May 30, 1944. C. H. SHAFFER 2,350,253

CORE MAKING MACHINE

Filed July 21, 1941 7 Sheets-Sheet 1

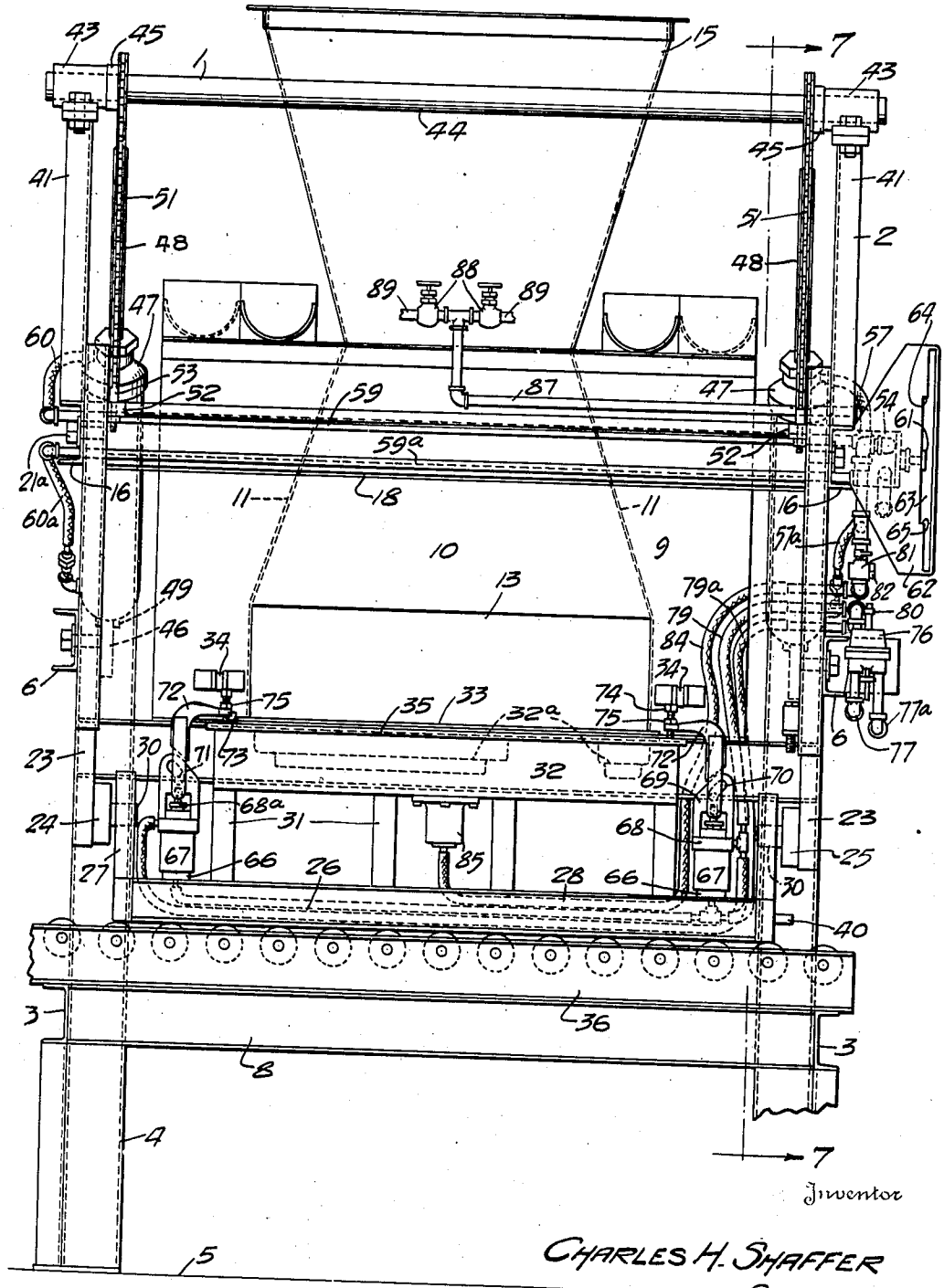


Fig. 1.

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CORE MAKING MACHINE

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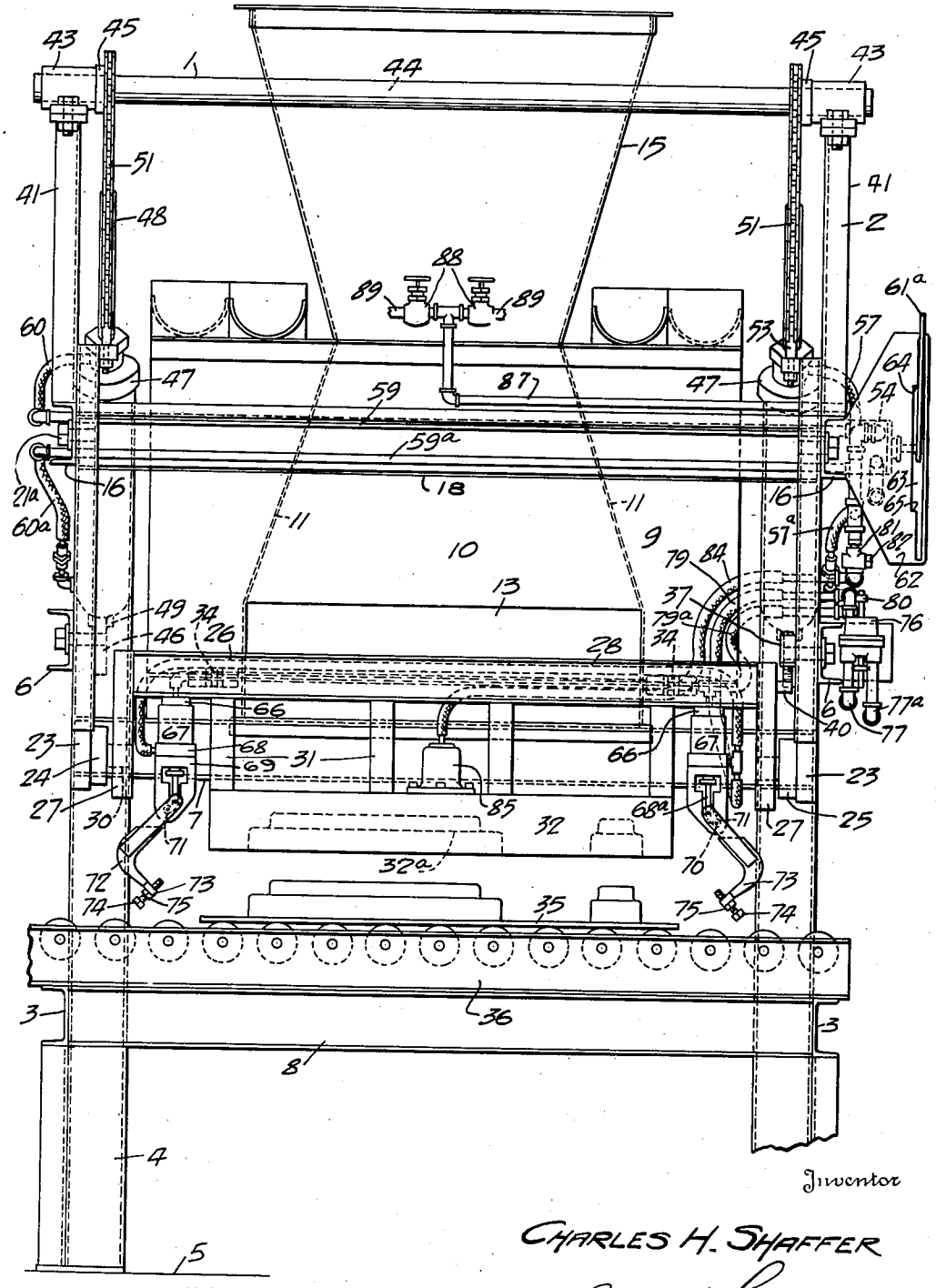


Fig. 2

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CORE MAKING MACHINE

Filed July 21, 1941 7 Sheets-Sheet 3

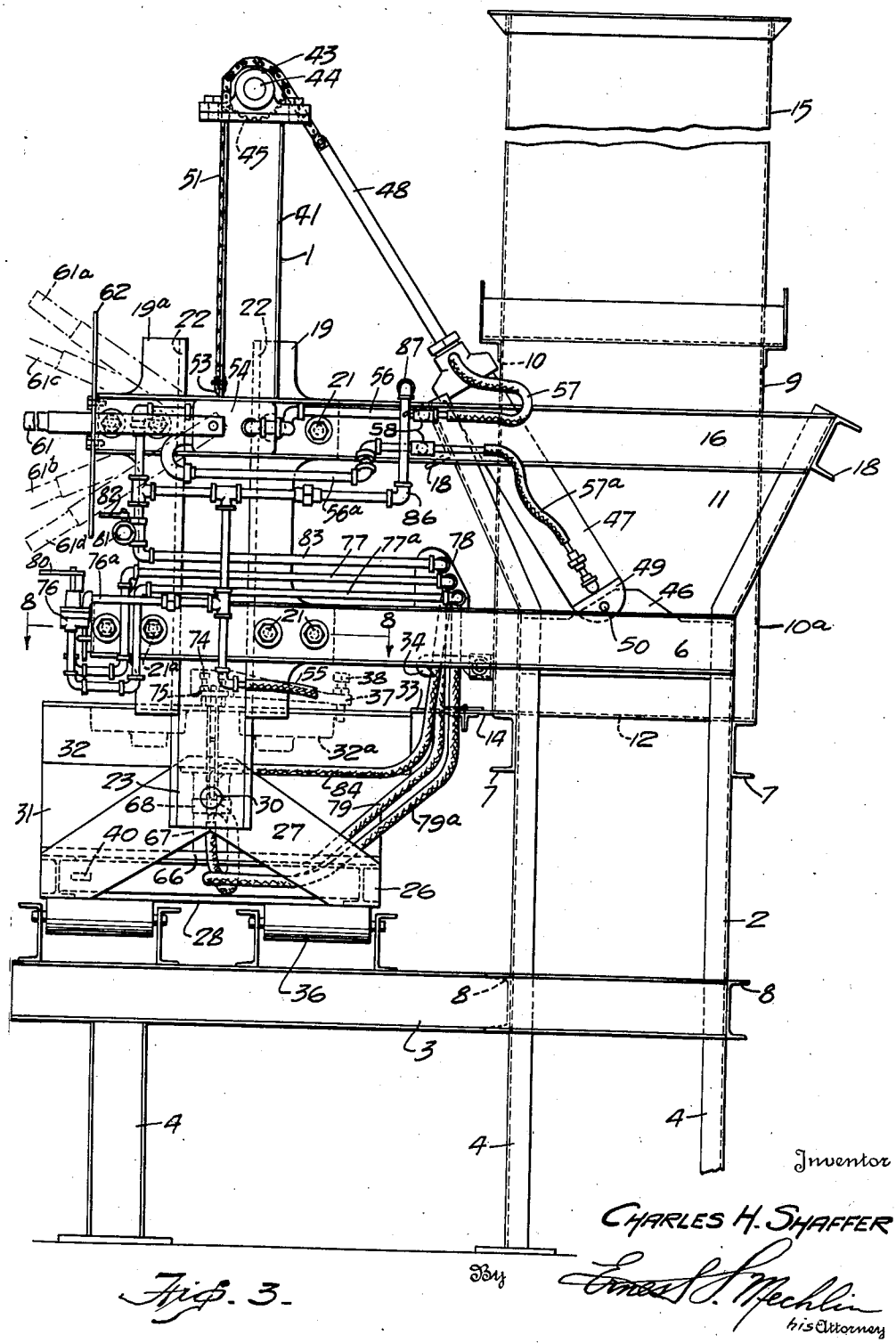


Fig. 3.

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CORE MAKING MACHINE

Filed July 21, 1941 7 Sheets-Sheet 4

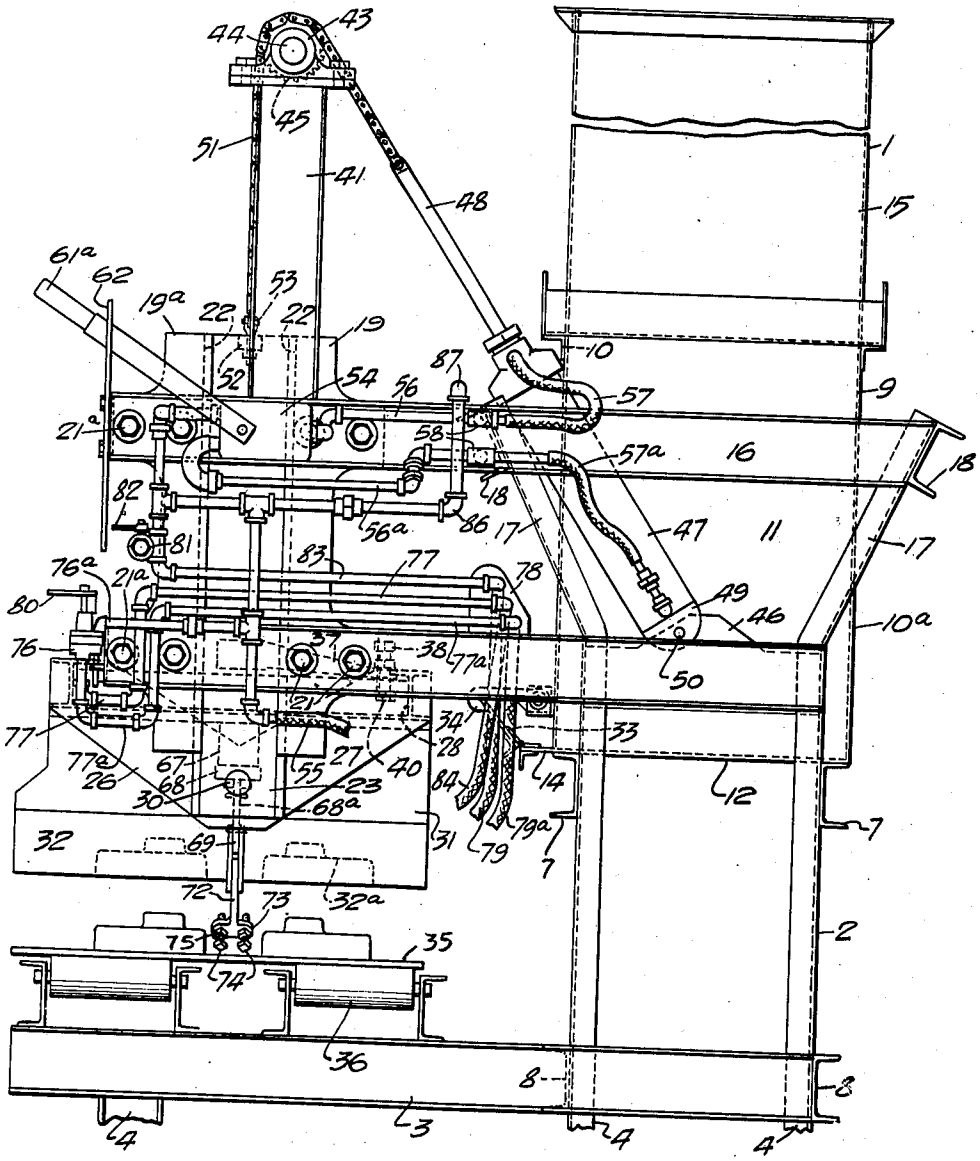


Fig. 4.

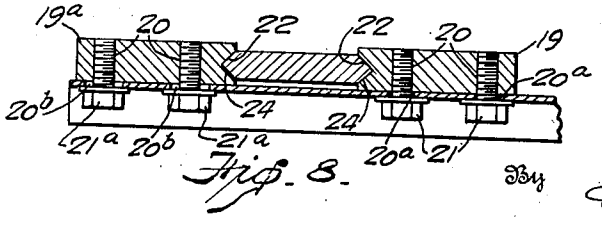


Fig. 8.

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CORE MAKING MACHINE

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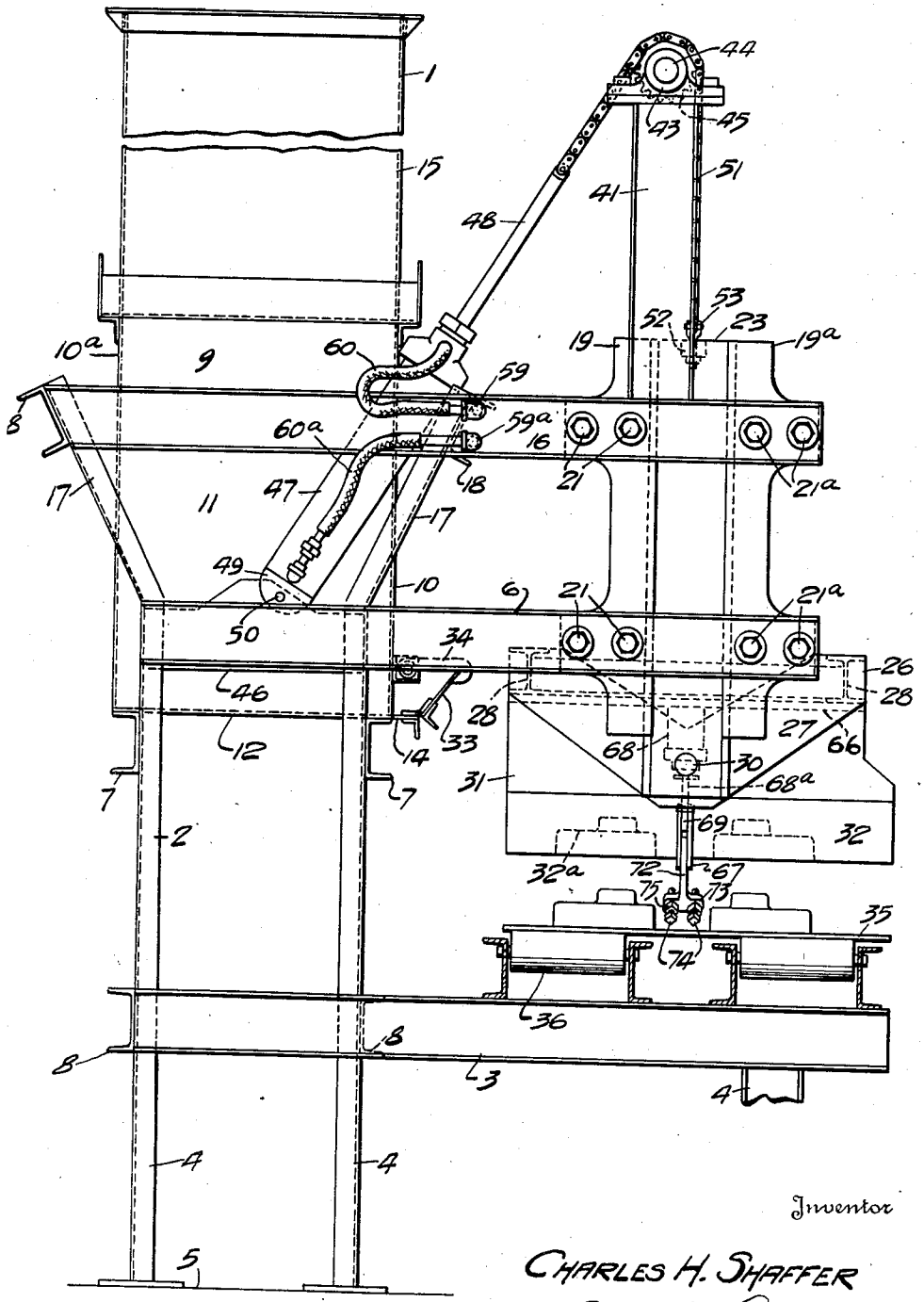


Fig. 5.

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CORE MAKING MACHINE

Filed July 21, 1941 7 Sheets-Sheet 6

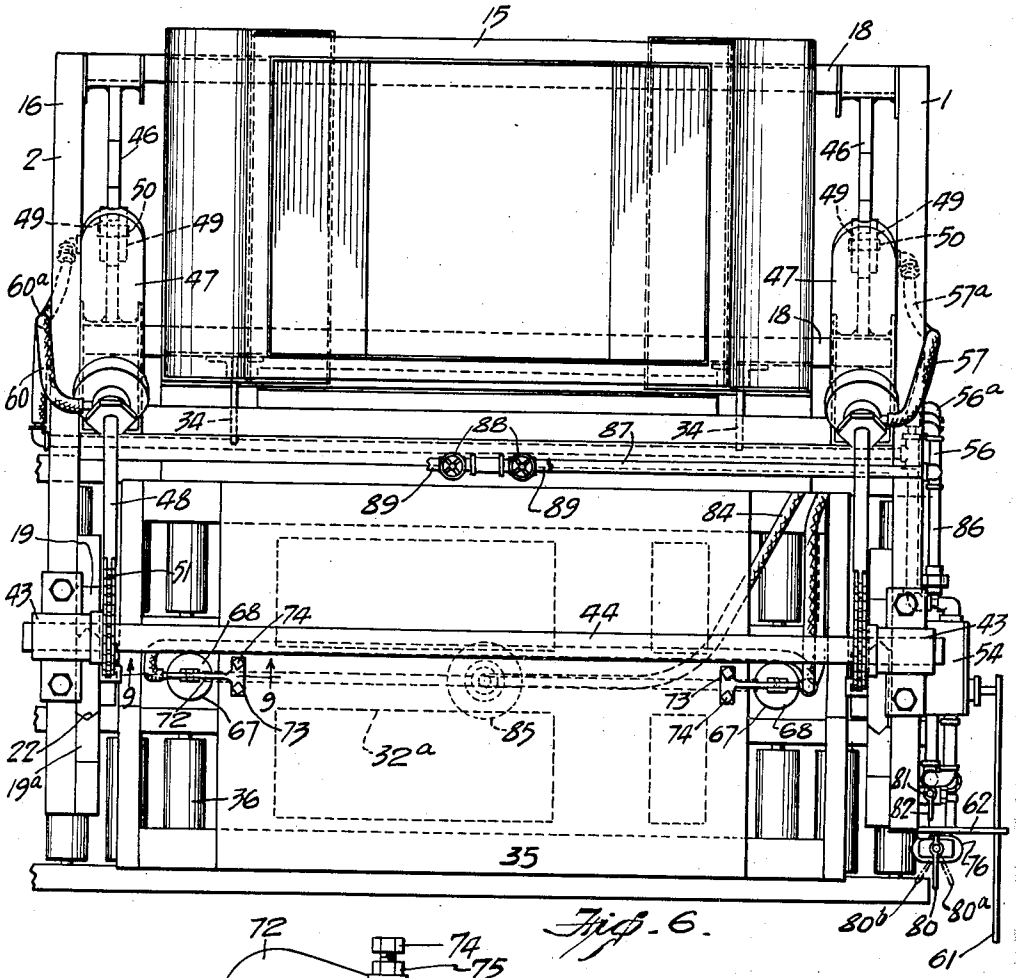


Fig. 6.

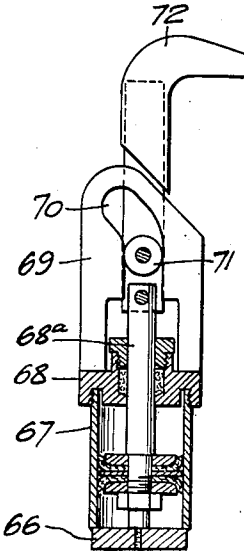


Fig. 9.

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CORE MAKING MACHINE

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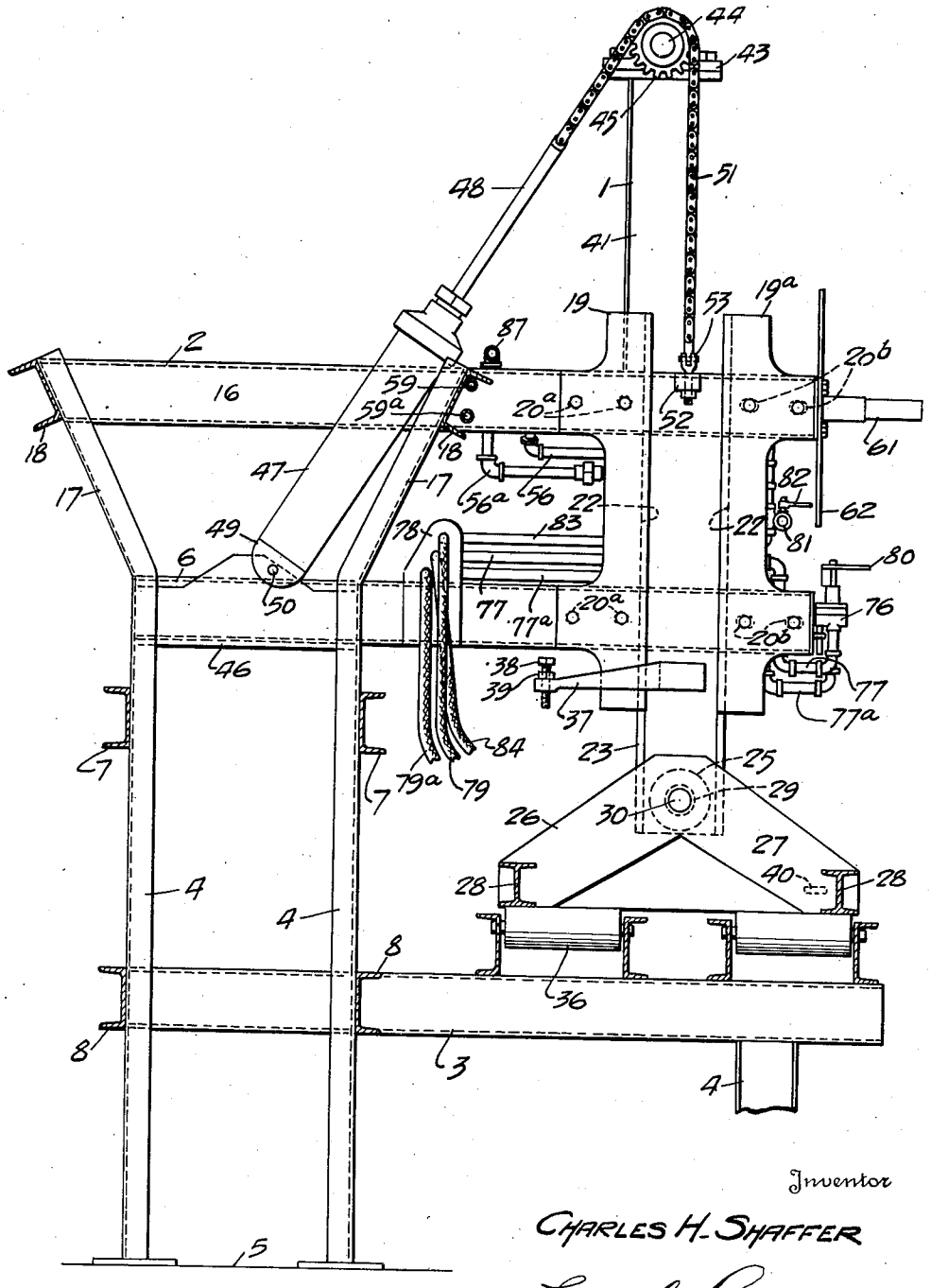


Fig. 7.

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Patented May 30, 1944 2,350,253

UNITED STATES PATENT OFFICE

2,350,253

COREMAKING MACHINE

Charles H. Shaffer, Lancaster, N. Y.

Application July 21, 1941, Serial No. 403,418

9 Claims. (Cl. 22—10)

This invention pertains to a core making machine employed in foundry practice for the formation of sand cores incident to the manufacture of castings.

An object of the invention is the provision, in a core making machine of the roll-over type, of a selectively operated means for raising and lowering a core box.

Another object of the invention is the provision, in a core making machine, of a core plate retained in assembled relation with a core box by means of a selectively operated mechanism.

A further object of the invention is the provision, in a core making machine, of a transversely or laterally disposed conveyer which is adapted to function as an auxiliary support for an assemblage including a cradle and core box in the one instance and at another time function as a medium through which a core plate carrying completed cores is shifted or moved away from the machine so as to facilitate a renewal of the operation of making additional cores.

An added feature of the invention is the provision, in a core making machine, of adjustable stop means for maintaining a parallel relationship between a core plate and a conveyer therefor.

A still further object of the invention is the provision, in a core making machine, of a fluid pressure responsive actuating means adapted to raise and lower a core box through the medium of vertically movable means with the actuating means flexibly and adjustably connected to the vertically movable means.

The above as well as numerous other objects of the invention will become apparent from the accompanying drawings which, in several views, disclose an exemplified form of the invention and wherein:

Figure 1 is a front elevational view of a core making machine embodying a form of the invention and illustrating the relative position of parts preparatory to introducing sand in a core box.

Figure 2 is a front elevational view of a core making machine similar to that illustrated in Figure 1 except that the relationship of parts thereof is shown after the cores have been made.

Figure 3 is a side elevational view of the machine illustrated in Figure 1.

Figure 4 is a side elevational view of the machine shown in Figure 2.

Figure 5 is a side elevational view of the machine shown in Figure 2 illustrating the opposite side of the machine shown in Figure 4.

Figure 6 is a plan view of the machine shown in Figure 1.

Figure 7 is a vertical cross sectional view taken along the lines 7—7 of Figure 1, looking in the direction of the arrows.

Figure 8 is a horizontal sectional view taken along the lines 8—8 of Figure 3, looking in the direction of the arrows.

Figure 9 is a vertical sectional view taken along the lines 9—9 of Figure 6, looking in the direction of the arrows.

Referring now in detail to the drawings wherein like reference characters indicate like parts, the numeral 1 designates generally a core making machine having a skeletonized frame or superstructure 2 formed by transversely spaced, horizontal, longitudinally extending lower beams 3 secured to transversely and longitudinally spaced vertically extending upright posts or standards 4 which bear upon a foundation or floor 5. Positioned a predetermined distance above the lower beams are transversely spaced intermediate beams 6 of channel form in cross section which are desirably parallel to the lower beams and secured to the posts by any preferred method, such as by welding (not shown). The posts or standards are reinforced against a spreading action thereof which may be caused by a superimposed load by upper and lower spaced parallel cross bearers 7 and 8, respectively, connecting aligned pairs of posts.

Bearing upon or carried by the top cross bearer is a hopper or container 9 formed by front and rear walls 10 and 10a joined by side defining walls 11 and a base plate 12 to present a receptacle for a supply of sand used in the manufacture of cores. The front wall 10 has an elongated aperture 13 adjacent its juncture with the base plate so that an operator may scoop the sand from the lower extremity of the hopper. The base plate is extended a slight distance beyond the vertical plane or limits of the front wall longitudinally of the machine toward one extremity thereof, as at 14, so as to form a ledge for the support or accommodation of the sand within the container. Mounted upon the hopper and adequately secured thereto is a chute 15 communicating with the hopper to form a means for carrying the sand from a delivery conveyer (not shown) or any other instrumentality employed. Extending parallel and co-extensive with the intermediate beams are transversely spaced upper or top beams 16 which are sup-

ported intermediate their ends by diagonal braces 17 forming substantial continuations of some of the posts 4 and which may be welded or otherwise secured to the top and intermediate beams 16 and 6, respectively. Transverse or cross ties 18 extend between the top beams and are secured to the diagonal braces to rigidify the upper limits of the skeletonized frame and maintain the top beams in a predetermined spaced relation.

Adjacent the extremities of the top and intermediate beams, removed from the hopper and chute, are arranged pairs of laterally spaced inner and outer guide plates or track bars 19 and 19a having suitably disposed tapped apertures 20. The apertures in the guide plates 19 are in alignment with holes 20a formed in the top and intermediate beams for the accommodation of bolts 21 which bind the inner track bars to the frame. The tapped apertures in the guide plates 19a are in substantial alignment with elongated horizontally disposed slots 20b in the upper and intermediate beams for the reception of bolts 21a binding the outer track bars to their related beams. As will be noted by referring to Figures 4 and 7 of the drawings, the bolts 21a may be loosened to facilitate adjusting the outer guide plates and thereby compensate for wear which will be created therein as a result of continued use. Also, by reason of the elongated slots, guide plates of a pair may be arranged in parallel relation. Related guide plates are provided with depressions, grooves, or V-shaped guideways 22 facing one another and extending vertically of the machine. Mated with each pair or set of guide plates 19 and 19a is a guide, elevator or carriage 23 having V-shaped sides 24 fitted into or nesting with the guideways of the plates to form an interlock between the elevators and the track bars as well as direct the carrier along a given vertical path. The carriers, spaced transversely of the machine, have adjacent their lower extremities, bearings 25 located on the vertical axis of the carriers.

Extending between the elevators is a cradle 26 comprising separated end hangers 27 which are inverted V-shaped in elevation when viewed from the side and are joined adjacent their lower extremities by laterally extending horizontal I-shaped sills 28 secured to the hangers by means of welds (not shown) or any other desired method. The hangers have apertures 29 adjacent their extremities which may be termed upper or removed from the sills for the accommodation of pivot pins or trunnions 30 outstanding from the hangers and journaled in the bearings so as to facilitate a rotative movement of the cradle thereabout. The cradle directly supports risers 31 secured thereto by any preferred method which, in turn, function as supports for a core box 32. The risers may be made of various heights since it is their office to place the upper surface of the core box in substantially the same horizontal plane as the hopper base plate, and accordingly the depth of the core box employed is determinative of the height of the risers. Pivotally attached to the free or core box adjacent extremity of the base plate is an apron 33 adapted to bridge or span the distance between the hopper base plate and the core box and thereby permit sand to be scooped by an operator from the hopper opening 13 to the core box. When the core box has been properly filled and tapped or rammed with sand the apron 33 is pivoted upwardly to provide an operator with a clear working space about the core box to continue or complete the operation of core making. Latches or any means characterized by the illustrated hooks 34 are pivotally secured to the hopper front wall 10 and are arranged to engage the free extremity of the apron to retain the latter in elevated position or out of supported contact with the core box when it is not the desire of the operator to obtain sand from the hopper.

The core box is provided with a detachable or removable cover or core plate 35 which is placed thereon after the sand has been packed or rammed into the core box cavities 32a preparatory to rolling the assembly over. Forming a direct auxiliary support for the cradle in one instance while the cores are being made or, at another time, a support for the core plate after the completion of the core making operation is a roller means or conveyer 36 bearing upon the lower beams 3 and extending transversely or laterally of the machine so that when the core box has been elevated from the core plate and completed cores the latter two may be shifted transversely of the machine out of the way of the operator to facilitate a repetition of the operation of forming additional cores.

In rolling the assemblage over preparatory to disengaging the core plate from the core box care should be exercised so that the core plate will be in a horizontal plane parallel to the plane presented by the tops of the rollers of the conveyer so that when the core plate holding means is released it will be completely supported by the conveyer as otherwise a sudden drop of any portion of the core plate will result in damage to the cores formed in the box. To eliminate any element of chance in not having the core plate, before being released from the core box, come to a full bearing relationship with the conveyer, there has been secured, preferably to one side of the carriages, an arm or bracket 37 which extends rearwardly in the direction of the hopper. Associated with and projecting through the bracket adjacent the free extremity thereof is a rotatable means or bolt 38 held in a predetermined position by means of a lock nut 39. Outstanding from the outer lower extremity of the yoke adjacent the arm 37 is a stop, lug or limiting means 40 arranged so that upon a roll-over action of the assemblage the stop 40 will engage the bolt 38 and thereby assure a parallel relationship between the core plate and supporting surfaces of the conveyer. As will be noted, the bolt 38 may be manipulated or adjusted vertically to ensure the proper relationship between the core plate and conveyer.

Means has been associated with the elevators or carriers to raise the cradle and core box assemblage from its lowermost position or as that illustrated in Figure 1, and for this purpose there has been provided a plurality of stanchions 41, preferably two in number and each upstanding from the respective top beams in the proximity of the guide plates. The stanchions have, associated with their upper extremities, a plurality of bearings 43 which are connected to or house extremities of a transversely and horizontally disposed idler shaft or axle 44. The axle has keyed or otherwise secured thereto, intermediate its ends and in proximity to the bearings, a plurality of, preferably two, sprockets 45 each of which is in substantial vertical alignment with a subjacent associated carrier. Joining the

standards or posts on each side of the machine and superimposed upon each intermediate beam is a bracket 46 of plate-like form which is secured to the related structure by any means desired, such as welding (not shown). Movably associated with each bracket is an actuating means or a hoist cylinder 47 having a reciprocating plunger 48 projecting from one or an upper extremity thereof and provided with laterally spaced ears 49 at or adjacent its other or lower extremity which are secured to the bracket through bolts or pins 50, thereby pivotally attaching the hoist cylinders to the frame so that the plungers may, at all times, move along or through an unrestricted path longitudinally of the cylinder. Attached to the outer or free extremity of each plunger is a flexible means or roller chain 51 which is threaded or trailed over and intermeshed with an aligned sprocket to depend therefrom and be secured to an associated carrier. Each carrier has, adjacent its upper extremity, a shoulder or lip 52 outstanding from the carrier inwardly of the machine and provided with a vertically disposed aperture which accommodates an adjustable means characterized by the illustrated yoke 53. The yoke is the medium through which each roller chain is secured to a related carrier, and by reason of this connection adjustments may be made to the yoke to change or alter the effective length thereof so that the cradle may support the core box in a true horizontal disposition as well as cause both carriers to move in a selected direction simultaneously.

Fluid pressure means has been associated with the cylinders so as to actuate the plungers thereof in effecting a raising or lowering action of the cradle and core box assemblage, and as exemplary of such a means a top or upper beam, preferably the one to the right facing the machine as in Figure 1, has affixed thereto, adjacent its extremity removed from the hopper, a hoist cylinder operating valve 54 having a fluid pressure supply line 55 communicating therewith. The fluid pressure line is associated with a source of supply (not shown) which may contain any medium for the transmission of force, such as water, air or any like substance. Extending in the same general direction as the top beam away from the cylinder valve are a plurality of, preferably two, cylinder conduits 56 and 56a, vertically disposed relative to one another, the former of which is connected to the upper extremity of the cylinder on the same side of the machine as viewed in Figure 1 and through a flexible coupling 57, while the latter conduit 56a is connected to the lower extremity of the same cylinder through a flexible coupling 57a. Interposed in each cylinder conduit 56 and 56a is a T-coupling 58 which has, leading therefrom through both of the top beams, cylinder upper and lower branch pipes 59 and 59a leading from the cylinder conduits 56 and 56a, respectively. The upper and lower branch pipes terminate in flexible hoses 60 and 60a, respectively, to have the hose 60 connected to the upper extremity of the cylinder at the left-hand side of the machine and the hose 60a connected to the lower extremity of the same cylinder. The couplings 57 and 57a and the hoses 60 and 60a are made of a flexible material so as to compensate for any service movements of the cylinders and prevent a leak in or escape of fluid pressure from the lines joining the cylinder valve and the cylinders. The cylinder valve has an operating handle 61 so as to project toward the front of the machine and be within easy grasp of an operator. The valve is so arranged that if the handle 61 is moved from the illustrated horizontal or normal position downwardly in a counterclockwise direction, as indicated diagrammatically at 61d, fluid pressure is permitted to pass through the couplings 57a and the hoses 60a to the cylinders beneath the plungers and cause the plungers to move outwardly of the cylinders. This action of the plungers will result in a lowering action of the cradle and core box. A movement of the operator's handle in a clockwise direction to a position as indicated diagrammatically at 61a will result in fluid pressure entering the upper limits of the cylinder to force the plungers inwardly of the cylinders and cause the cradle and core box to be raised away from the conveyer.

A guide plate 62 is secured to the top beam carrying the cylinder valve, and this plate is provided with an elongated aperture 63 through which the operating handle extends. Adjacent one side of the aperture in defining relation therewith are vertically spaced shoulders 64 and 65 positioned intermediate the vertical limits of the aperture so that when the operating handle is moved from horizontal or normal position, as illustrated by full lines particularly in Figure 3, in either direction to engage one of the shoulders, only a limited or restricted amount of fluid pressure is permitted to pass through the valve and enter the cylinders, and therefore the plungers will move slowly in response and in a direction corresponding to the flow of fluid. This arrangement is provided in the machine so that when the handle is raised or moved to a position indicated diagrammatically as at 61a fluid pressure is permitted to enter the upper limits of the cylinder to urge the plungers inwardly of the cylinders at a comparatively rapid speed. This plunger action will result in the cradle and core box assemblage being raised from the position illustrated in Figure 1 until the assemblage reaches its uppermost limit of travel. At this time the operator will roll the assemblage over so that the core plate will be facing downwardly. The operating handle is then moved downwardly to a position as indicated diagrammatically at 61b to engage the shoulder 65, resulting in the fluid pressure being cut off from the upper limits of the cylinder to be by-passed to the lower limits of the cylinder and cause the plungers to move outwardly of the cylinders at a reduced speed. This plunger action is permitted to continue until the core plate comes to rest on the transverse conveyer at which time the core plate is disengaged from the core box and the operating handle is moved to a position as indicated diagrammatically at 61c to engage the shoulder 64. This lever action will cause a reversal of the flow of fluid pressure to the cylinders, again moving the plungers inwardly of the cylinders and the assemblage upwardly away from the core plate. This latter movement will be at a reduced speed so as not to cause damage to the cores upon the withdrawing action of the core box. As soon as the cores have broken away from the core box, or shortly thereafter, the operating lever is again raised to the position indicated at 61a to move the assemblage at a greater rate of speed and decrease the time consumed for a single core making operation. Upon reaching the uppermost limits of its range of movement the assemblage is again rolled over to position the cradle lowermost in the assemblage, and the operating

handle is then moved to the bottom of the slot 63, as indicated diagrammatically at 61d. This lever action will cause a full or unrestricted flow of fluid pressure to the lower reaches of the cylinders and a maximum speed drop in the assemblage to again place the cradle in bearing relation with the conveyer to renew the operation of forming additional cores.

As heretofore indicated, the core plate is removably secured to the core box so as to hold it in assembled relation therewith during the roll-over operation and permit the core plate to be disengaged from the core box after the plate is placed in bearing relation with the conveyer. Consideration has been given to forming the core plate securing means so as to be selectively operated and thereby diminish the time consumed for a complete operation of forming a core or set of cores. Toward the accomplishment of this end the securing means of the present structure comprises a supporting bar 66 secured to the cradle sills to extend transversely of the cradle adjacent each extremity of the core box.

Each supporting bar has affixed thereto intermediate its ends a core plate clamp 67 including a barrel or cylinder 68 having, projecting outwardly and upwardly or vertically therefrom, a piston 68a. Mounted upon each barrel is a roller guide 69 having an angularly disposed raceway 70 for the accommodation of a contained anti-friction element or roller means 71 positioned immediately above the outer or upper extremity of the piston. Forming a part of each clamp is a fork 72 having the lower end thereof bifurcated to accommodate the outer extremity of the piston and being pivotally secured to the piston extremity so as to be capable of movement therewith. The anti-friction element of each clamp is pivotally secured to and adapted to be retained in the raceway by the associated fork. The fork of each clamp has, extending toward and in overlying relation with the related extremity of the core plate, a plurality of, preferably two, tines 73 provided with thread defining apertures for the accommodation of adjustable elements or screws 74 which are adapted to contact the core plate and retain the latter in assembled relation with the core box. Each screw 74 may be manipulated until a predetermined length thereof is exposed beneath its related tine, and a lock nut 75, rotatably associated with each screw and superimposed upon and in gripping relation with each tine, sets or locks the screws in this position.

For the purpose of actuating the core plate clamps there is provided a clamp valve 76 anchored through a pendant projecting downwardly from the valve to the frame of the machine in lower spaced relation to the hoist cylinder valve or on the right-hand side of the machine when considering the disclosure of Figure 1. The clamp valve is fed through a nipple 76a communicating with the supply pipe 55. Connected to suitable ports in the lower portion of the clamp valve is a pair of upper and lower ducts 77 and 77a, respectively, which continue along, in spaced relation, above the intermediate beam to project angularly short of the hopper through a support plate 78 secured to the intermediate beam. The upper duct 77 is in communication with a flexible tube 79 which is branched so as to be connected to the upper extremities of both clamp barrels and the lower duct 77a is connected to a flexible tube 79a also branched but communicating with the lower reaches of both clamp barrels. A control or handle 80 is associated with the clamp valve for a manipulation of the valve to permit fluid pressure to enter either the duct 77 or 77a.

From the above, therefore, it will be noted that when the control or handle 80 is positioned as illustrated in full lines in Figure 6 or neutral, both ducts are cut off from the supply pipe. If it is desired to hold the core plate in assembled relation with the core box the control is moved from normal position to that as indicated diagrammatically at 80a, at which time fluid pressure is permitted to enter the upper duct 77 and reach the upper limits of the two clamp barrels to urge the pistons 68 inwardly of the barrels. This piston movement, as will be noted by referring to Figure 1, will urge the forks in a corresponding direction placing the roller elements 71 at the lower limits of the raceway 70 and the adjustable elements 74 in contact with the core plate. After the assemblage has been rolled over and the core plate is placed in bearing relation with the conveyer, a movement of the control to a position as indicated diagrammatically at 80b will cause a bleeding action of the duct 77, permitting the fluid pressure therein to by-pass through the valve 76 to the ducts and enter the ducts 77a so as to reach the clamp barrels below the pistons and force the latter in an outward direction. Such a piston movement will result in the anti-friction elements 71 traveling along the angular portions of the raceways to the upper reaches thereof and thereby cause a compound movement of the forks or tines thereof carrying the adjustable elements out of contact with the core plate to permit a separating action of the core box and core plate.

Since there is a certain degree of adhesion between the core forming sand and the core box, vibratory means has been provided in the machine to break the core or cores away from the core box. Accordingly, leading from and communicating with the main supply line is an auxiliary valve 81 provided with a manipulating means or handle 82 and having, continuing therefrom, a pipe 83 which extends substantially parallel to the ducts 77 and 77a to extend angularly through the support plate and continue therefrom as a flexible connection 84. The flexible connection communicates with a vibratory means 85 which is anchored to either the sills of the cradle or, as preferred, to the core box on the side thereof adjacent the cradle. When the assemblage has been raised and rolled over preparatory to lowering the assemblage for the purpose of disengaging the core plate from the core box the manipulating means is actuated so as to permit the flow of fluid pressure through the auxiliary valve 81 to thereby ultimately enter the flexible connection and set the vibratory means in motion. While the assemblage is being lowered vibratory forces are set up in the core box tending to break the sand away from the core box so that after the core plate is disengaged from the core box the latter may be withdrawn, leaving the core or cores deposited on the core plate and diminishing the possibility of breaking or injuring the cores.

A feed pipe 86 in direct communication with the main supply line extends longitudinally of the machine over the top beam to a position short of the hopper where it turns upwardly across the top beam and inwardly toward the intermediate portion of the machine, as at 87. The feed pipe terminates in a stop valve 88 which has, leading therefrom, a flexible conduit or hose 89

connected to a hammer or ram (not shown). When sand is being packed into the cavities of the core box an operator employs the ram to ensure a tight compact mass of sand properly filling the cavities of the core box.

From the above it will be noted that various changes and alterations may be made to the illustrated and described construction without departing from within the spirit of the invention and the scope of the appended claims.

I claim:

1. In a core making machine, a frame, transversely spaced vertically extending guide means adjustably secured to said frame, sliding means associated with said guide means, a cradle pivotally connected to said sliding means, fluid actuated means associated with said frame and adjustably connected to each of said sliding means for moving the latter vertically, a core box including a cover plate secured to said cradle, and fluid actuated clamping means attached to said cradle and adapted to engage said cover plate.

2. In a core making machine, a frame, transversely spaced vertically extending guide means secured to said frame, a movable means associated with each of said guide means, a cradle extending between and pivotally secured to said movable means, fluid actuating means associated with said frame and flexibly connected to said movable means for moving the latter vertically, a sand hopper carried by said frame, a core box including a cover plate secured to said cradle and positioned in a plane below said hopper, an apron pivotally mounted on said hopper adapted to span the distance between said hopper and core box, and selectively controlled means attached to said cradle for clamping said cover plate to said core box.

3. In a core making machine, a frame, transversely spaced vertically extending guide means secured to said frame, a movable means associated with each of said guide means, a cradle extending between and pivotally secured to said movable means, fluid actuating means associated with said frame and flexibly connected to said movable means for moving the latter vertically, a sand hopper carried by said frame, a core box including a cover plate secured to said cradle and positioned in a plane below said hopper, an apron pivotally mounted on said hopper adapted to span the distance between said hopper and core box, selectively controlled means attached to said cradle for clamping said cover plate to said core box, and conveyer means extending transversely of said frame forming a support for said cradle or cover plate.

4. In a core making machine, a frame, transversely spaced grooved guide means adjustably secured to said frame, vertically movable means extending between and into said grooves, means pivotally secured to said frame for raising said vertically movable means, a cradle extending between and pivotally secured to said movable means, a core box including a cover plate carried by said cradle, cover plate clamping means secured to said cradle, and control means for actuating said clamping means into and out of contact with said cover plate.

5. In a core making machine, a frame, grooved guide means secured to said frame, vertically movable means slidable in the grooves of said guide means, a rotatable cradle pivotally secured to said movable means, cylinders pivotally secured to said frame, flexible means connecting said cylinders and movable means, a core box having a cover plate associated with said cradle, clamping means secured to said cradle and adapted to be selectively manipulated to engage said cover plate, and means for operating said cylinders to raise or lower said movable means.

6. In a core making machine, a frame, guide means secured to said frame, vertically movable means in slidable relation to said guide means, an idling axle positioned above said movable means and journaled to said frame, rotatable means pivotally secured to said movable means, a core box mounted on said rotatable means, fluid responsive actuating means pivotally anchored to said frame, and flexible means passing over said idling axle and connecting said actuating means and movable means.

7. In a core making machine, a frame, guide means secured to said frame, vertically movable means in slidable relation to said guide means, an idling axle positioned above said movable means and journaled to said frame, rotatable means pivotally secured to said movable means, a core box having a cover plate mounted on said rotatable means, fluid responsive actuating means anchored to said frame, and flexible means passing over said idling axle and connecting said actuating means and movable means, and a conveyer extending transversely of said frame forming a support for said rotatable means or cover plate.

8. In a core making machine, a frame, transversely spaced guide means secured to said frame, transversely spaced vertically movable means slidably engaging said guide means, selectively controlled fluid actuated means pivotally connected to said frame and connected to said vertically movable means for raising and lowering the latter, rotatable means extending transversely of said frame and being pivotally connected to said movable means, a core box anchored to said rotatable means and having a cover plate, and selectively controlled fluid actuated means carried by said rotatable means and being adapted to clamp said cover plate to said core box.

9. In a core making machine, a frame, transversely spaced guide means secured to said frame, transversely spaced vertically movable means slidably engaging said guide means, selectively controlled fluid actuated means connected to said vertically movable means for raising and lowering the latter, adjusting means in said fluid actuated means for determining the relative vertical position of said vertically movable means, rotatable means extending transversely of said frame and being pivotally connected to said movable means, a core box anchored to said rotatable means and having a cover plate, selectively controlled fluid actuated means carried by said rotatable means and being adapted to clamp said cover plate to said core box, and a conveyer extending transversely of said frame in lower spaced relation to said vertically movable means for supporting said rotatable means or cover plate.

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