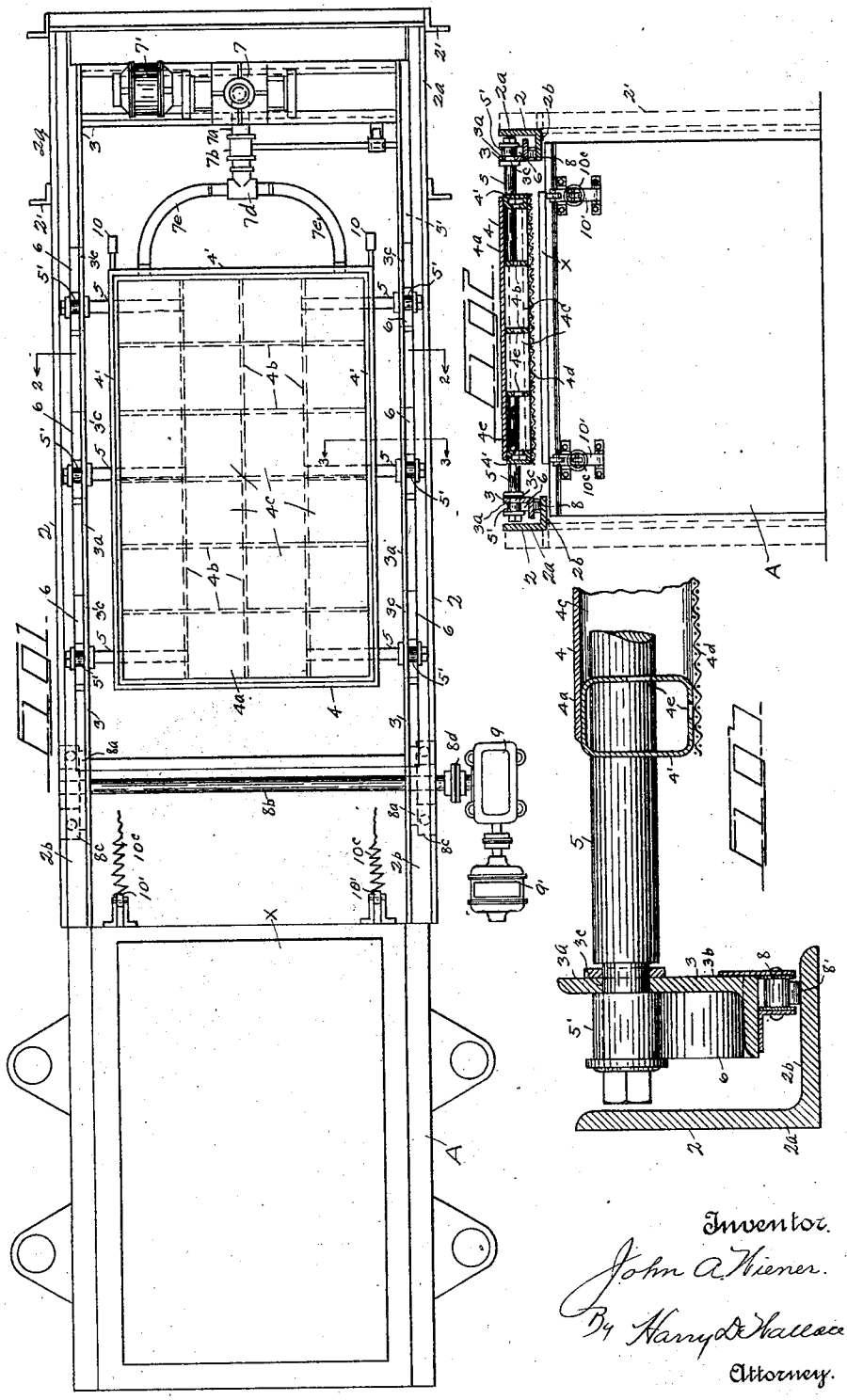
April 29, 1930. J. A. WIENER 1,756,614

LIFTING AND TRANSFERRING DEVICE

Filed April 23, 1929 2 Sheets-Sheet 1



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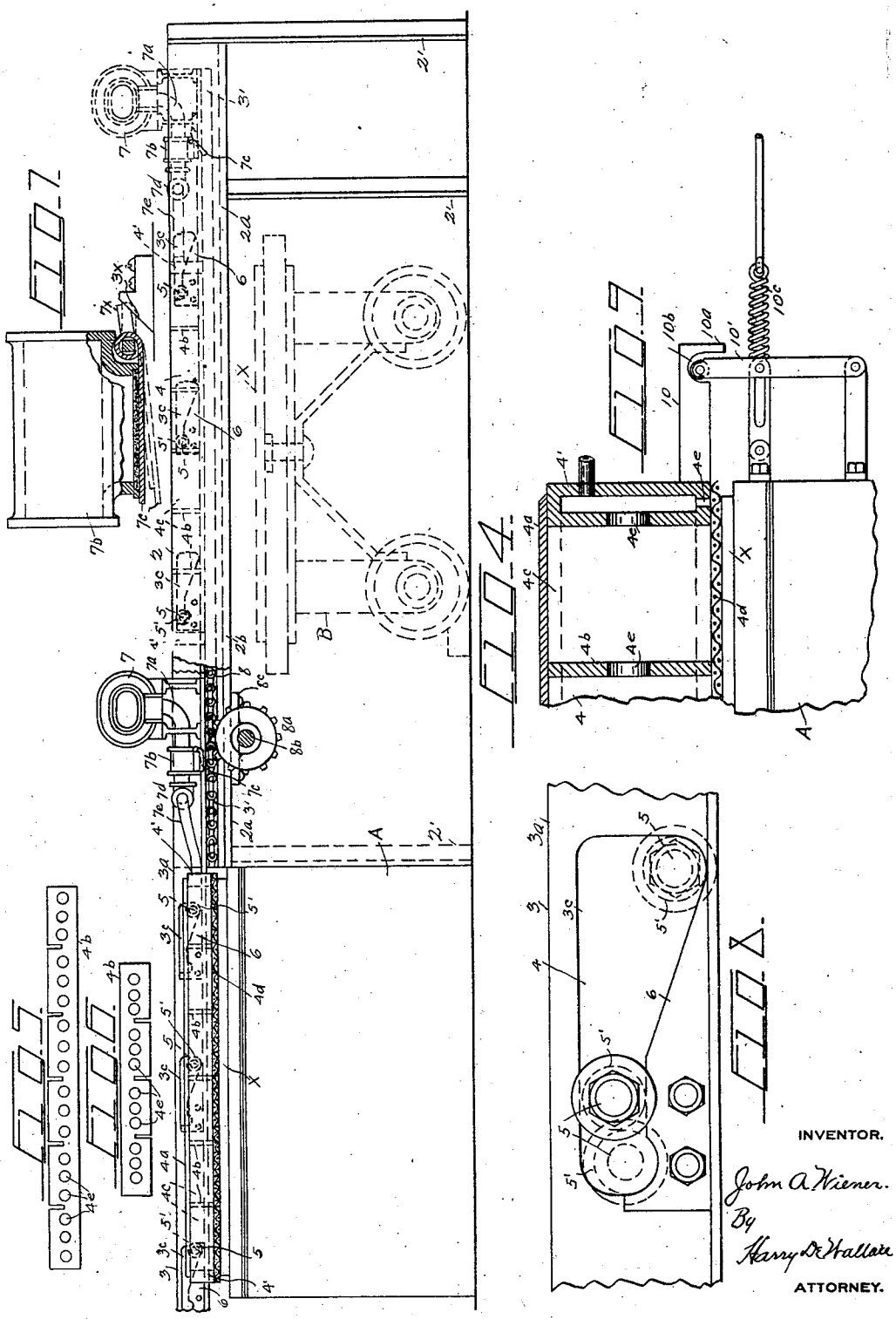


FIG. 7.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 8.

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Patented Apr. 29, 1930 1,756,614

UNITED STATES PATENT OFFICE

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LIFTING AND TRANSFERRING DEVICE

Application filed April 23, 1929. Serial No. 357,510.

This invention relates to a machine for automatically handling fibre boards and like sheet materials, and has for its primary object to provide novel vacuum-controlled lifting and transferring mechanism, having an element that enters the molding chamber of of the wet machine, and picks up the sodden sheets from the screen that supports them during the formative state, carries said sheets away, and deposits them upon carriages or other conveyors for delivery to the drying presses. A further object is to provide novel pick-up and transfer mechanism comprising a unitary vacuum box or member of peculiar construction and arrangement, which is mounted for reciprocable movements towards and from the molding position, and said box being provided with a plurality of communicating cells or compartments, having open bottoms, the bottom margins of the cell walls being arranged in a common plane, and being covered with a permanent sheet of coarse netted fabric, that overlies the whole top surface of the sheets and prevents the powerful vacuum from destroying the plane character of, or otherwise distorting, the sodden and limp webs during the transferring operation. In practice, the effective lifting area of the vacuum box corresponds substantially to the plan dimensions of the boards. This facilitates the ready and rapid transfer of the product and obviates all danger of the edges or corners being distorted or broken. A further object is to provide means for reciprocating the vacuum box, and for effecting the automatic gravitation and elevation thereof to effect the picking up of the sheets. And a further object is to provide automatic means to start and stop the reciprocating movements of the box, as well as, to break the vacuum for releasing the sheets when they arrive at the predetermined destination.

The various features and parts of the invention will be understood from the detailed description which follows, and by reference to the accompanying drawings, in which—

Figure 1 is a top plan view of the complete machine, the vacuum box being in the sheet-discharging position. Fig. 2 is a vertical cross-section taken on line 2—2 of Fig. 1. Fig. 3 is a cross-section, taken on line 3—3 of Fig. 1, and being an enlargement of the parts in the upper left corner of Fig. 2. Fig. 4 is a broken side elevation of the device of Fig. 1. The full lines showing suction or lifting box extended and in the act of picking up a web fibre board. Figs. 5 and 6 are respectively side views of the longitudinal and transverse partitions. Fig. 7 is an enlarged view of the flop-valve that controls the vacuum. Fig. 8 is an enlarged broken side elevation of the carriage, showing the inclined tracks that control the lowering and raising of the vacuum box. Fig. 9 is an enlarged side view of the bumper and locking means that control the vacuum box during the pick-up intervals.

In the drawings, 2 represents an elongated open stationary frame, one end of which is supported by uprights 2′, while the other end may be connected to, or supported near, a member of the sheet-molding apparatus, as A. The longitudinal members of frame 2 consist of angle irons 2^a, whose horizontal webs or arms 2^b constitute tracks, for the reciprocation of a shorter and narrower open frame or carriage 3, which is equipped with roller-chains 3′, that traverse said tracks. The frame 3 supports the gravitative vacuum box 4, which is floatably mounted between the members 3^a of frame 3, by means of a plurality of lateral oppositely projecting rods or gudgeons 5, the corresponding ends of which extend into the box 4, while the other ends pass through relatively large slots 3^c in the upright webs 3^b of frame 3. The outer ends of the rods 5 are preferably fitted with flange-rollers 5′, that are in constant engagement with inclined or wedge-like blocks 6, that are bolted to the outer faces of the webs 3^b, the said wedges being substantially the same length as the slots 3^c, and being so disposed as to coincide with the bottoms of said slots (see Fig. 8). The vacuum box 4 is preferably rectangular in plan (see Fig. 1), and is closed at one end and at the opposite sides by a hollow frame or conduit 4′, upon which is mounted a plane deck 4^a. This encloses all surfaces of the box except the bottom, which is normally open. Interiorly, the box 4 is subdi-

vided by similar vertical longitudinal and transverse partitions 4^b, into a plurality of cells or compartments, of substantially equal area, as 4^c. The bottom edges of the partition 4^b, and conduit 4', are all arranged in a common plane, and this open bottom of the box is preferably covered with a sheet of coarsely netted wire 4^d, the latter having substantially the same area as said bottom and being in full bearing contact with the frame 4', and the bottom edges of all of said partitions, which prevents the screen from warping by the force of the vacuum. The conduit 4', as well as, the several partitions are preferably perforated, as shown at 4^e, in Figs. 2, 3 and 9, for the free communication of the conduit with said cells, in order that the vacuum or suction when applied to the box may be effective throughout its interior. When the box 4 is brought into contact with a plane fibre board, as X (see Figs. 4 and 9), a perfect seal is effected, and the sheet may be lifted and safely transferred to a truck, as B, or to any desired location. The vacuum may be created by any suitable pump, as 7, which is preferably mounted upon, and is movable with, the carriage 3 and box 4. The pump 7 is shown operated by a motor 7', and communicates with the box 4 by means that includes a pipe 7^a, in which is disposed a "flop" valve 7^b, the latter having a gravitative gate 7^c, that may be opened for breaking the vacuum, by means shown in Figs. 1 and 7. The valve 7^b has full communication with one end of box 4, by means of a T 7^d and oppositely arranged branch-pipes, which preferably consist of hose or other flexible tubes, as 7^e. The farther ends of these tubes tap the hollow frame 4' as best seen in Fig. 1. To the underside of the members 3^a of the carriage 3, are rigidly attached sprocket-chains 8, which preferably extend in a direct line the full length of said members. These chains are equipped with rollers 8' (see Fig. 3), that travel over the flange-tracks 2^b and enable the box 4 to be trundled back and forth while performing the sheet-transferring work. The chains 8 are engaged, and the carriage 3 is reciprocated, by sprocket-wheels 8^a, the latter being mounted upon a common transverse shaft 8^b, which may be supported by depending hangers 8^c (see Figs. 1–4). One end of shaft 8^b is coupled, at 8^d, in Fig. 1, with a speed-reducer 9, which is driven by a motor 9', the latter being controlled by any suitable switch (not shown), of the well-known type that enables the motor to be reversed, for example, for moving the box 4 towards the wet machine, to pick up a sheet X, and then in the opposite direction, for delivering the sheet, as shown in Fig. 4. When box 4 is moved towards the molding position A, to pick up a sheet X, it remains momentarily in its elevated position, as shown in Fig. 2, and by the dotted lines in Fig. 4. When the box finally registers with the sheet X, a pair of locking levers or latches 10 attached rigidly to the rear end of box 4, engage similar upright levers or bumpers, as 10', and the latches 10 being formed with long lugs 10^a that depend from sockets 10^b, make abrupt engagement with the uprights 10', which arrests the further forward movement of the vacuum box. The carriage 3 meantime continues its forward travel a distance equal to the length of the slots 3^e and the inclined tracks 6, and then the carriage is stopped, by the shutting down of the motor 9'. During this final forward movement, the carriage 3 carries with it all of the wedges 6, and as these wedges support the box 4 in its elevated state, the box gravitates towards the fresh sheet X, as may be understood by comparing Fig. 2 with Fig. 4. During this lowering of the box 4, the rollers 5' remain in engagement with the tracks 6, and finally come to rest at the lowest level or plane of the said tracks, as shown in Figs. 4 and 8. This gravitative action of the box 4 brings its wire covered bottom into full contact with the sheet X, and the weight of the box causes the wire 4^d to sink into the sodden board X and enable the conduit 4' and partitions 4^b to effect a positive seal that enables the vacuum box to pick up and transfer the sheet without disturbing its plane character, or otherwise distorting or mutilating the limp board. In practice, the pick-up and transfer mechanism operates continuously, and as the intervals between the reciprocations of the carriage 3 are relatively short, the vacuum pump 7, also operates continuously. By this arrangement, the vacuum controlled parts are always ready to elevate and transfer the sheets X, or perform other work, whenever the bottom of the box 4 becomes sealed, as explained. Immediately following the lowering of box 4, as in Fig. 4, the operator reverses and starts the motor 9', for effecting the return of the box and related parts to the position, shown in Fig. 1. When the motor is reversed, the carriage 3 again travels alone a distance equal to the length of the wedges 6, and during this initial backward movement, the wedges being rigid to the carriage lift the box 4 sufficiently to enable the latches 10 to clear the bumpers 10', and the gudgeons 5 having during the same interval traveled the full length of the slots 3^e, the box 4 thereafter moves rearwardly with the carriage 3 to the sheet-discharging position, shown at the right in Figs. 1 and 4. When the carriage nears the end of its rearward travel, an arm 7^x carried by the gate 7^c encounters an incline 3^x carried by the frame (see Figs. 1, 4 and 7), and is rocked in the direction for opening the gate, to break the vacuum and allow the sheet X to gravitate towards a truck, or other conveyor B, as shown in Figs. 4.

Having thus described my invention, what I claim, is—

1. A machine for transferring sheets having in combination with an elongated open stationary frame mounted relatively to a sheet-molding press, a carriage movable on said frame towards and away from said press, means to reciprocate the carriage, a vacuum box suspended within the carriage, means to connect said carriage and said box so that same are movable longitudinaly relatively to each other to enable the vacuum box to gravitate and pick up the sheets, and means to break the vacuum to discharge the sheets when the carriage completes its return movement.

2. A machine for picking up and transferring wet sheets of fibre directly from the molding bed, comprising a frame formed with parallel tracks, a carriage adapted to be trundled over said tracks towards and from said bed, a floating open bottom vacuum box supported by said carriage adapted to be projected into the molding chamber means to stop the box when it registers with the sheets, means to connect the box and carriage whereby said carriage may continue its forward travel after such registry is effected and to cause said box to gravitate towards the sheets, means to create a vacuum in said box, said vacuum adapted to become effective when the box makes contact with the top surface of the sheets, means to reciprocate said carriage, and means to break the vacuum to enable the sheets to gravitate to another conveyor.

3. A machine for transferring wet sheets of pulp from the molding chamber, comprising an elongated frame, a carriage mounted for movement on said frame towards and away from said chamber, a gravitative vacuum box carried by said carriage adapted to be projected into the molding chamber to pick up the wet sheets by the forward movement of the carriage, means to stop the forward movement of the box when the latter registers with the sheets, means whereby the carriage may continue its forward movement and will cause the box to gravitate towards and to pick up the sheets, means to reciprocate the carriage, and means to break the vacuum at the end of the backward movement of the carriage.

4. In combination with a carriage and means for reciprocating same, gravity responsive vacuum means having movement with the carriage and to enable the carriage to move independently of the vacuum means during gravitation of the latter, means for arresting forward movement of the vacuum means at a predetermined point in the forward movement of the carriage, and means for mounting said vacuum means on the carriage and for causing gravitation of the vacuum means upon arresting thereof and upon continued forward movement of the carriage and upon return movement of the carriage for restoring the vacuum means to initial position.

5. In combination with a carriage and means for reciprocating same, vacuum means and means for mounting said vacuum means on the carriage for movement therewith and to enable the carriage to movement independent of the vacuum means and for causing the vacuum means to be moved by the carriage to work engaging position upon forward movement of the carriage and upon return movement of the carriage to be restored to initial position.

6. In combination with a movable carriage, a vacuum device, members mounted on the carriage to engage the device so as to effect movement of the device with the carriage and having inclined parts, means to arrest movement of the device during movement of the carriage in one direction thereof to cause the device to move downwardly on the inclined parts to work engaging position and upon movement of the carriage in a second direction to elevate the device, and means to operate the carriage.

7. In combination with a movable carriage, a vacuum device, means to mount said device on the carriage for movement therewith and to enable the carriage to have movement independent of the device, means to effect said independent movement of the device by and during movement of the carriage in one direction and for restoring said device to initial position by and during movement of the carriage in a second direction, and means to operate the carriage.

8. In combination with a movable carriage, a vacuum device, means to mount said device on the carriage for movement therewith and to enable the carriage to move independently of the device, means to engage and hold the device at a predetermined point and during continuous movement of the carriage in one direction, means operable by the carriage to effect said independent movement of the device during holding thereof by the holding means to cause the device to engage the work and to restore said device to initial position and to release same from the holding means upon movement of the carriage in a second direction, and means to operate the carriage.

9. In combination with a movable carriage, a vacuum device, means to support the device from the carriage for independent movement transversely of the carriage and for enabling the carriage to move independently of said device, means to operate the carriage, and means to effect said transverse independent movement of the device away from and toward the carriage during said independent movement of the carriage.

10. In combination with a movable carriage, a vacuum device, means to mount said

device on the carriage to move with the latter and to effect movement of the device away from the carriage at a predetermined point in the movement of the carriage, means to engage the device and to hold same against movement with the carriage while permitting same to move away from the carriage, and means to operate the carriage.

In testimony whereof I affix my signature.

JOHN A. WIENER.