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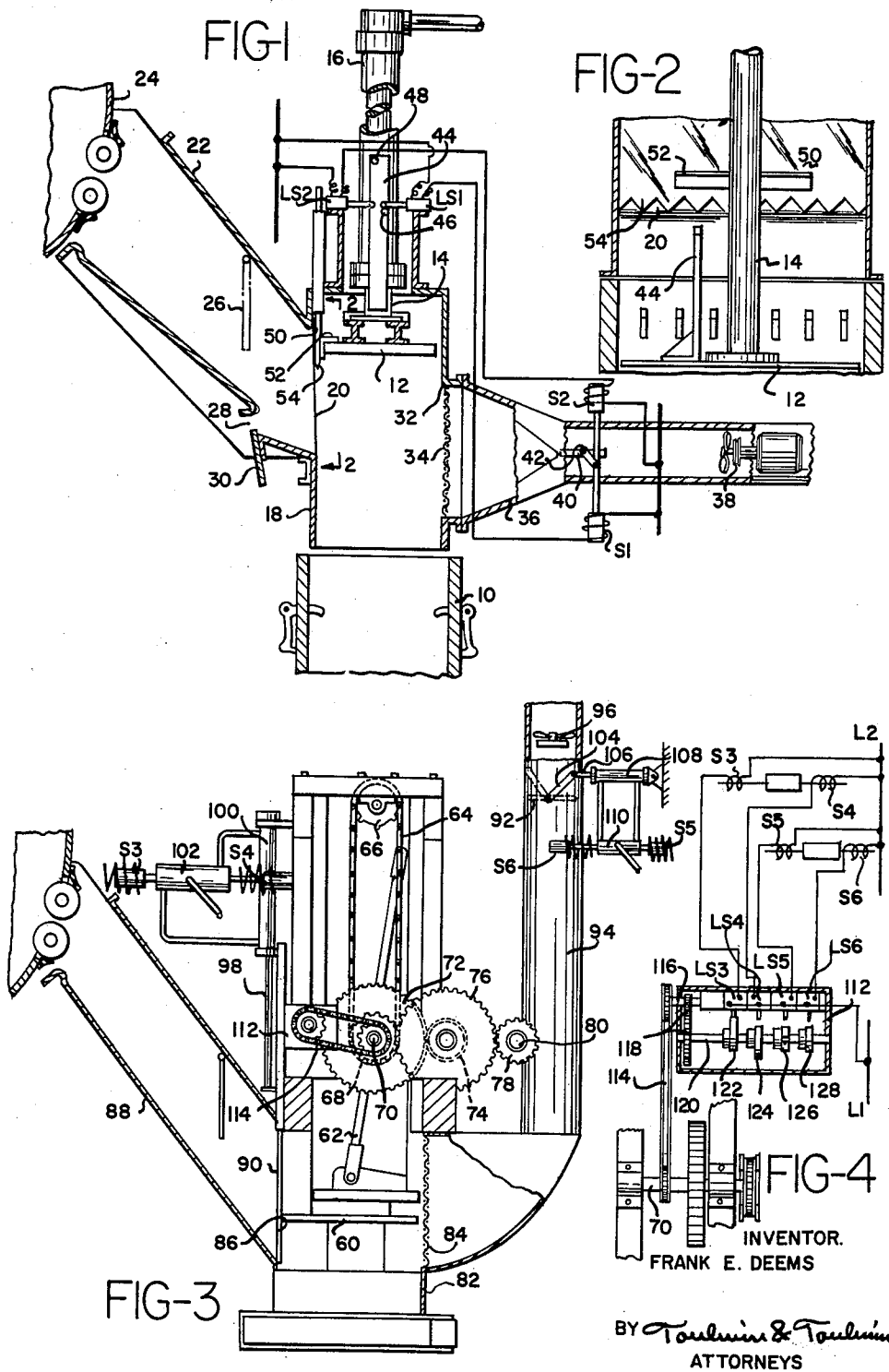
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METHOD OF BALING FIBERS

Original Filed Aug. 11, 1961

2 Sheets-Sheet 1



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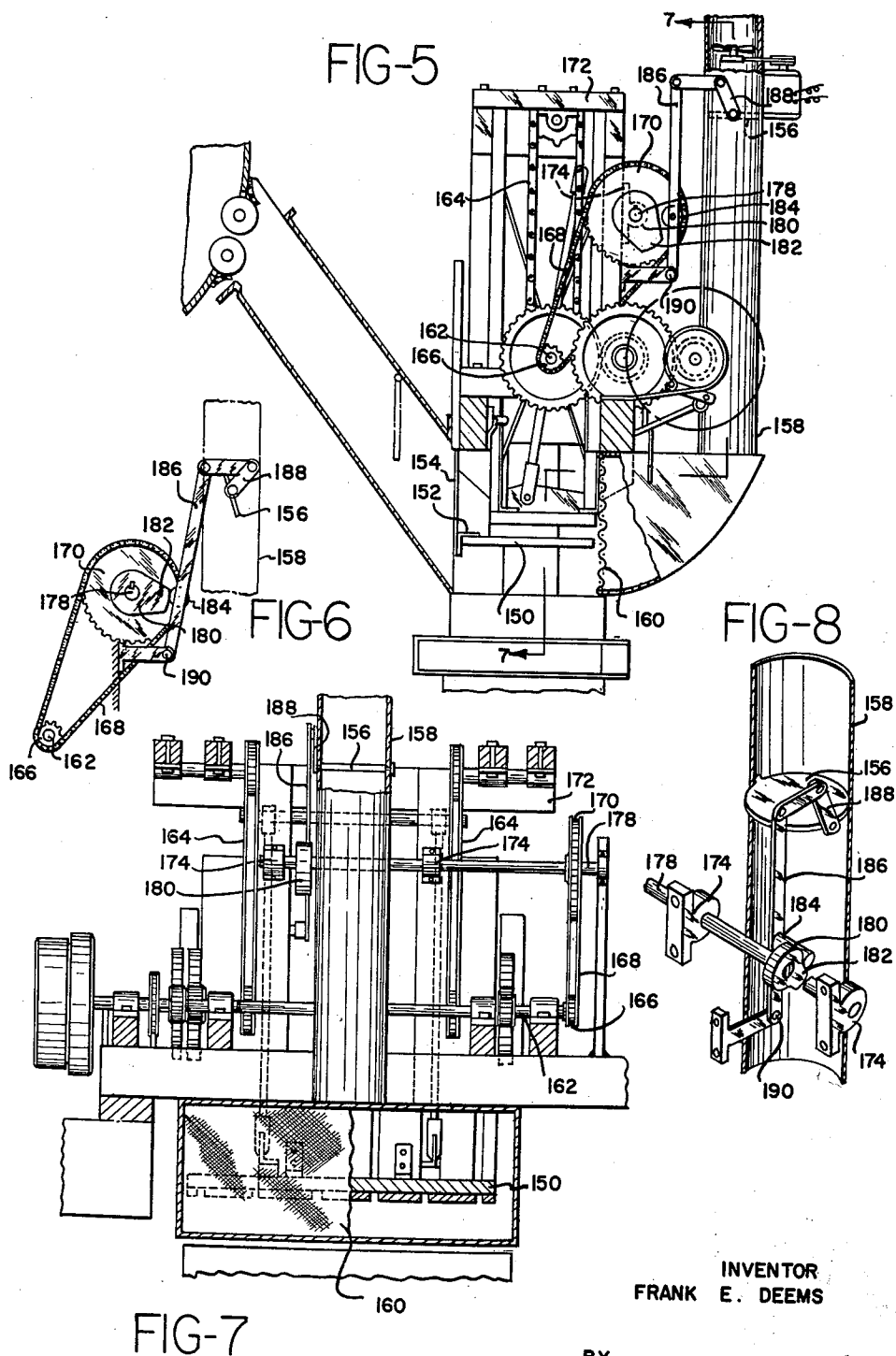
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METHOD OF BALING FIBERS

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5 Claims. (Cl. 100—35)

This invention relates to a method of baling fibers and is particularly concerned with a method utilizing pneumatic feeding means for conveying fibers to a fiber press or baler.

This application is a division of my co-pending application Serial No. 131,007 which is a continuation-in-part of my co-pending application, Serial No. 45,056, filed July 25, 1960, now Patent No. 3,025,785, and entitled: Pneumatic Feed Means for Fiber Press.

In the baling or pressing of fibers, such as cotton fibers into bales, one of the important steps to be carried out is the conveying of the fibers into baling position. This movement of the fibers must be carried out rapidly in order to prevent the loss of time and, also, substantially uniform distribution of the fibers in the baling chamber is necessary in order to be able to produce bales of uniform density and which are square on the end so that they can easily be handled.

Heretofore, expensive complex mechanical arrangements have been provided for delivering fibers into the baling chamber but these arrangements have the objection, in addition to being expensive and complicated that they require considerable service to maintain them in good operating condition.

Such mechanical fiber handling devices also tend to break fibers and to cause them to become entangled.

Other mechanical lint feeders employ brushes or revolving sweeps to urge the fibers, such as cotton lint into the baling hopper. The tendency of an arrangement of this nature is to tumble the fibers and to beat them into a frothy mass which will interfere with the baling operation and which is also harmful to the fibers.

None of the heretofore known devices have had the advantage of giving a uniform filling of the baling hopper to produce uniform regularly shaped bales.

The present invention proposes to utilize air for moving the fibers to and into a press box so that the fibers will be uniformly distributed in the box and will be conveyed thereto quickly without in any way damaging the fibers.

The use of air in this general connection has been known heretofore but none of the previous devices have operated substantially quickly or reliably enough to be practical and, accordingly, commercial units of this nature have never become popular.

With the foregoing in mind, it is a primary object of the present invention to provide a method for baling fibers, such as lint cotton which is more rapid than heretofore known apparatus.

A still further object of the invention is the provision of a method or fiber conveying, particularly for fiber baling machines which is highly adaptable and which can be adapted to substantially all existing press types with only minor modification.

A still further object of this invention is the provision of a method for feeding fibers, particularly for fiber presses, which will handle the most delicate fibers without damaging the fibers in any way.

Still a further object of this invention is the provision of a method or fiber feeding which utilizes air as a conveying medium but which will operate on low air volumes and low pressures.

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It is also a still further object of this invention to provide a method for drawing fibers and particularly lint cotton into a press box without disturbing the fibers while simultaneously extracting from the lint a considerable portion of the fine dirt and trash particles therein.

The foregoing objects as well as other objects and advantages of this invention will become more apparent upon reference to the following specification taken in connection with the accompanying drawings in which:

FIGURE 1 is a somewhat diagrammatic vertical sectional view through one form of my invention;

FIGURE 2 is a vertical sectional view indicated by line 2—2 on FIGURE 1;

FIGURE 3 is a view like FIGURE 1 but shows a modified structure for operating the press and modified controls for controlling the movable gate and air control damper;

FIGURE 4 is a diagrammatic view showing the electric control circuit associated with the modification of FIGURE 3;

FIGURE 5 is a diagrammatic view similar to FIGURE 3 but shows an arrangement for mechanically operating the air control damper and gate;

FIGURE 6 is a fragmentary view showing the damper control mechanism of FIGURE 5 in a different position;

FIGURE 7 is a view looking in from the right side of the FIGURE 5 structure and is indicated by line 7—7 on FIGURE 5; and

FIGURE 8 is a fragmentary perspective view showing the damper operating mechanism of the FIGURE 5 modification.

Referring to the drawings somewhat more in detail, FIGURE 1 shows, somewhat diagrammatically, a fiber press or trampler having a press box 10 in which fibers, such as lint cotton, are to be compacted by a follower block 12. Follower block 12 is mounted on a ram 14 extending into a cylinder 16 that is suitably supported on the frame of the fiber press. Reversible energization of the motor made up by the ram 14 and the cylinder 16 will move the follower block vertically and thus compact fibers in the press box.

Immediately above the press box 10 is a hopper 18 that has an opening 20 in one side wall from which extends a chute 22. The chute is inclined downwardly toward opening 20 so that fibers supplied thereto, as from the condenser generally indicated at 24, will tend to slide downwardly toward the hopper. The chute may have a dependent swingable member 26 suspended from the top wall which partially closes the chute 22 but which is swingable to permit fibers to pass therethrough.

The chute can also have a lateral opening 28 in the bottom wall adjacent the hopper through which air can be admitted with the effective area of this opening being variable by adjustment of a slideable door member 30.

In the side wall of the hopper opposite opening 20 is a second opening 32 having thereover a screen member 34. This second opening 32 is connected with a suction duct 36 associated with which duct is fan means 38 which impels air rightwardly through duct 36 away from the hopper. A damper 40 is mounted in duct 36 and has an operating lever 42 with armatures connected thereto and associated with which armatures are solenoids S1 and S2.

Energization of solenoid S1 will move the damper into its opening position whereas energization of solenoid S2 will move the damper to its closed position.

Solenoid S1 is in circuit with a limit switch LS1 which is arranged for being closed as the tramping block 12 approaches its uppermost position. This is accomplished by mounting on the tramping block a support member 44 having a cam element 46 arranged for engagement with

limit switch LS1 as the tramping block approaches its uppermost position.

Solenoid S2 is in circuit with a second limit switch LS2 which is arranged for being closed by cam element 48 on support member 44 when the tramping block reaches a predetermined downwardly displaced position in the hopper. In this manner, the damper is caused to open when the tramping block is retracted thereby to permit air to be drawn from the hopper through the screened opening 32 while the damper will close as the tramping block advances downwardly thereby to interrupt the suction and to permit the fibers to drop freely into the baling chamber beneath the tramping block.

The opening 20 leading from the chute is controlled somewhat similarly by a reciprocating gate member 50, which has an angle member 52 thereon adapted for abutting engagement by the tramping head as the tramping head moves upwardly so that the gate is lifted by the tramping head and thus opens simultaneously with the retraction of the tramping head and then closes by gravity simultaneously with the advancing movement of the tramping head while the tramping head can continue on downwardly into the press box after the gate has been closed and is halted.

The gate 50 will be seen in FIGURE 2 and will be seen to include a serrated or saw tooth lower edge portion 54 by means of which the lint cotton, or other fibers in the chute, are retained therein while the lint cotton or fibers projecting from the chute are permitted to be torn therefrom by the downward movement of the tramping block.

The described arrangement is such that when the tramping block retracts upwardly, the fibers will move from the chute into the hopper rapidly under the influence of the air drawn through the hopper and into the duct 36. This makes for quick filling of the hopper and for substantially uniform filling so that the press box will be rapidly and uniformly filled by reciprocation of the tramping block. At the same time, the fibers are handled in a gentle manner and there is very little breakage or tangling of the fibers so that the fibers compressed in the press box will be in the best possible condition for further handling.

The modification described above is one in which the tramping block is hydraulically operated while the gate at the end of the chute is mechanically controlled by the tramping block and the damper in the duct which draws air from the hopper is electrically controlled.

In FIGURES 3 and 4, there is shown a modified arrangement which is the form that a great many existing fiber presses take. This modification, as well as the modification of FIGURES 5 through 8, shows a manner in which a more conventional type fiber press or trampler could be modified to take advantage of the teachings of the present invention.

In FIGURE 3, the tramping head or follower block is indicated at 60 and it is connected by link means 62 with a chain 64 passing about pulleys 66 and 68 which are rotatably supported in the press frame. The pulleys are spaced and are independently supported so that, while moving in one and the same direction, the upper end of link means 62 can be carried about by the chain between the pulleys and thus cause reciprocation of the tramping head in the press box therebeneath.

The pulley 68 is the driven pulley and is mounted on a shaft 70 that carries a gear 72 meshing with a smaller gear 74 on another shaft which other shaft carries a larger gear 76 that meshes with a smaller gear 78 on a drive shaft 80. This drive shaft is driven by a belt, or in any other suitable manner, and is under the control of a clutch, or a shiftable belt or the like, so that the reciprocation of the tramping head can be controlled.

As in connection with the first described modification, the tramping head is reciprocable vertically in a hopper 82 having a screened outlet opening 84 on one side and having an opening 86 on the other side communicating

with the chute 88 that leads upwardly and outwardly from the said opening 86.

Also, as in connection with the first described modification, there is a reciprocating gate 90 for closing opening 86 and there is also a damper 92 located in duct 94 that leads from screened opening 84. This duct 94 also comprises fan means 96 for impelling air in the duct away from screened opening 84. According to the modification of FIGURE 3, gate 90 is attached to ram 98 of a fluid motor 100 that is under the control of a valve 102. This valve has a first solenoid S3 which, when energized, will shift the valve to cause the gate to move upwardly and there is also associated with the valve a second solenoid S4 which, when energized, will shift valve 102 to cause the gate to move downwardly.

Damper 92 has an operating arm 104 connected to ram 106 of a fluid motor 108 that is connected in circuit with a valve 110. Valve 110 has a first solenoid S5 associated therewith which, when energized, will shift valve 110 to cause damper 92 to close. A second solenoid S6 associated with the valve will shift the valve, when energized, to cause the damper to open.

The control of the several solenoids referred to above is accomplished by connecting the solenoids in circuit with limit switches and controlling these limit switches by cams or the like that are mechanically driven from some portion of the drive mechanism associated with the fiber press. These limit switches and cams are mounted in a control box 112 carried by the press frame and which control box includes a shaft driven by chain 114 that passes about a sprocket on shaft 70.

As will be seen in FIGURE 4, chain 114 engages a sprocket on the shaft 116 of the control unit and this shaft is connected by gearing 118 with a cam shaft 120 in the control box 112. Gearing 118 provides for reduced speed of rotation of shaft 120 so that it makes exactly one complete revolution for each complete cycle of tramping head 60.

Mounted on shaft 120 are the cams 122, 124, 126 and 128, associated with which are the limit switches LS3, LS4, LS5, and LS6, respectively. Each of these limit switches is connected in circuit with one of the solenoids S3, S4, S5, and S6, as indicated in FIGURE 4. The arrangement is such that each limit switch will be closed at a predetermined position of the tramping head and energize the pertaining solenoid which will shift the pertaining valve and bring about the desired movement of the gate or damper associated therewith.

In this manner, the control of the positioning of the gate and damper is correlated with the reciprocation of the tramping head but there are no mechanical connections between the tramping head, or gate, or trampler but, instead, the control of the gate and damper is taken from the drive train leading to the tramping head so that positive synchronization of the tramping head and gate and damper can be had.

Thus, the same end result is accomplished by the modification of FIGURES 3 and 4 that is accomplished by the FIGURES 1 and 2 modification but in somewhat different manner.

FIGURES 5 through 8 show still another arrangement that is particularly adapted for the modification of existing equipment. This modification shows a fiber press that is constructed about the same as that of FIGURE 3 and which has the same sort of drive leading to the tramping head. In FIGURES 5 through 8, however, the tramping head 150 is arranged to engage the angle clip 152 carried by gate 154 abutting from beneath so as to move the gate between its open and closed positions in the same manner at the gate 50 is actuated in the first modification.

The operation of the damper 156 in duct 158 leading from screened opening 160, however, is accomplished mechanically rather than electrically or hydraulically. This is done by mounting on shaft 162 which

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carries the lower sprocket for actuating the tramping head and drive chain 164, a small sprocket 166 that is connected by a chain 168 with a larger auxiliary sprocket 170 supported on the press frame 172 by means of bearing blocks 174. The ratio of sprockets 166 and 170 is such, about four to one, that auxiliary shaft 178 makes exactly one revolution for each complete cycle of tramping head 150.

The damper 156 is operated by fixing a cam 180 on shaft 178 which cam has a lobe 182 engageable with roller 184 on a lever arm 186, the upper end of which is pivotally connected with operating arm 188 and with damper 156 while the lower end is pivotally supported at 190 on the press frame. This cam arrangement provides for opening of the damper 156 as the tramping head approaches its uppermost position and for closing of the damper as the tramping head moves downwardly.

The closing of the damper, if not accomplished by the weight of the parts of the actuating mechanism, can be brought about by suitable biasing springs acting thereon in opposition to cam 182.

This control of the damper, together with the actuation of the gate produces the same end results as the previously described modifications. The modification of FIGURES 5 through 8 has the advantage, similarly to the modification of FIGURES 3 and 4, of permitting ready adaptation of the present invention to existing fiber presses.

From the foregoing, it will be appreciated that there is provided by the present invention a novel method for handling fibers, particularly, in connection with the baling thereof which treats the fibers extremely gently, thus, avoiding damage thereto while, at the same time, the fibers are moved rapidly and are carried into the hopper leading to the baling chamber and distributed therein so that uniform bales will be produced.

The invention is adaptable to existing presses as well as to presses of new manufacture and the same beneficial results will obtain in both cases.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions; and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. The method of baling fibers in a fiber press which has a supply hopper through which a tramping block reciprocates which comprises; supporting the fibers adjacent the hopper on one side thereof on a surface inclined downwardly toward the hopper, moving air laterally from the hopper end of the chute and through the hopper from said one side thereof to the opposite side at the level of said surface while the tramping block of the press is retracted upwardly to a position above said surface to convey a charge of fibers from said surface into the hopper, admitting the said air into the end of the chute remote from the hopper whereby the movement of air through the chute carries charges of fibers from the chute into the hopper, interrupting the said movement of the air through the hopper, advancing the tramping block downwardly to a position below said surface to compress the charge of fibers so delivered to the hopper, and carrying out the foregoing steps repetitively to build up a bale of fiber consisting of a plurality of the said charges.

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2. A method according to claim 1, which includes the step of preventing movement of fibers from the inclined surface into the hopper while the tramping block is advanced, and permitting movement of the fibers from the inclined surface into the hopper when the tramping block is retracted.

3. A method according to claim 1, which includes arranging side walls and top walls relative to the inclined surface to form a closed chute leading from the hopper, and admitting the air that is drawn across the hopper through the top wall of the chute at the end thereof remote from the hopper.

4. The method of baling fibers in a fiber press which has a supply hopper through which a tramping block reciprocates which comprises; connecting a downwardly inclined chute to the side of the hopper for the press through which fibers can be delivered into the hopper, supplying fibers into the end of the chute remote from the hopper, drawing air laterally from the end of the chute across the hopper when the tramping block of the press is retracted to draw a charge of fibers into the hopper, interrupting the said movement of the air when the tramping block again advances, closing the hopper end of the chute simultaneously with the advancing movement of the tramping block, admitting the said air into the end of the chute remote from the hopper whereby the movement of air through the chute carries charges of fibers from the chute into the hopper, also admitting air into the chute at the bottom thereof adjacent the hopper end of the chute whereby a portion of the air moving into the hopper and laterally of the hopper moves beneath the charge of fibers entering the hopper and exerts a lifting effect thereon, and carrying out the foregoing steps repetitively to build up a bale of fibers consisting of a plurality of the said charges.

5. The method of baling fibers in a fiber press which has a supply hopper through which a tramping block reciprocates which comprises; connecting a downwardly inclined chute to the side of the hopper for the press through which fibers can be delivered into the hopper, supplying fibers into the end of the chute remote from the hopper, drawing air laterally from the end of the chute across the hopper when the tramping block of the press is retracted to draw a charge of fibers into the hopper, interrupting the said movement of the air when the tramping block again advances, closing the hopper end of the chute simultaneously with the advancing movement of the tramping block, admitting the said air into the end of the chute remote from the hopper whereby the movement of air through the chute carries fibers from the chute into the hopper, restricting the movement of air through the chute at one region therealong toward the hopper end thereof to the bottom portion of the chute to increase the efficiency with which the air moving along the chute conveys the charge of fibers therefrom into the hopper, and carrying out the foregoing steps repetitively to build up a bale of fibers consisting of a plurality of the said charges.

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