a predetermined density. This is brought about due to the provision of the cylinder 104 in the line 114 which is effective to return the valve 92 and lever 94 to start position when the ram presses against the cotton with predetermined force. By appropriately setting the relief valve 116, this unit pressure which is a function of the density of the bale, may be varied. Further, since the hydraulic lines leading to the top and bottom of the ram are closed when lever 94 is in neutral position, the ram piston cannot creep either up or down, and the ram also automatically stops at the top and bottom of its stroke thereby providing for operation of the ram in a minimum of time while employing a safety feature for the motor and hydraulic system.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and we desire, therefore, that only such limitation shall be placed thereupon as are specifically set forth in the appended claims.

What we claim is:

1. The combination with a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the filled box is being packed, of apparatus to lock the press box while in both of said positions and to raise the box for movement from one position to the other comprising a manually operated lever, fulcrum points on the lever adjacent the inner end of the lever cooperating with the press box and a stationary member, said lever being effective to raise the press box off the base frame upon movement of its outer end, and means carried by the lever and effective positively to lock the press box against movement when the outer end of the lever is in its unmoved position and the press box is in either of said positions.

2. The combination with a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the filled box is packed, of apparatus to lock the press box while in both of said positions and to raise the box for movement from one position to the other comprising a lifting beam having its inner end located beneath the press box and effective upon movement of its outer end to raise the press box for movement from one of said positions to the other, a latch tongue carried by the lifting beam intermediate the inner and outer ends thereof and effective to lock the press box against movement when the outer end of the beam is in its unmoved position and the box occupies either of said positions, a latch effective to hold the beam in its moved position while the press box is travelling from one said position to the other, and means effective upon arrival of the press box at either of said positions automatically to release the latch and thereby to permit the outer end of the beam to move for locking the press box.

3. The combination with fiber baling apparatus of the kind having a press box structure mounted for vertical movement relative to a supporting base and thence for movement from fiber receiving to fiber packing position and vice versa, of a press lifting beam having an inner end portion operatively disposed under the press box to raise the same off said base when its outer end

is moved, a latch tongue carried by the beam and engageable with the press box structure when the lifting beam is in unmoved position and disengageable from the press box structure when the lifting beam is in its moved position, means to rotate the press box, and means effective upon arrival of the press box in fiber receiving or fiber packing position to release the beam for return to its unmoved position.

4. The combination with a fiber baling press of the kind having a press box movable from fiber receiving to fiber packing position and a base on which the box rests when in either of said positions, of a lifting beam fulcrumed adjacent one end for raising the press box for movement between said positions, a portion adjacent the outer end of the beam to which force may be applied to raise the press box, locking means effective when the beam is in press box lowered position to lock the press box against movement and when in press box raised position to free the press box for movement, means effective to hold the beam in press box raised position, and means effective upon arrival of the press box at either of said positions to return the beam to the lowered and locked position of the press box.

5. The combination with a fiber baling press of the kind having a press box movable from fiber receiving to fiber packing positions and a base on which the box rests when in either of said positions, of a lifting beam having a fulcrum point adjacent its inner end and located under the press box with its outer end projecting outwardly from the base in reach of the foot of an operator of the press, said press box being in lowered position when the outer end of the beam is in raised position, means secured to the beam for counterbalancing a part of the weight of the press box, a locking tongue carried by the beam and effective to lock the press box against movement when the outer end of the beam is in raised position, power means for rotating the press box from fiber receiving to fiber packing positions, means effective upon lowering the outer end of the beam to energize the power means, and means effective upon arrival of the press box at either of said positions automatically to raise the outer end of the beam and deenergize the power means.

6. The combination with a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, of apparatus to lock the press box while in both of said positions and to raise the box for movement from one position to the other comprising a lifting beam having its inner end located beneath the press box and effective upon lowering of its outer end to raise the press box for movement from one of said positions to the other, means carried by the lifting beam effective upon upward movement of the outer end of the beam to lock the press box when the box occupies either of said positions, a latch effective to hold the beam in lowered position while the press box is moving from one position to the other, means effective upon arrival of the press box at either of said positions automatically to release the latch and allow the outer end of said beam to move upwardly, power means for moving the press box from fiber receiving to fiber packing positions, means effective upon lowering the outer end of the beam to energize the power means, and means effective upon arrival of the press box at either of said positions automatically to deenergize the power means.

7. In combination, a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, a trumper disposed over the press box while in the filling position for tramping fiber in the box, a lifting beam having its inner end located beneath the press box and effective upon lowering of its outer end to raise the press box for movement from one of said positions to the other, means to lock the press box against movement in both

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of said positions when the outer end of the beam is in raised position, power means for operating said trampler, controls and suitable circuits for energizing and deenergizing said power means and operatively connected to said beam, said power means being energized through said control means only when the outer end of said beam is in raised position and the press box is locked against movement, and said power means being deenergized through said control means when the outer end of the beam is in lowered position thereby preventing actuation of said trampler when the press box is unlocked.

8. In combination, a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, a lifting beam having its inner end located beneath the press box and effective upon lowering of its outer end to raise the press box for movement from one of said positions to the other, means to lock the press box against movement in both of said positions when the outer end of the beam is in raised position, a ram operatively associated with the press box while in the packing position for packing the fiber in the box, power means for operating said ram, control means for energizing and deenergizing said power means and operatively connected to said beam, said power means being energized through said control means only when the outer end of said beam is in raised position and the press box is locked against movement, and said power means being deenergized through said control means when the outer end of the beam is in lowered position thereby preventing actuation of said ram when the press box is unlocked.

9. In combination, a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, a trampler disposed over the press box while in the filling position for trampling fiber in the box, a lifting beam having its inner end located beneath the press box and effective upon lowering of its outer end to raise the press box for movement from one of said positions to the other, means effective upon upward movement of the outer end of the beam to engage and lock said press box against movement at both of said positions, a latch effective to hold the beam in lowered position while the press box is moving from one position to the other, power means for operating said trampler, control means for energizing and deenergizing said power means and operatively connected to said beam, said power means being energized through said control means only when the outer end of said beam is in raised position and the press box is locked against movement, means effective upon arrival of the press box at either of said positions automatically to release the latch and thereby permit the outer end of the beam to move upwardly, and a safety catch effective to engage the beam and prevent it from returning to its raised position when the press box overtravels either of its positions thereby preventing the trampler power means from being energized when the press box is out of filling position.

10. In combination, a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, a lifting beam having its inner end located beneath the press box and effective upon lowering of its outer end to raise the press box for movement from one of said positions to the other, means carried by the lifting beam effective upon upward movement of the outer end of the beam to engage and lock the press box against movement at both of said positions, a latch effective to hold the beam in lowered position while the press box is moving from one position to the other, a ram disposed over the press box at the packing position for packing the fiber in the box, power means for lowering the ram, control means

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for energizing and deenergizing said power means and operatively connected to said beam, said power means being energized through said control means only when the outer end of said beam is in raised position and the press box is locked against movement, means effective upon arrival of the press box at either of said positions automatically to release the latch and thereby permit the outer end of the beam to move upwardly, and a safety catch effective to engage the beam and prevent it from returning to its raised position when the press box overtravels either of its positions thereby preventing the power means from being energized and lowering the ram when the press box is out of packing position.

11. The combination with fiber baling apparatus of the type having a press box mounted for horizontal rotation on a supporting base from a fiber receiving to a fiber packing position and being vertically movable on said base, of a press box lifting beam having an inner end portion operatively disposed under the press box to raise the press box vertically when its outer end is lowered to permit the box to move from one position to the other, means carried by said beam to lock the press box against rotative movement when the outer end of the beam is in raised position and the box is in either of said positions, drive means to rotate the press box, a switch operable upon lowering of the outer end of said beam for momentarily energizing said drive means to permit rotation of the press box, a parallel holding circuit for said drive means energized by the movement of said press box from either of said positions, and means effective to deenergize said drive means upon positioning of said press box at either of said positions thereby stopping the rotation of said press box.

12. The combination with a fiber baling press having a press box mounted for horizontal rotation on a supporting base from a fiber receiving position in which a trampler is arranged over the box to a fiber packing position in which a vertically movable ram is associated with the box, of a beam having an inner end portion operatively disposed under the press box to raise the press box vertically when its outer end is lowered to free the box for movement from one position to the other, means carried by the beam to lock the press box against rotative movement when the outer end of the beam is in raised position and the box is in either of said positions, drive means to rotate the press box, a first switch operable upon lowering of the outer end of the beam to energize said drive means and rotate the press box from one position to the other, means to operate said trampler when the press box is in fiber receiving position, a second switch for energizing said trampler operating means which is opened upon the lowering of the outer end of said beam to prevent energizing of the operating means for said trampler when the press box is out of fiber receiving position, and said second switch being closed upon the raising of the outer end of said beam to allow the said trampler to operate.

13. The combination with a fiber baling press having a press box mounted for horizontal rotation on a supporting base from a fiber receiving position in which a trampler is arranged over the box to a fiber packing position in which a ram is associated with the box, of a beam having an inner end portion operatively disposed under the press box to raise the press box vertically when its outer end is lowered to permit the box to move from one position to the other, means carried by said beam to lock the press box against rotative movement when the outer end of the beam is in raised position and the box is in either of said positions, drive means for rotating the press box, a first switch operable upon the lowering of the outer end of the beam to energize said drive means and rotate the press box from one position to the other, power means to operate said ram when the press box is in packing position, a second switch for energizing said power means which is opened upon the lowering of the outer end of

said beam to prevent energizing of said power means for said ram when the press box is out of packing position, and said second switch being closed upon the raising of the outer end of said beam to allow the operation of said ram.

14. The combination with a fiber baling press having a press box mounted for horizontal rotation on a supporting base from a fiber receiving position in which a trampler is arranged over the box to a fiber packing position in which a ram is associated with the box, of a beam having an inner end operatively disposed under the press box to raise the press box vertically when its outer end is lowered to permit the box to move from one position to the other, means carried by said beam to lock the press box against rotative movement when the outer end of the beam is in raised position and the box is in either of said positions, drive means for rotating the press box from one position to the other, a switch operable upon the lowering of the outer end of the beam to energize said drive means and rotate the press box from one position to the other, means to operate said trampler when the press box is in fiber receiving position, power means to operate said ram when the press box is in packing position, switch means opened upon the lowering of the outer end of the beam to prevent energizing of said power means for said ram and to prevent energizing of operating means for said trampler thereby preventing movement of said trampler and said ram when the beam is in lowered position and the press box is unlocked, and said switch means being closed upon the raising of the outer end of said beam to allow the lowering of said ram and the operation of said trampler.

15. In a fiber baling press having a press box mounted for horizontal rotation on a supporting base from a fiber receiving position to a fiber packing position in which a ram is associated with the box, a beam having an inner end disposed under the press box to raise the press box vertically when its outer end is lowered to permit the box to move from one position to the other, means to lock the press box against rotative movement when the outer end of the beam is in raised position and the box is in either of said positions, means for operating said ram to pack fibers in the press box, a first switch movable to closed position upon the raising of said beam to allow the energizing of the operating means for said ram and movable to open position upon the lowering of said beam to prevent the energizing of said ram operating means, a second switch in series with said first switch, and manual means for closing said second switch and energizing said ram operating means when said first switch is closed.

16. The combination with a fiber baling press having a press box mounted for horizontal rotation on a supporting base from a fiber receiving position in which a trampler is arranged over the box to a fiber packing position in which a vertically movable ram is associated with the box, of a beam having an inner end portion operatively disposed under the press box to raise the press box vertically when its outer end is lowered to permit the box to move from one position to the other, means to lock the press box against rotative movement when the outer end of the beam is in raised position and the box is in either of said positions, drive means to rotate the press box, a switch operable upon the lowering of the outer end of said beam to allow energizing of said drive means and rotate the press box, and a second switch in series with the first mentioned switch and being closed when the ram reaches its raised position for energizing the drive means for said press box, said second switch being open upon the operation of said ram thereby preventing the energizing of said drive means for the press box when the ram is in the press box.

17. In a fiber baling press having a press box and a vertically movable ram associated with the press box for packing fibers therein, apparatus for automatically stopping the movement of the ram when a predetermined hydraulic pressure is reached through contact of the ram

with the fibers, said apparatus comprising a fluid reservoir, a pump for pumping fluid from said reservoir to said ram, a fluid pressure line extending from said pump for conveying fluid to the ram, a four-way valve interposed in said pressure line and selectively shifted between open positions in which fluid may pass therethrough for moving the ram in either direction and closed position in which the flow of fluid to the ram is stopped thereby holding said ram in a substantially fixed position, a relief valve connected to the pressure line between the pump and said four-way valve and being adjustable for actuation by a predetermined fluid pressure at which pressure it will allow the flow of fluid therethrough, manual means to shift the four-way valve to said open position, and means operable responsive to the actuation of said relief valve when the predetermined pressure is reached for closing said four-way valve thereby stopping the movement of the ram and holding it in a substantially fixed position on the compressed fibers.

18. In a fiber baling press having a press box and a vertically movable ram associated with the press box for packing fibers therein, apparatus for automatically stopping the movement of the ram when a predetermined hydraulic pressure is reached through contact of the ram with the fibers, said apparatus comprising a fluid reservoir, a pump for pumping fluid from said reservoir to said ram, a fluid pressure line extending from said pump for conveying fluid to the ram, valve means interposed in said pressure line and selectively shifted between open position in which fluid may flow therethrough for moving the ram and closed position in which the flow of fluid to said ram is stopped thereby holding said ram in a substantially fixed position, a relief valve connected to the pressure line and being adjustable for actuation by a predetermined fluid pressure at which it will allow the flow of fluid therethrough, means for driving said pump, a switch for energizing and deenergizing said drive means, and means operable responsive to the actuation of said relief valve when the predetermined pressure is reached for closing said valve means and for actuating said switch to deenergize the drive means for said pump.

19. In a fiber baling press having a press box and a vertically reciprocable ram associated with the press box for packing fibers therein, a fluid reservoir, a pump for pumping fluid from said reservoir to said ram, means for driving said pump, a fluid pressure line extending from said pump for conveying fluid to the ram, valve means interposed in said pressure line and selectively shifted between open position in which fluid may flow therethrough for moving the ram and closed position in which the flow of fluid therethrough to said ram is stopped thereby holding said ram in a substantially fixed position, a switch for energizing said drive means when in closed position, and manual means for simultaneously closing said switch and shifting the valve means to open position whereby said drive means is energized and fluid is conveyed to said ram through said valve means for moving said ram.

20. In a fiber baling press having a press box and a vertically reciprocable ram associated with the press box for packing fiber therein, a pump for pumping fluid to said ram, means for driving the pump, a fluid pressure line extending from said pump for conveying fluid to the ram, valve means interposed in said pressure line and selectively shifted between open position in which fluid may flow therethrough for moving the ram and closed position in which the flow of fluid therethrough to the ram is stopped thereby holding said ram in a substantially fixed position, a relief valve connected to the pressure line and being adjustable for actuation at a predetermined fluid pressure, a switch for energizing said drive means when in closed position, manual means for simultaneously closing said switch and shifting the valve means to open position whereby said drive means is energized and fluid is conveyed to said ram through said

valve means for moving said ram, and means operable responsive to the actuation of said relief valve when the predetermined pressure is reached for automatically closing said valve means and opening said switch thereby deenergizing said drive means and holding said ram in a substantially fixed position.

21. In a hydraulic system for automatically stopping the movement of a ram associated with a press box in a fiber baling press when a predetermined hydraulic pressure is reached through contact of the ram with the fiber, a pump, a fluid pressure line from the pump for conveying fluid to the ram for actuation thereof, a four-way valve in said pressure line and being shiftable between open and closed positions, a relief valve connected to the pressure line between the pump and the four-way valve and being adjustable for actuation by a predetermined fluid pressure at which pressure it will allow the flow of fluid therethrough, a return flow line from the relief valve for conveying fluid therefrom, fluid pressure means connected to said flow line and having relatively movable parts, one of said relatively movable parts being actuated by said relief valve when the predetermined pressure is reached and being operatively connected to said four-way valve for shifting said four-way valve from open to closed position, manual means for opening said four-way valve to allow movement of said ram in either direction, and said four-way valve being shifted to closed position by said one relatively movable part upon the reaching of the predetermined pressure in said relief valve thereby stopping the movement of said ram.

22. In a hydraulic system for automatically stopping the movement of a vertically reciprocable ram associated with a press box in a fiber baling press when a predetermined hydraulic pressure is reached through the lowering and raising of said ram, a pump, a fluid pressure line extending from said pump, a four-way valve connected to said pressure line, flow lines extending from said valve to said ram for conveying fluid to the ram and for returning the fluid therefrom, said valve being shiftable between open positions in which fluid is supplied to said ram for raising and lowering thereof and a closed position in which the ram is stopped in a substantially fixed position, a relief valve connected to the pressure line between the pump and said valve and being adjustable for opening by a predetermined fluid pressure, a return flow line from the relief valve for conveying fluid therefrom when it is opened, fluid responsive pressure means having relatively movable parts connected to said return flow line, one of said relatively movable parts being operatively connected to said four-way valve for shifting said four-way valve from the open positions to the closed position, and said four-way valve being shifted to closed position by said one relatively movable part upon the reaching of the predetermined pressure in said relief valve in the raised or lowered position of the ram.

23. In a fiber baling press having a press box and a vertically reciprocable ram associated with the press box for packing fibers therein, apparatus for automatically stopping the movement of the ram when a predetermined hydraulic pressure is reached, said apparatus comprising means for supplying fluid to the ram, a switch for energizing and deenergizing said fluid supply means, a fluid pressure line for conveying fluid from said supply means to said ram, valve means in said pressure line and shiftable between open and closed positions for selectively supplying fluid to the ram, a manual lever operatively connected to said valve means for selective opening and closing of the valve means, a relief valve connected to the pressure line and being adjustable for opening at a predetermined fluid pressure, fluid responsive pressure means connected to said relief valve and being actuated upon opening of said relief valve, said fluid responsive means being operatively connected to said manual lever for shifting said valve means from open to closed position and to said switch for deenergizing

said fluid supply means, the actuation of said manual lever when said valve means is in closed position energizing said supply means and shifting said valve means from the closed position to open position whereby fluid is supplied to said ram for actuation thereof, and the actuation of said relief valve at the predetermined pressure actuating said fluid responsive means thereby shifting said valve means to closed position and deenergizing said fluid supply means and holding the ram in a substantially fixed position.

24. In combination, a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, drive means to rotate the box from one position to the other position, means to lock the press box while in either of said positions and to raise the box for movement from one position to the other position, a ram operatively associated with the press box while in the packing position for packing the fiber in the box, fluid pressure means for moving said ram into and out of the press box, means for automatically stopping the movement of said ram into said press box when a predetermined fluid pressure is reached through contact of the ram with the fibers, electrical control means to prevent energizing of said drive means for rotating the press box when the ram is in the box, and additional electrical control means to prevent the energizing of said fluid pressure means when said press box is being moved from one position to the other position.

25. In combination, a fiber baling press having a press box and a base frame on which the box rests in one position while being filled with fiber and in another position while the fiber therein is being packed, drive means to rotate the box from one position to the other position, means to lock the press box while in either of said positions and to raise the box for movement from one position to the other position, a vertically movable ram associated with the press box for packing the fiber in the box, a pump to supply fluid to the ram, a fluid pressure line connecting the pump and the ram to convey fluid to the ram for moving it on its packing stroke, valve means interposed in said pressure line and selectively shifted between open position in which fluid may pass therethrough for moving the ram and closed position in which the flow of fluid to said ram is stopped to hold the ram in a substantially fixed position, a relief valve connected to the pressure line and adjustable for actuation by a predetermined fluid pressure, means operable responsive to the actuation of said relief valve when said predetermined pressure is reached to close said valve means thereby stopping the ram and holding it in a substantially fixed position, control means to prevent energizing of said drive means for rotating the press box when the ram is in the box, and additional control means to prevent energizing of said pump and said fluid pressure means when said press box is being moved from one position to the other position.

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