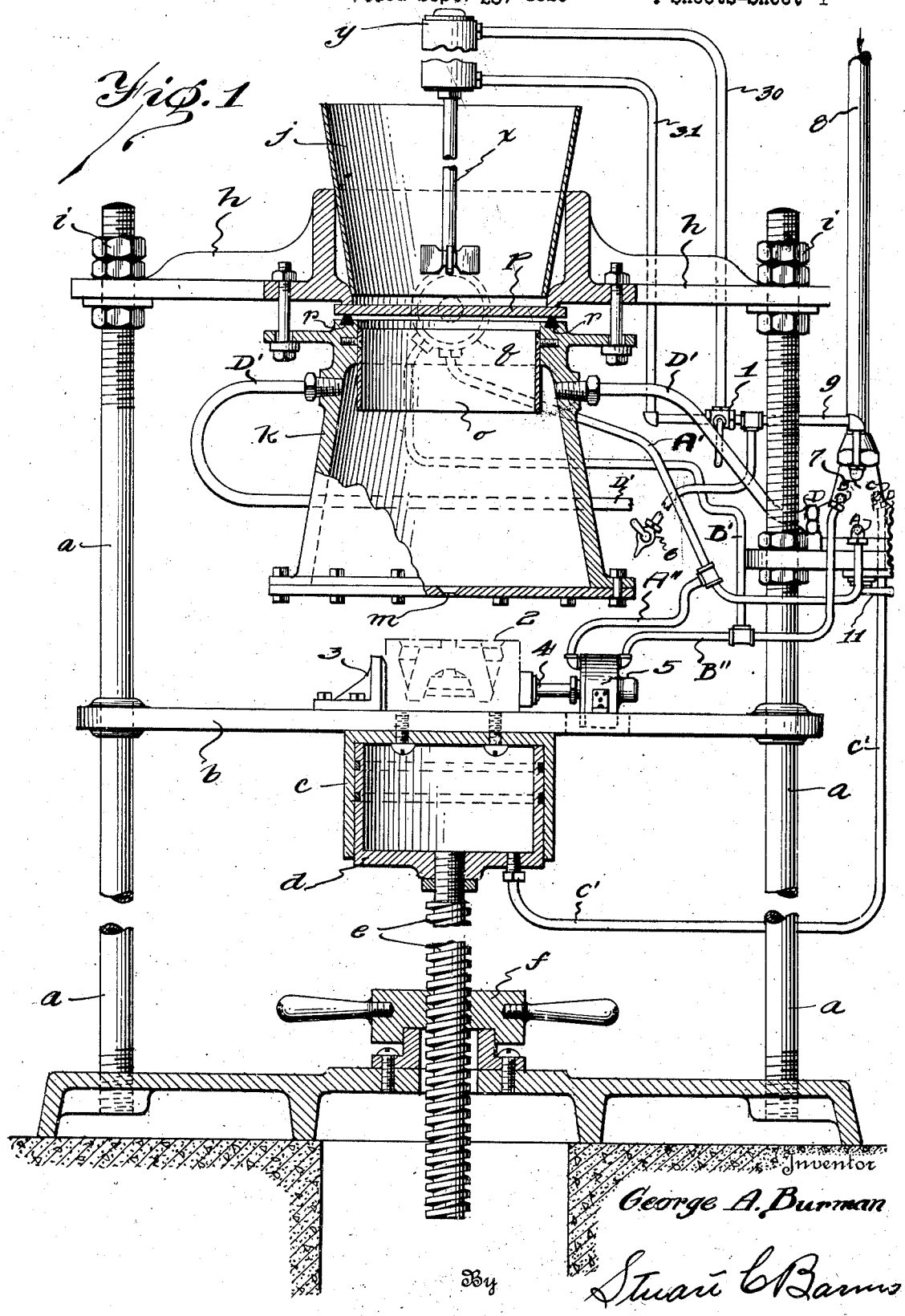
Nov. 24, 1925. 1,563,156

G. A. BURMAN

CORE MAKING MACHINE

Filed Sept. 28, 1923 4 Sheets-Sheet 1

Fig. 1



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Nov. 24, 1925. 1,563,156

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CORE MAKING MACHINE

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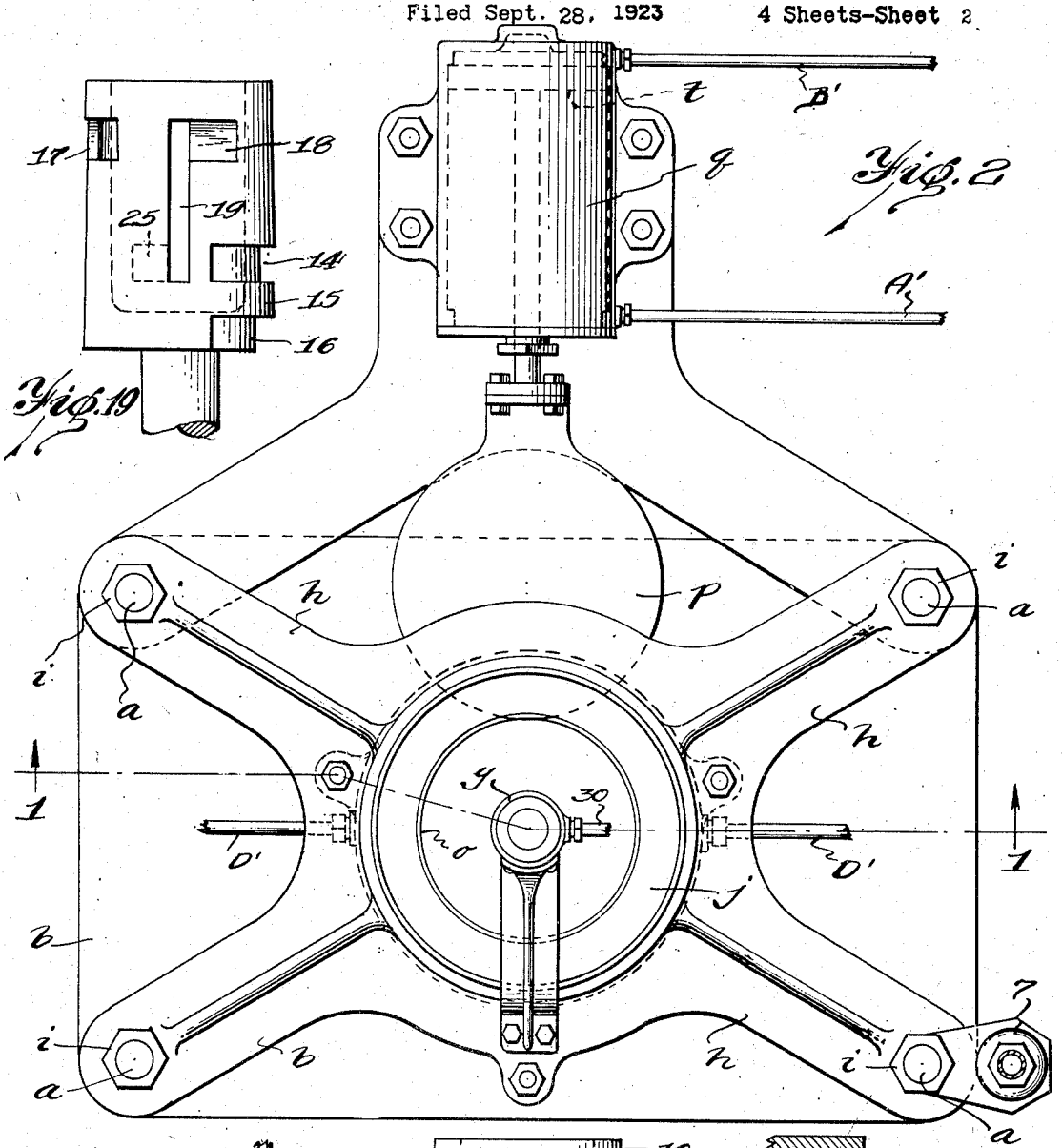


Fig. 19

Fig. 2

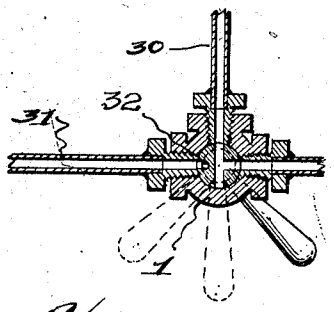


Fig. 3

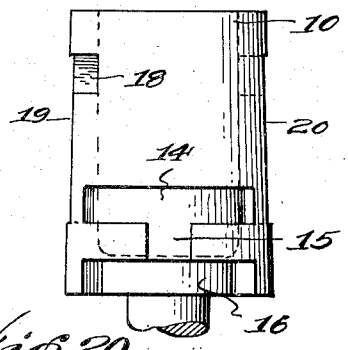


Fig. 20

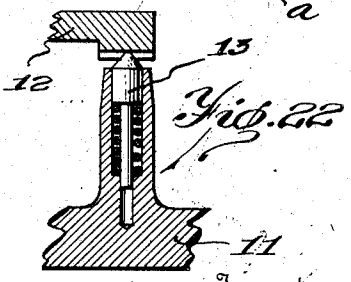


Fig. 22

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G. A. BURMAN

CORE MAKING MACHINE

Filed Sept. 28, 1923 4 Sheets-Sheet 3

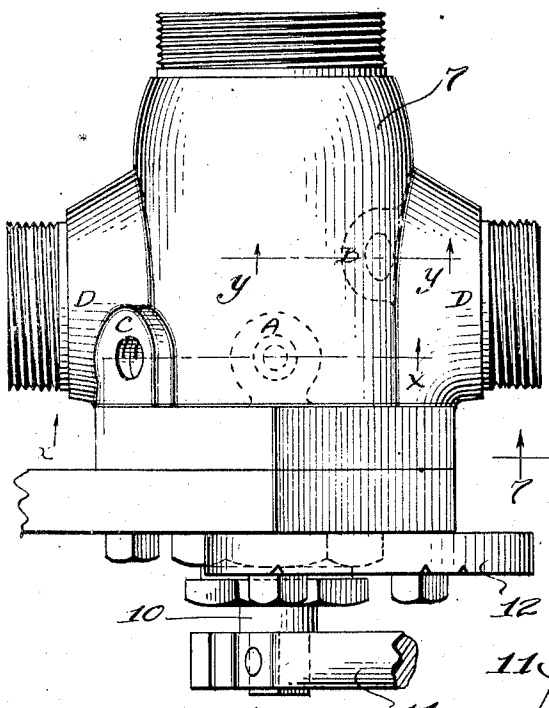


Fig. 4

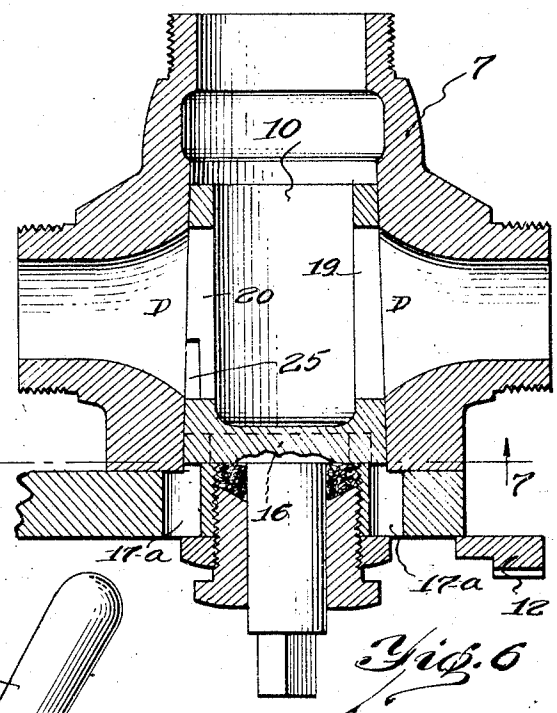


Fig. 6

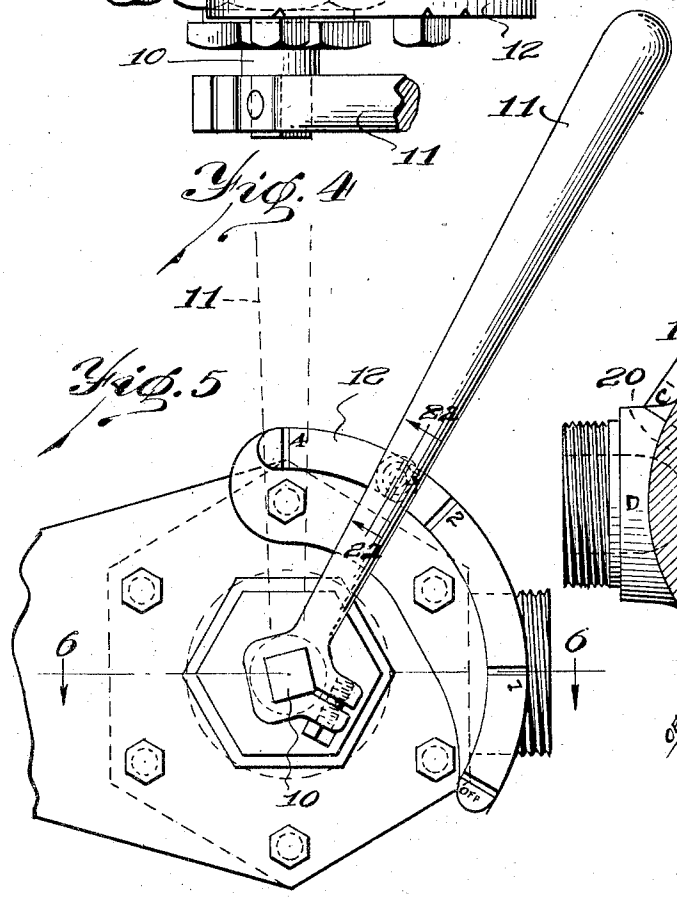


Fig. 5

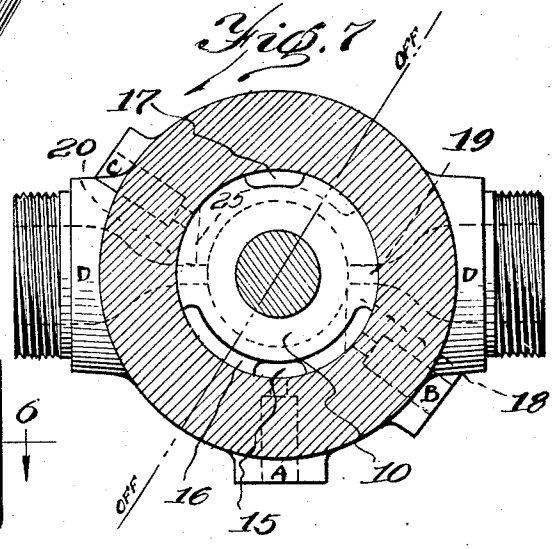


Fig. 7

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Nov. 24, 1925. **1,563,156**

G. A. BURMAN

CORE MAKING MACHINE

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Fig. 8

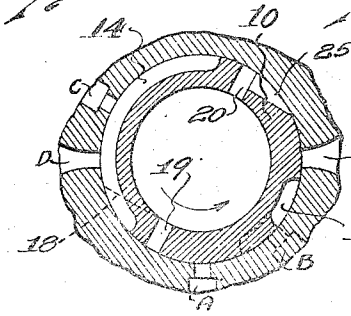


Fig. 9

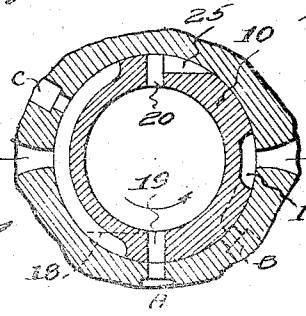


Fig. 10

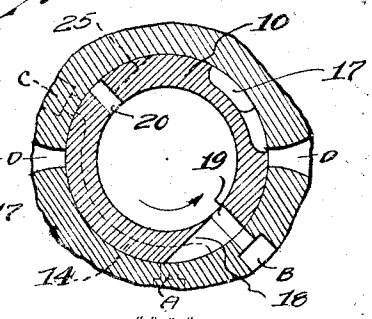


Fig. 11

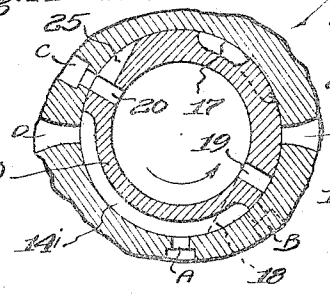


Fig. 12

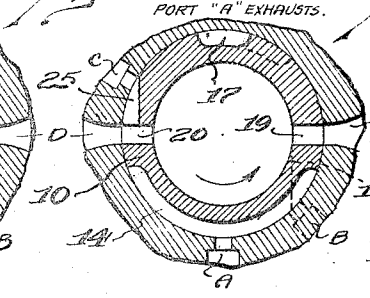


Fig. 13

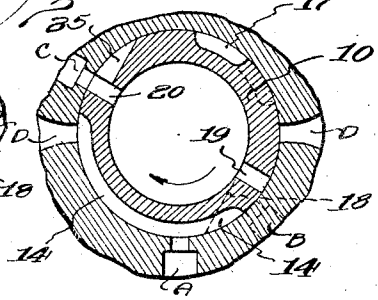


Fig. 14

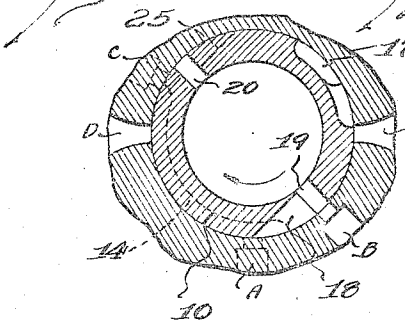


Fig. 15

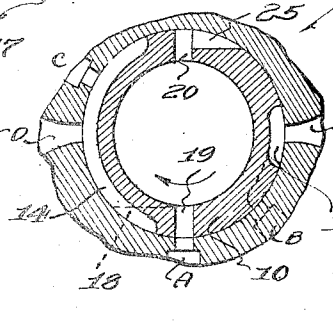
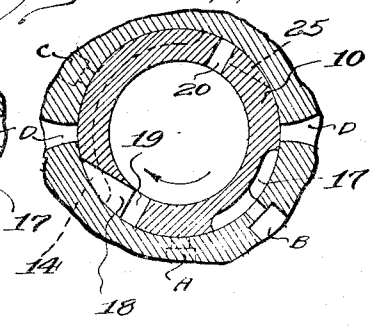


Fig. 16



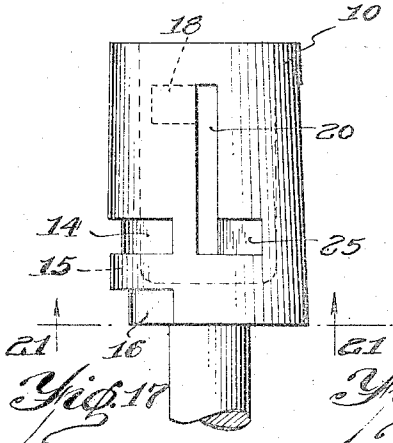


Fig. 17

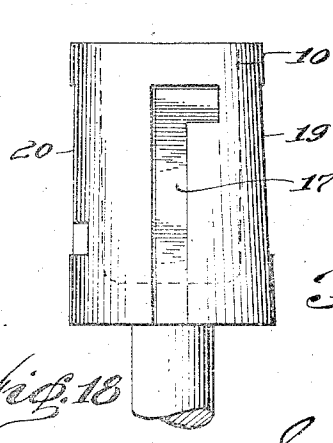


Fig. 18

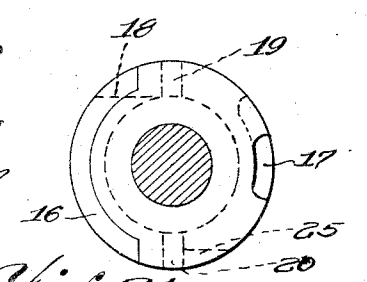


Fig. 21

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George A. Burman

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Attorney

Patented Nov. 24, 1925. 1,563,156

UNITED STATES PATENT OFFICE.

GEORGE A. BURMAN, OF DETROIT, MICHIGAN, ASSIGNOR TO E. J. WOODISON COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

CORE-MAKING MACHINE.

Application filed September 28, 1923. Serial No. 665,335.

To all whom it may concern:

Be it known that I, GEORGE A. BURMAN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Core-Making Machines, of which the following is a specification.

This invention relates to machines for making cores and moulds with the aid of pneumatic pressure. It is not broadly new to use pneumatic pressure in packing core boxes or mould boxes. Several prior patents show various contrivances and apparatus to accomplish this purpose.

It is the object of the present invention to provide improved apparatus for making cores and moulds. Among the improved features are the following:

A baffle is provided in the sand reservoir for measurably lessening the flow of sand back through the air pipes when the same are exhausting so as to avoid cutting the valve.

Another feature is a pneumatic controlled ram for use when the sand sticks in the chute for charging the sand reservoir. This can be controlled in juxta-position with the other air controls so that the operator may quickly force the sand down through the charging hopper without having to stop the operation of the machine and decrease the hourly core and mould production.

Another feature of the improvement is a progressive pneumatic control which first opens the slide valve allowing the sand to drop through the air and sand reservoir and actuates the core box clamp to release the same, then reverses the movement of the slide valve and core box clamp, followed by raising the table on which the core box rests, then applies the pneumatic pressure in the air and sand reservoir for charging the mould or core box. On a return movement of the control handle these various pneumatically controlled devices are released.

In the drawings:

Fig. 1 is a side elevation partly in section of the apparatus taken on the line 1—1 of Fig. 2.

Fig. 2 is a plan view of the same.

Fig. 3 is a vertical cross-section of the valve for controlling the feed ram and the air nozzle.

Fig. 4 is a side elevation of the pneumatic control valve.

Fig. 5 is a plan view of the same.

Fig. 6 is a vertical section of the same taken on the line 6—6 of Fig. 5.

Fig. 7 is a horizontal cross section of the same taken on the line 7—7 of Fig. 6.

Figs. 8 to 16 inclusive are sections of the valve and valve casing showing in detail the various operations of the valve.

Figs. 8, 9, 11, 12, 13 and 15 taken on the line x—x of Fig. 4 and Figs. 10, 14 and 16 taken on the line y—y of Fig. 4.

Figs. 17, 18, 19 and 20 are side elevations of the valve.

Fig. 21 is a plan view of the same.

Fig. 22 is a section on the line 22—22 of Fig. 5.

Referring to Fig. 1, *a* designates the upright posts on which is guided the sliding table *b* which is provided with an attached cylinder *c* which has a sliding arrangement with the stationary air piston *d*. This stationary air piston is adjustable vertically by means of a screw *e* and the handle provided nut *f*. By turning this nut *f* the position of the table before the air is used can be adjusted to accommodate the apparatus to moulds and core boxes of different heights. The spider *h* is secured adjustably on the top of the posts by the nuts *i*. This supports the sand charging hopper *j*; below this is suspended the air and sand reservoir *k* which has a small orifice *m* in the bottom of the same for the delivery of the sand to the mould boxes. In fact, numerous orifices may be provided in case it is desirable to simultaneously charge numerous mould boxes or core boxes. This sand and air reservoir has air inlet pipes D′ which provide air under pressure to eject the contents of the reservoir through the discharge orifice *m*.

This much of the construction is old. However, it has been found in the past that the valves that control the air charged to the resevoir are very often cut by the sucking of the sand back through the air pipes in the exhausting operation. In order to minimize this trouble I have placed a baffle *o* down in the reservoir which tends to

separate the sand from the air in the exhausting operation.

Above the sand and air reservoir is a sand charging hopper j and a slide valve p guards the passage from this hopper into the sand and air reservoir. In the prior art this slide valve has been operated by hand but I provide an air cylinder q for reciprocating this slide valve p in the proper order by means of the control shortly to be described.

When the proper port is opened air will enter the cylinder q through the pipe line B′ thus forcing the piston t forward and forcing the slide valve over the hopper mouth so as to cut off the communication between the hopper and the sand reservoir. The upper part of the sand reservoir k is provided with a rubber gasket r upon which the slide valve rests. As the table is raised the core box and table is forced up against the bottom of the sand reservoir thereby pinching the slide valve between the spider h and the sand reservoir.

Very often sand which is wet and most will stick and will not drop down. This would require the stopping of the operation and the climbing to a vantage point and ramming the sand down by hand. However, I provide a very quick control for handling such a situation. A ram x is provided operated from the air cylinder y which has a pipe connection 30 and 31 with a valve 1 which is detailed in Fig. 3. By turning the valve into the position shown in Fig. 3 in full lines, air is fed through the air line 30 and let into the cylinder and the ram is forced against the sand in the reservoir to dislodge it. By turning the valve through 90 degrees as shown by the dotted lines the air is fed through the air line 31 to the cylinder to withdraw the ram, the air in the cylinder exhausting through the port 32 in the valve.

The mould or core box which is designated 2 is clamped to the table by means of the abutment 3 and the side clamp 4 controlled by the cylinder 5. The piston in this cylinder is controlled by air entering into either the pipe A″ or B″ to withdraw or force the piston forward. The control will be described shortly.

The table b is raised by air admitted to the stationary piston d through the conduit C′ controlled in a manner soon to be detailed.

The air is let in behind the contents of the air and sand cylinder k through the conduit D′ which is controlled from the common valve described in the next paragraph.

The gist of the conception and the combination resides in a progressive control for the pneumatically operated instrumentalities. The exact number of these instrumentalities can be varied but as already described, they comprise in the progression of their application; first the slide valve p for charging the sand and air reservoir; second, the clamp 4 for clamping the core and mould box to the table; third, the cylinder c for raising the table to clamp the table against the air and sand cylinder, and fourth, the "blow", that is, letting the air into the air and sand reservoir for charging the mould or core box. These are all controlled by the valve in the valve casing 7. It will be noted that each of the pipes A′, B′, C′ and D′ returns to this valve casing and each of these pipes has a port A, B, C, and D in the valve casing. The air enters the valve casing through the air main 8 and the branch pipe 9, carries it to the ram cylinder and to the air nozzle 6 which are controlled by separate valves as their operation is at no set time. The other four instrumentalities are operated and released in the order already indicated.

A conical valve 10 such as shown in Figs. 17 to 21 inclusive is used. This valve is connected with a handle 11 (Fig. 5) which swings over a segment 12 where the four positions of the valve are marked. A detent 13 (see Fig. 22) tends to keep the handle in any one of the four operative positions. The off position is shown at the lower end of the segment depicted in Fig. 5. In this position the valve and the ports have the relative positions shown in Fig. 8. The first operation is to move the handle to the position No. 1. The valve and the ports in their relative relation are now shown in Fig. 9. It will be seen that the interior of the conical valve which is in direct communication with the air main is now open to the port A and consequently the air under pressure flows through the conduit A′ to the slide valve cylinder q, putting into communication the hopper with the air and sand reservoir. A branch conduit A″ leads to the cylinder 5 controlling the core box clamp and forces the piston backwardly in a position ready to receive the core box. Turning the valve handle to position No. 2 (see Fig. 5) brings the valve and the casing into the relation shown in Fig. 10. Here the air main is connected up directly with the port B while the port A exhausts through the exhaust groove 14. The port B connects through the pipe B′ with the slide valve cylinder q to shut off the hopper from the sand reservoir. The branch conduit B″ actuates the side clamp 4 to clamp the core box 2 against the abutment 3. In order to understand the exhausting of the port it will be necessary to compare Fig. 10 with Fig. 20 to show the exact construction of the groove 14. This groove 14 connects through the vertical passage 15 with a second groove 16 in the bottom of the conical valve. In the bottom of the valve casing are a plurality of ports 17ª

(see Fig. 6). These connect with the passage 16 at all times so hence when the segmental groove 14 registers with the port A as shown in Fig. 10, a direct connection with the atmosphere is established.

The handle is next moved to the position 3 (Fig. 5). The position of the parts are now as shown in Fig. 11. The interior of the conical valve is in communication with the port C and hence air under pressure is furnished through the pipe C′ to the stationary piston *d* and serves to lift the table and clamp the mould or core box directly against the air and sand reservoir *k*. The port B is still open to hold the side clamp in position for the passageway 18 in the valve still communicates with the port B. The slide valve is of course also held in a closed position. This is accomplished by the fact that the port B is located at a higher level in the valve casing than the ports A and C (see Fig. 4). The passageway connects with the slot 19 in the side of the valve leading to the interior of the same as indicated in Fig. 11. The air is now on in both the pipes C′ and B′. The side clamp is held against the mould or core box and the table is held against the bottom of the air and sand reservoir. Now, in the fourth position shown in Fig. 5 the parts are as shown in Fig. 12, the passageway 18 still connects with the port B hence the air is still in direct communication with the conduits B′ and B″ and the air is also still in direct connection with the port C because of the passageway 25 and additionally in direct connection with the ports D—D for the slots 19 and 20 in the side of the conical valve register with these ports D—D. This supplies air under pressure to the conduits D′—D′. Now, referring to Fig. 1, it will be seen that this furnishes the "blow." The air is let into the air cylinder behind the contents and the same is expelled through the discharge orifice *m* into the mould box or core box.

Referring to Figs. 13 to 16 inclusive, the arrangement for the release of the air pressure will be seen. The handle 11 (Fig. 5) will be pulled back to the third position. This will cause the ports D and A to register with the exhaust groove 14 (Fig. 13). In fact the position is identically the same as shown in Fig. 11 and the air will exhaust through the port D, the groove 14, passage 15 and slot 16 (Fig. 17) in precisely the same way as explained in connection with Fig. 10 when port A exhausts. Since port A is already exhausted this position does not affect port A. When the valve turns to the next position, which is the position No. 2 in Fig. 5, the parts will assume the position shown in Fig. 14. This position begins to exhaust port C and the table is allowed to drop. When the first position on the segment shown in Fig. 5 is reached, the parts will be in the position shown in Fig. 15. Port B will now be exhausted and port A will be in direct communication with the air main, air is let in cylinders *q* and 5 through the pipes A′ and A″ respectively thereby opening the slide valve and releasing the core box clamp. The inverted L shaped exhaust passage 17 registers with the port B and consequently exhausts the air from the cylinder *q* and 5 through the conduit B′ and the conduit B″. Hence all the contrivances will be released. It will be noted that the air pressure applies the device in the following order; first it opens the slide valve and releases the clamp, then clamps the core box to the table and closes the slide valve, then raises the table and finally "blows" the sand. Then on the return movement of the valve handle the air for the "blow" is first released, then the table, and finally the side clamp and slide valve are actuated as described. In letting the air through these various contrivances the opening and closing movement will be a step by step movement.

In the operation of the machine it will be noticed that the port A is opened during the return movement of the valve operating lever. As described, this forces air under pressure to the cylinder *q* and 5 through the conduits A′ and A″ respectively. While the machine is at rest and while the handle is located in the "off" position, pressure will be maintained in the cylinder *q* and 5 tending to hold the slide valve and side clamp in an open position. Obviously when the valve operating handle is again moved to start the pneumatic operation of the machine the port A will again be opened and in direct communication with the air main. But since the cylinders *q* and 5 are already charged with compressed air to withdraw the piston, there is no work done when the valve is in this position. Because of the fact that the slide valve *p* is opened while the machine is at rest, the operator is able to work the ram *x* to loosen the sand and air, the sand to pass from the hopper into the sand reservoir. This may be conveniently done while the helper is placing the core box on the table preparatory to "blowing" another core.

What I claim is:

1. In apparatus for the purpose described, the combination of an air and sand reservoir, provided with a discharge orifice, means for conducting air under pressure thereto, a hopper for charging said reservoir with sand through a passage provided with a valve to guard said passageway, and means for ramming down the sand when it sticks in such passage way.

2. In apparatus for the purpose described,

the combination of an air and sand reservoir, provided with a discharge port, means for furnishing air under pressure thereto, a hopper for charging the reservoir with sand through a passageway provided with a valve, and power-operated means controllable from a remote point for ramming the sand down through said discharge passage.

3. In apparatus for the purpose described, the combination of an air and sand reservoir, means for affording air under pressure thereto, a hopper for charging the reservoir with sand through a passage way provided with a valve to guard the same, a reciprocating ram contained in the hopper, and a pneumatic cylinder and piston for operating said ram.

4. In apparatus for the purpose described, the combination of an air and sand reservoir provided with a discharge orifice, a vertically reciprocating table, a side clamp for the mould or core box, and means including a single control for successively operating the side clamp and holding the same closed while raising the table and furnishing air under pressure to the air and sand reservoir.

5. In apparatus for the purpose described, the combination of an air and sand reservoir, means for furnishing air under pressure thereto, a pneumatically raised table, a pneumatically operated side clamp, and pneumatic means including a single control for successively applying the side clamp and holding the same closed while raising the table, and furnishing air under pressure to the air and sand reservoir.

6. In apparatus for the purpose described, the combination of a stationary air and sand reservoir, means for furnishing air under pressure thereto, a stationary hopper for charging the air and sand reservoir with sand provided with a valve for cutting off and establishing communication between the hopper and the air and sand reservoir, a vertically reciprocating table, and means including a single control for progressively opening and closing the valve in the sand hopper, raising the table, and furnishing air under pressure to the air and said reservoir.

7. In apparatus for the purpose described, the combination of a stationary air and sand reservoir, a stationary hopper for charging the reservoir with sand and provided with a valve for closing the passageway between the hopper and the reservoir, a reciprocating table, a side clamp and means including a single control progressively operable for causing the valve below the hopper to open and close, and to actuate the side clamp to the mold box or core box, to raise the table, and to cause air under pressure to flow into the air and sand reservoir.

8. In apparatus for the purpose described, the combination of an air and sand reservoir provided with a discharge orifice in its bottom, means for furnishing air thereto under pressure, a hopper for charging the reservoir with sand provided with a valve for guarding the passageway between the hopper and the reservoir, a pneumatic cylinder and piston for opening and closing said valve, a pneumatically operated vertically reciprocating table, a pneumatically operated horizontally reciprocating side clamp and pneumatic means including a single valve for successively opening and closing the valve in the hopper and applying the side clamp to the core box, raising the table, and allowing air under pressure to flow into the air and sand reservoir to effect the "blow."

9. In apparatus for the purpose described, the combination of an air and sand reservoir, means for furnishing air under pressure thereto, a sand hopper for charging the reservoir with sand, a slide valve for guarding said hopper passageway into the reservoir, a pneumatic piston and cylinder for controlling said slide valve, a vertically reciprocating table pneumatically operated, and pneumatic means including a single valve for progressively operating said instrumentalities and releasing the same by controlling the inlets for the air under pressure and the exhaust thereof.

10. In apparatusfor the purpose described, the combination of an air and sand reservoir provided with a discharge orifice in the bottom thereof, means for furnishing air under pressure thereto, a sand hopper for discharging sand thereinto, a valve for guarding the same pneumatically operated, a vertically reciprocating pneumatically operated table, a pneumatically operated side clamp on said table and connections including a single means for controlling the pneumatic operation of the hopper valve to open the valve and then close the same, for then applying the side clamp, for raising the table and finally for letting air under pressure into the reservoir, said control means having the capacity for releasing the air under the table, the air in the side clamp and the air in the reservoir.

11. In apparatus for the purpose described, the combination of an air and sand reservoir, a sand hopper above the reservoir, a pneumatically operated valve for controlling the passageway from the hopper into the reservoir, a vertically reciprocating pneumatically operated table, a horizontal reciprocating pneumatically operated side clamp and a single valve whose movement in one direction operates in progression to open and close the valve in the hopper, apply the side clamp, raise the table and let air under pressure into the reservoir.

12. In apparatus for the purpose described, the combination of an air and sand

reservoir provided with a discharge orifice, means for conveying air under pressure thereto, a sand hopper above the reservoir, a valve for guarding the passageway between the hopper and the reservoir pneumatically operated, a vertically reciprocating pneumatically operated table, a side clamp pneumatically operated and a single valve provided with suitable connections progressively operating to open and close the valve in the hopper, apply the side clamp, raise the table and let air under pressure into the reservoir and successively on the return stroke releasing the pressure in the reservoir, the pressure under the table and the pressure that applies the clamp.

In testimony whereof I affix my signature.

GEORGE A. BURMAN.