

Sept. 28, 1926.

1,601,236

C. BURNHAM

BOX MAKING MACHINE

Filed Sept. 2, 1925

4 Sheets-Sheet 1

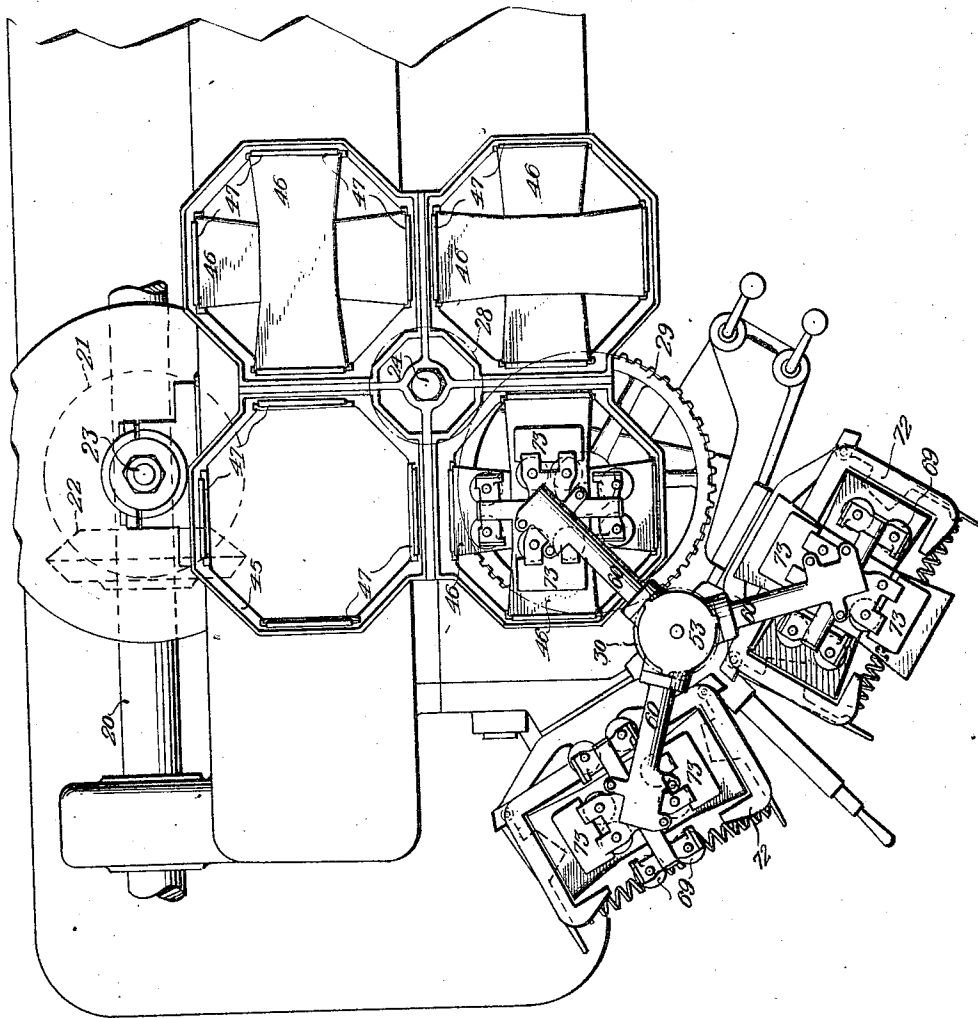


Fig. 1.

Inventor
Charles Burnham
Davis & Davis

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Attorneys

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Fig. 2.

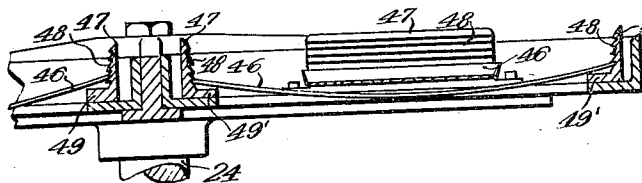
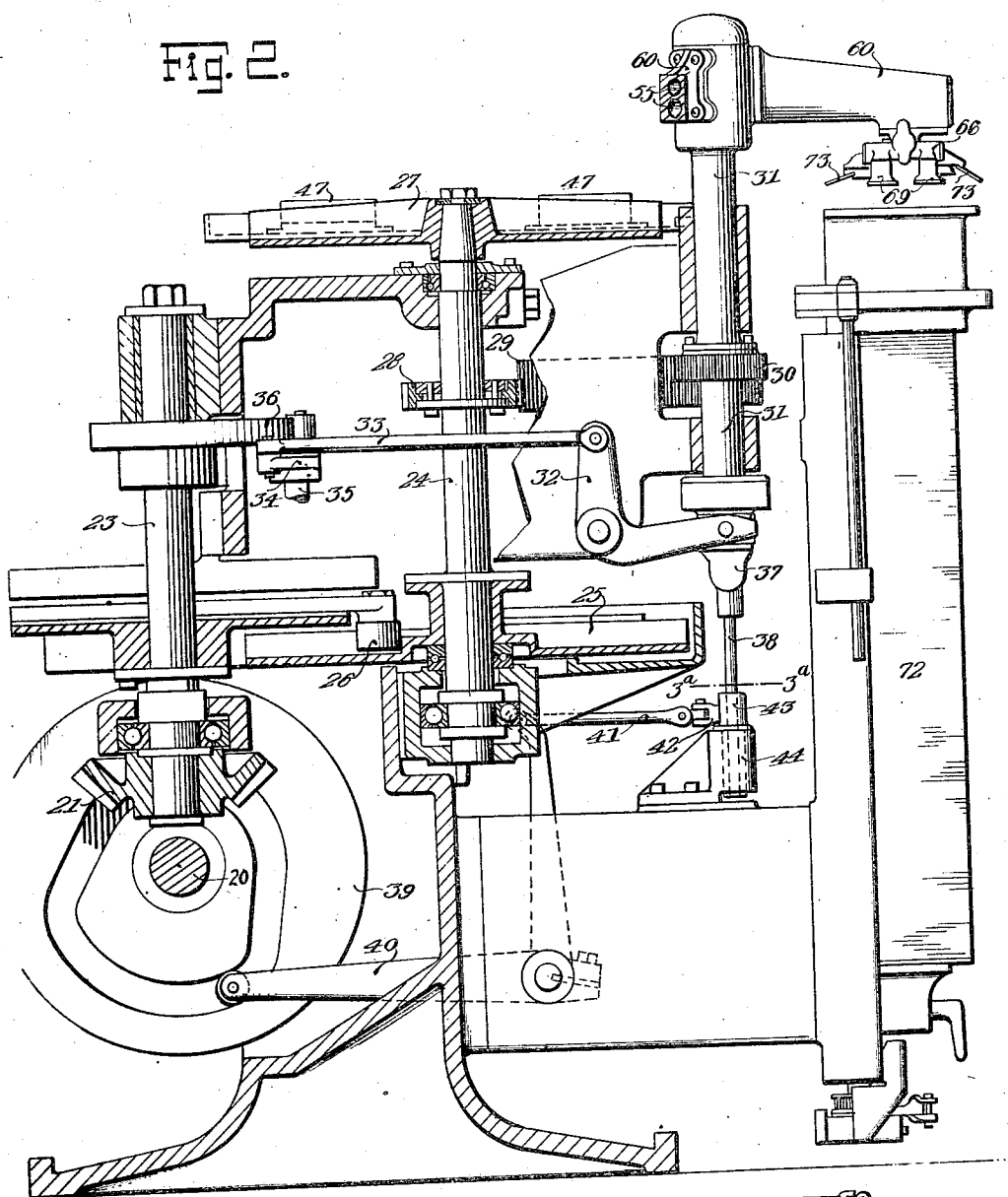


Fig. 3.

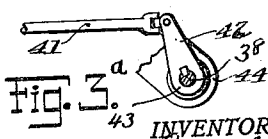


FIG. 3.
INVENTOR
Charles Burnham
BY Davis & Davis
ATTORNEYS

Sept. 28, 1926.

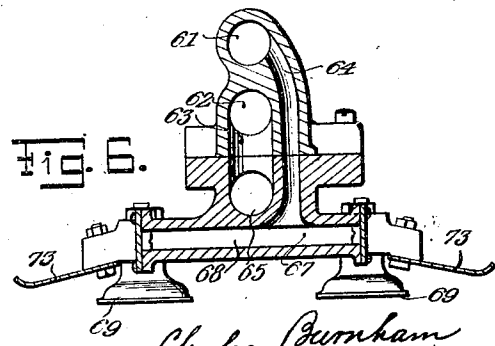
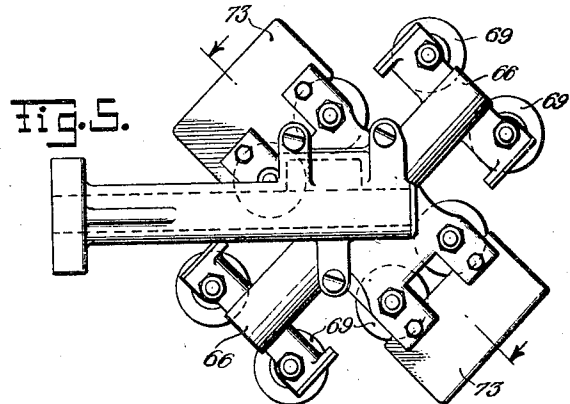
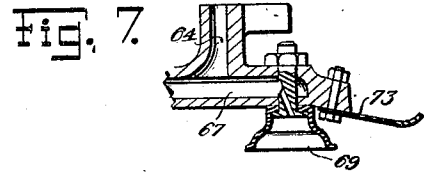
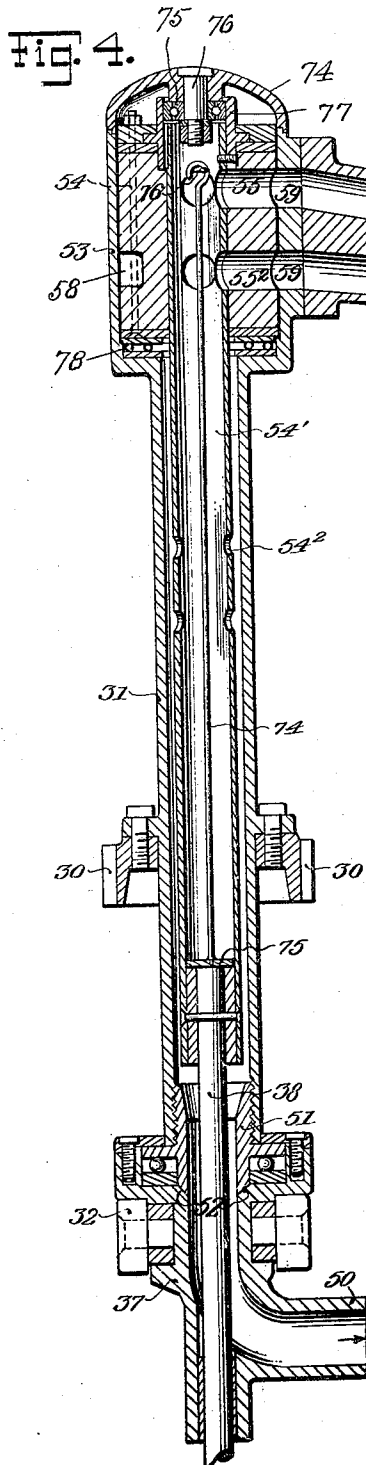
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Charles Burnham
Davis & Davis

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Attorneys

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C. BURNHAM

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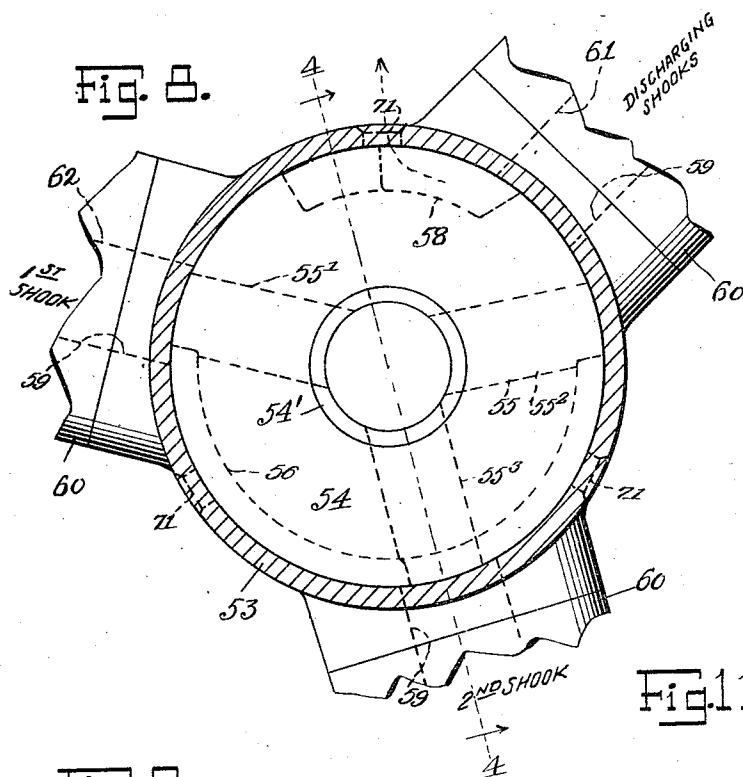


Fig. 9.

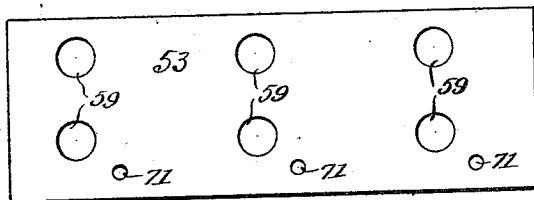
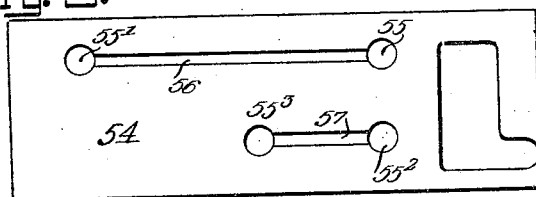


Fig. 10.

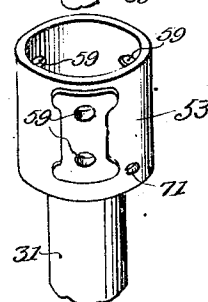
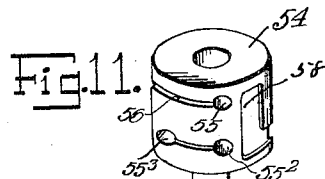


Fig. 12.

Inventor

Charles Burnham
Davis & Davis

By

Attorneys

Patented Sept. 28, 1926.

1,601,236

UNITED STATES PATENT OFFICE.

CHARLES BURNHAM, OF WASHINGTON, DISTRICT OF COLUMBIA.

BOX-MAKING MACHINE.

Application filed September 2, 1925. Serial No. 54,102.

This invention has relation to that type of box machine disclosed in my former Patent No. 1,154,968, dated September 28, 1915, and my present improvements relate to the feeding or picker mechanism for placing the shocks, in crossed relation, in the rotary shock-carrier or turret for delivery to the box-forming mechanism, the latest form of this box-forming mechanism being shown in my copending application Serial No. 46,872, filed July 29, 1925.

In the drawings—

Fig. 1 is a plan view of the mechanism;

Fig. 2 is a vertical sectional view thereof;

Fig. 3 is a vertical sectional view taken through the turret shock-carrier;

Fig. 3^a is a detail horizontal section on the line 3^a—3^a of Fig. 2;

Fig. 4 is a vertical sectional view through the picker-shaft;

Figs. 5, 6 and 7 are detail views of one of the suction pickers;

Fig. 8 is a horizontal section taken through the top end of the valve-chamber of the picker-shaft;

Fig. 9 is a diagram showing the port arrangement in the valve;

Fig. 10 is a similar view showing the port arrangement in the valve-chamber;

Fig. 11 is a detail perspective view of the valve;

Fig. 12 is a detail perspective view of the valve-chamber.

Referring to the drawings annexed by reference characters, 20 designates a driving shaft geared, by bevel pinions 21 and 22 to a vertical shaft 23. This vertical shaft 23 intermittently drives a turret-shaft 24 by means of a Geneva movement consisting of a star member 25 affixed to said shaft 24 and a roller-carrying member 26 carried by the shaft 23.

Affixed to the upper end of the shaft 24 is the shock-carrier, and affixed to said shaft at a point below its upper end is a pinion 28 which meshes with and drives an intermediate gear 29, this gear 29 being in turn meshed with a gear 30 affixed to a vertical hollow picker-shaft 31, the intermediate gear 29 being sufficiently wide to permit the gear 30 to be moved up and down a predetermined distance without becoming demeshed.

The picker-shaft 31 is intermittently reciprocated vertically by means of a bell-crank 32 whose upwardly-extending arm is connected by means of the link 33 to an arm

34 which is rocked on its pivot 35 by means of a cam 36 affixed to the aforesaid shaft 23. The horizontal arm of the bell-crank 32 is pivotally connected to a non-rotating tubular member 37 on which the picker-shaft 31 is stepped. With this arrangement, it will be seen that the picker-shaft 31 is vertically reciprocated at predetermined intervals and that the turret-carrier 27 as well as the picker-shaft 31 are intermittently rotated. In addition to these movements, mechanism is provided for vertically reciprocating a valve-rod 38 which extends up through the tubular member 37 and into the lower end of the hollow picker-shaft 31, this mechanism being as follows: A cam 39 is affixed to the drive-shaft 20 and is provided with a groove for actuating a bell-crank 40, the upwardly-projecting arm of this bell-crank being connected by means of a link 41 to a radial arm 42 affixed to a sleeve 43 down through which the valve-rod 38 extends. The valve-rod is free to slide up and down through said sleeve 43, but cannot turn independently thereof, so that the valve-rod will be intermittently rotated by means of the link 41 and its connected devices at predetermined times during the operation of the picker. A sleeve 43 is journaled in a bearing 44.

As formerly, the turret-carrier embodies four open frames 45, each adapted to receive a pair of crossed shocks 46, the picker mechanism being so constructed as to deposit the shocks into these frames in succession as the carrier steps around, so that as each shock-carrying frame comes into position for the operation of the basket-forming mechanism (not shown), it will present thereto a pair of superposed crossed shocks held in position in the frame at their ends.

The pickers, hereinafter described, deposit the shocks into the open frames and jam or push them downwardly until they engage the holding devices in the frame. The holding devices in the present instance consist of upstanding plates 47 provided on their inner faces with a series of closely-spaced saw-tooth grooves 48, said inner faces inclining upwardly and outwardly, so that the distance between the lowermost opposite grooves or serrations in each pair of these plates will be slightly nearer together than the upper grooves or serrations, to thereby adapt these serrated holders to shocks slightly varying in length. The pickers shove the shocks down between the holders

47 and the end edges of the shooks snap into the saw-tooth serrations 48 and are thus held in position, extending across the center of the central opening in the frame. To avoid
 5 any possibility of the shooks being pushed down through the central opening in the frame, I provide inwardly-extending edges or lugs 49, 49' at the base of each of the holders 47. The lugs 49 for the first shook
 10 (it being remembered that these shooks are deposited in the carrier in succession) have their arresting faces in a slightly lower plane than the other pair of arresting lugs 49', the object of this being to prevent the
 15 second shook from being forced down into the frame far enough to disturb the previously-placed shook.

Suction is maintained down through the picker-shaft 31 by means of any suitable
 20 suction apparatus connected to the laterally-extending nipple 50 connected to the lower end of the aforesaid tubular member 37. A substantially air-tight connection is maintained between this stationary member 37
 25 and the lower end of the hollow shaft 31 by means of a tubular sleeve 51 screwed into the lower end of the shaft 31 and having its lower edge bevelled to fit against a bevel-seat 52 formed on the upper end of the
 30 member 37, suitable means being provided for holding this bevelled edge of the sleeve in contact with the stationary seat 52 during the rotation of the hollow shaft 31.

The upper end of the tubular shaft 31 is
 35 provided with an enlarged cylindrical section 53 which forms a valve-chamber for housing a cylindrical valve 54 which is attached rigidly to the upper end of the tube 54' which is rigidly attached at its lower end
 40 to the upper end of the valve-rod 38, forming virtually an extension of this valve-rod, so that rotation of the lower member 38 of the valve-rod will rotatively actuate the valve 54. The valve is provided with a
 45 vertical central passage, and radiating from this central passage to the outer cylindrical surface of the valve are ports 55, 55', 55² and 55³, the upper ones of which are connected together by an external channel-port 56,
 50 while the two lower ports 55 and 55³ are connected together by a channel-port 57. The face of the valve 54 is provided also with a superficial relief-port 58.

The valve-casing 53 is provided at three
 55 equidistant points around its circumference with pairs of ports 59 which are adapted to be put in communication with the ports in the valve at predetermined intervals. Affixed to the valve-cylinder 53 are three
 60 picker-arms 60, each of which is provided with a pair of longitudinal air-channels 61, 62 communicating respectively with the above-described ports 59. The lower channel 62 is connected at its outer end with a
 65 port 63, and the other channel 61 is con-

ected at its outer end to a port 64. The port 63 communicates with the main, longitudinal port 65 of a horizontal tube 66, and the other port 64 communicates with a horizontal air-passage 67 formed in a tube
 70 68 which extends transversely under the aforesaid tube 65, the tubes 68 and 65 lying at right angles to each other. Connected to each end of each of the tubes 65 and 68
 75 is a pair of suction-cups 69, adapted to pick up and hold the shooks when the cups have been pressed down on the upper faces thereof and suction is maintained through the
 80 ports connected with the suction-cups. The four suction-cups connected with the lower tube 68 are arranged in a plane above the four suction-cups connected with the other
 85 tube 65. These upper suction-cups are so positioned as to pick up the first shook, and while said first shook is being held by suction, the other set of suction-cups picks up
 90 the second shook; and both the shooks, in crossed relation, are delivered simultaneously into the carrier. It is essential, therefore, that the valve and port arrangement
 95 shall be such as to subject the upper set of suction-cups to suction when they are pressed down upon the top shook in the stack and hold such suction during the time
 100 the picker is moving to the next stack to pick up the second shook in the same manner through the medium of the other set of suction-cups, suction being of course maintained until both shooks are deposited, by a
 105 downward thrust, into one of the frames of the carrier.

Upon each descent of the tubular picker-shaft 31, the following operations take place: The instant the crossed shooks are
 110 delivered into the carrier and the suction-cups in the other two pickers come in contact with their respective shooks, the valve 54 is rotated backwardly a short distance. This movement of the valve does three
 115 things: first, the relief-port 58 puts the two ports 59 of the depositing picker into communication with the atmosphere through one of the cylinder ports 71, thus relieving
 120 the suction on the suction-cups of that particular picker; secondly, the next picker, i. e., the one that is picking up the second
 125 shook, will have suction applied to its lower channel 62 by being brought into communication with the port 55³, thus picking up the second shook. thirdly, the remaining
 130 picker will have suction applied to its top channel 61 through port 55', to insure the picking up of the first shook. Then, while the valve-casing 53 is given another step in
 135 its rotation to shift the picker-arms and is also being elevated, the valve 54 is rotated forwardly to its rest position, where it lies until it is again oscillated backwardly after the pickers have again descended.

It will be understood that the two shook- 130

stacks 72 are arranged as formerly in position to cooperate with the pickers and that each is provided with means for intermittently feeding the shooks upwardly so as to always keep the top shook in position to be grasped by the suction-cups. For convenience in manipulation, the cups of the upper set are placed closer together than those of the lower set; to compensate for this and thus provide for a certain and firm thrust of the first shook into the carrier, I provide this upper set of cups with a pair of oppositely-extending plates 73 which respectively project out from the end of the tube 68 and have their outer edges curved upwardly, these plates being slightly resilient. The under faces of the outer curved portions of these plates are positioned so that when these upper cups are jammed down into the carrier, these plates are pressed against the upper faces of the shook at points between the suction-cups and the ends of the shook, thus giving the shook a broad bearing on the picker to insure proper presentation of the shook to the carrier.

Air communication between the hollow shaft 31 and the hollow part 54' of the valve-rod is maintained through the medium of holes 54² in said hollow portions of the valve-rod. For convenience in cleaning out the dust that accumulates in tubular part 54', I provide a wire rod 74 carrying at its lower end a disk-scraper 75, fitting within the part 54'; by pulling up the rod 74 (by means of its hook 76), it will be seen that the tube 54' may be cleared of its accumulated dust. The top part or cover 74 of the valve-casing 53 is made removable for this purpose. The tube 54' forms a dust-trap in which dust drawn off the shooks collects, thus protecting the pump.

The rotary valve 54 is centered within the valve-casing 53 by a ball-bearing 75 at its upper end, one of the raceways of this ball-bearing being carried on a bolt or pin 76 and the outer raceway being carried by a short tube 77 set in the top end of the valve. The cover 74 is flanged into the top end of the valve-casing 53. This ball-bearing arrangement serves to center the valve 54 in the casing and relieve it of friction against the circular wall of the valve-casing, thus eliminating wear, this centering of the valve being of special importance in view of the fact that the radial air pull is always inward. Another ball-bearing 78 is arranged at the bottom of the valve 54, the balls of this bearing resting on a rest-plate which rests upon the bottom of the valve-casing.

What I claim as new is:

1. In a box-shook handling apparatus embodying a pair of shook-stacks, an adjacent shook-carrier, and means for picking up the

shooks successively from the stacks and crossing them and depositing them in the carrier, embodying an intermittently-rotated picker-shaft carrying suction-pickers, a single valve controlling the air both in suction and in relief, and means for actuating said valve.

2. In a box-shook handling mechanism, a plurality of stacks for the shook-blanks, a carrier to receive the crossed shooks, and means for picking up the shooks in succession from the stacks and depositing them in the carrier embodying an intermittently-rotated hollow shaft, means for raising and lowering said shaft at predetermined intervals, a plurality of picker-arms carried by said shaft, a rotary valve enclosed within said shaft and adapted to rise and fall therewith, said valve being provided with exhaust ports and relief ports, and means for rotating said valve at predetermined intervals.

3. In a shook handling apparatus, a hollow picker-shaft and means for raising and lowering it at predetermined intervals, means for intermittently rotating said shaft, a plurality of suction-pickers carried by said shaft and having two exhaust ports, a single rotary valve for controlling said exhaust ports, this valve being provided with a relief port for each picker, and means for oscillating the valve at the time of depositing the shooks.

4. In a box-shook handling apparatus, a hollow picker-shaft, means for rotating the picker-shaft, means for intermittently raising and lowering the picker-shaft, a plurality of suction-pickers carried by said shaft, and a single rotary valve for controlling the exhaust and relief of said pickers, this valve being mounted on the picker-shaft so as to rise and fall therewith, means being provided for oscillating the valve at predetermined intervals.

5. In a shook handling apparatus, a rotary picker-shaft having an enlarged cylindrical valve-casing at its upper end provided with three sets of exhaust-ports and three relief-ports, a plurality of suction-pickers having their ports connected to said exhaust-ports, and a rotary hollow valve enclosed in said cylindrical valve-casing provided with exhaust-ports adapted to communicate with the ports of the suction-pickers as the picker-shaft is rotated, said valve being provided with a relief-port, and means whereby the valve is rotated at the time of discharge of the shooks from each picker to thereby relieve the suction therein.

6. A suction picker of the type set forth embodying two sets of suction cups, each set containing four cups and one set being arranged at right angles to the other, one set having its cups set closer together than the cups in the other set and in a higher plane, this latter set being provided with a pair of

oppositely-extending resilient plates adapted to bear against the upper face of the shook when this set of cups is brought into action.

7. In a box-making machine of the type set forth, a carrier adapted to receive crossed shook blanks, said carrier being provided at four opposite sides with a device for engaging the edges of the shook blanks, said device consisting of an upstanding member having an inclined face provided with a series of flange-forming notches.

8. In a box-making machine, a carrier adapted to receive crossed shook blanks, said carrier being provided at four opposite sides with a device for engaging the edges of the shook blanks to hold them in the carrier, and an arresting lug below each one of said holding devices, one pair of said lugs having its arresting faces in a higher plane than the other pair.

9. In an apparatus of the class set forth, a tubular picker-shaft carrying suction-pickers, and a rotary valve in said shaft having a hollow stem or shaft through which the air is drawn from the pickers, this hollow stem or shaft being closed at its bottom and

having an air-inlet at a point above its bottom to thereby form a dust-trap.

10. In a machine of the class set forth, a rotary hollow picker-shaft carrying hollow picker-arms, a rotary valve within the picker-shaft having ports adapted to communicate with the hollow arms as the shaft rotates, and means for centering the valve in the picker-shaft and relieving the valve of friction against the inner face of the hollow shaft.

11. In combination with a hollow picker-shaft having a cylindrical valve-casing and radial ports, hollow picker-arms attached to said valve-casing, a removable cover for the upper end of said valve-casing, an oscillating valve within the valve-casing having radial ports adapted to communicate with the hollow picker-arms, and a ball-bearing interposed between the cover and the top end of the valve for centering the valve and thus relieving it of friction against the valve-casing.

In testimony whereof I hereunto affix my signature.

CHARLES BURNHAM.