United States Patent

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[54] **BLOW HEAD HAVING VALVE MEANS COOPERATING WITH FLEXIBLE CHAMBER WALLS**

4 Claims, 4 Drawing Figs.

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[50] Field of Search ..... 164/200, 201, 202; 141/148—150, 172, 251, 263, 281; 251/342

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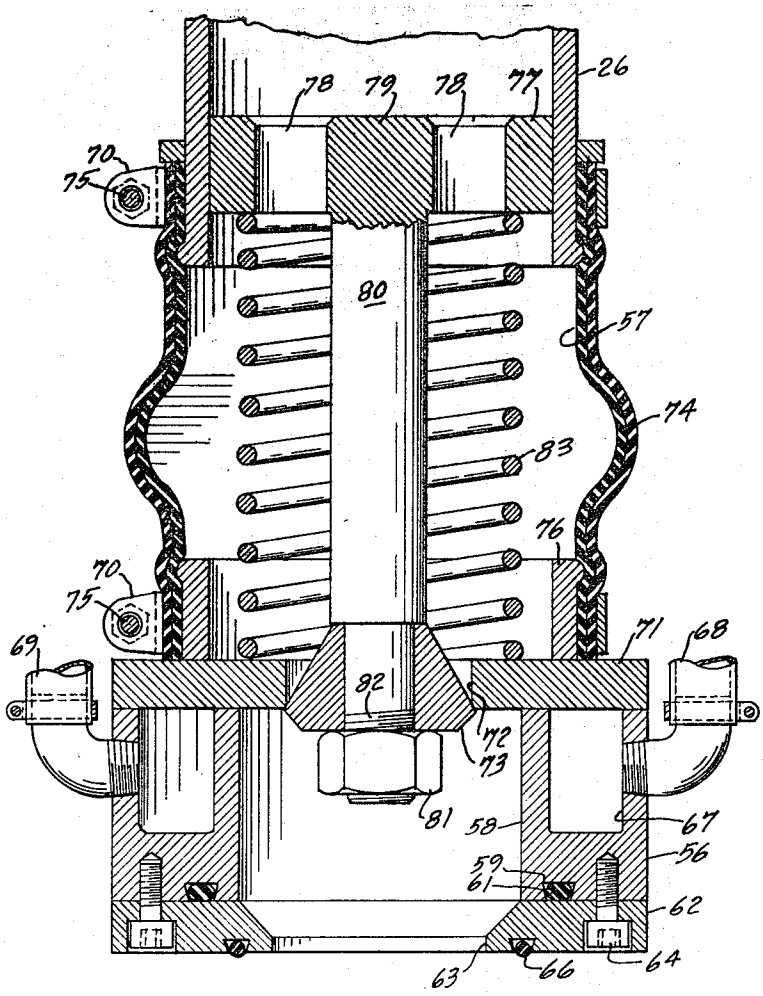
ABSTRACT: A self-aligning blow head for sand blowing equipment used for filling core boxes, flasks and the like with granular material characterized by means automatically to open a sand discharge valve when the apparatus is pressed into operative relation against the granular material opening of the core box to be filled and which shuts off the flow of sand when removed from the core box. The end of the blow head is water cooled for use in blowing resin coated sand as when filling heated core boxes, flasks or the like with the same.



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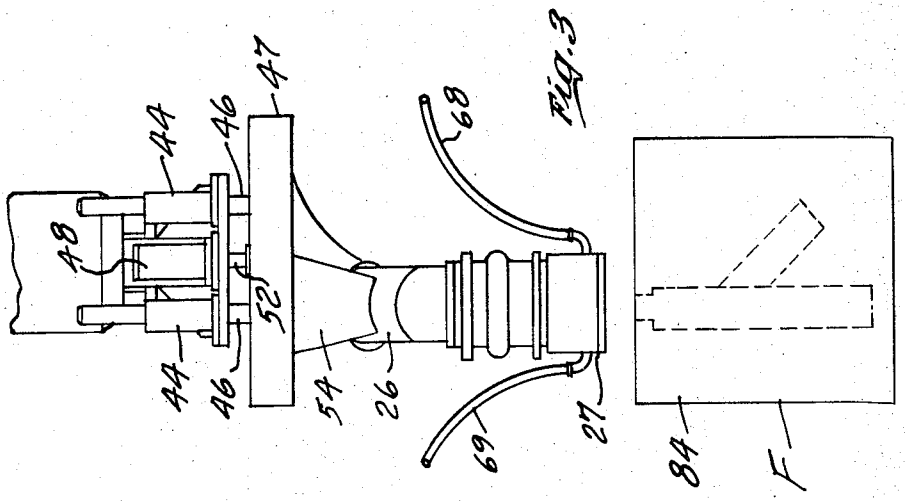

Fig. 3

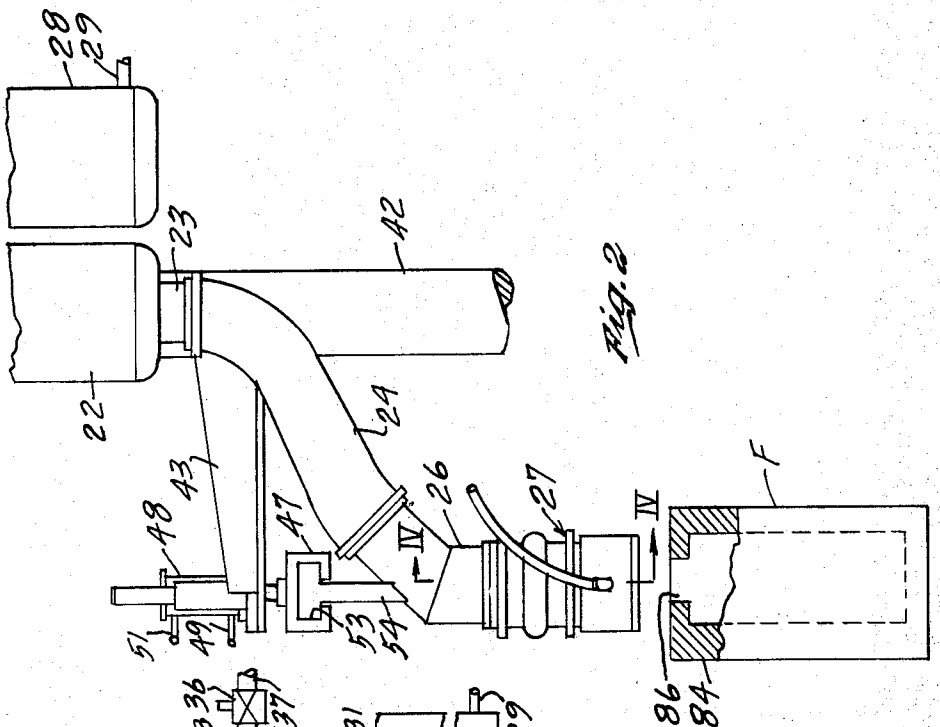

Fig. 2

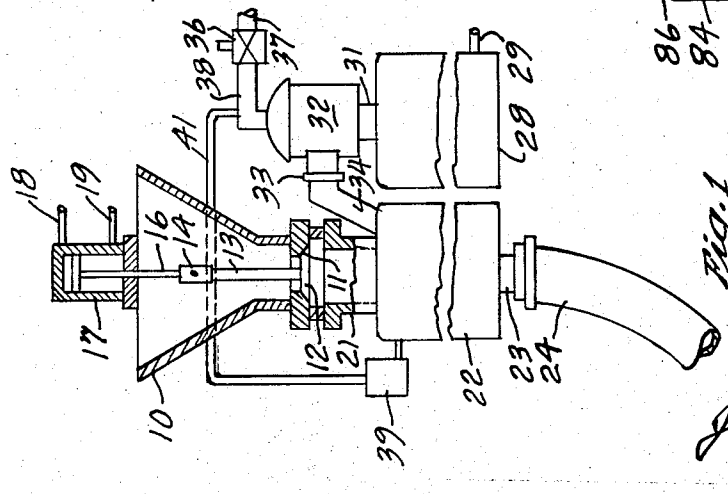

Fig. 1

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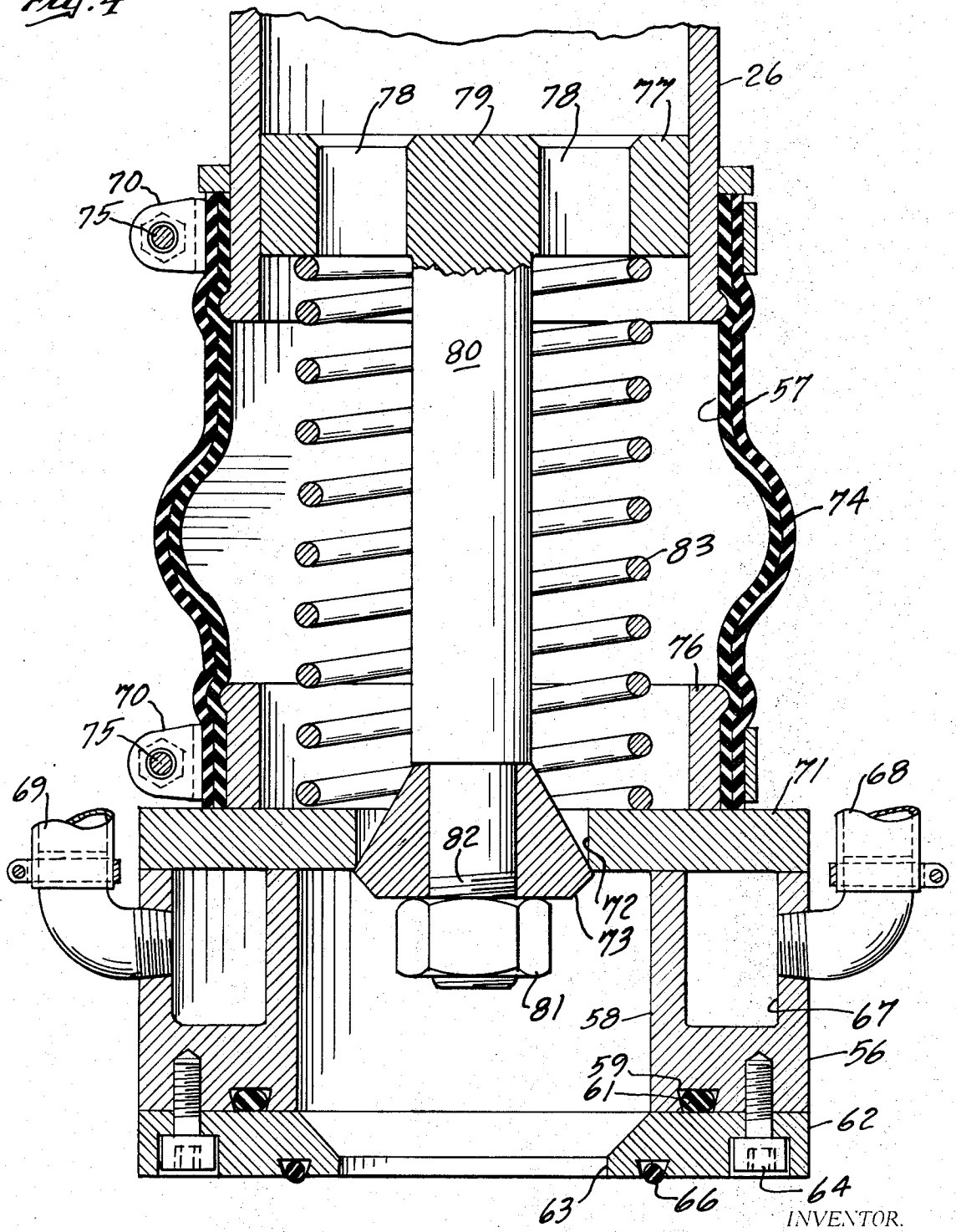
Fig. 4



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BLOW HEAD HAVING VALVE MEANS COOPERATING WITH FLEXIBLE CHAMBER WALLS

This invention relates to sand blowing equipment and particularly to apparatus for blowing granular material such as resin coated sand into heated core boxes, flasks or the like.

In the art to which my invention relates it is customary to fill core boxes, flasks and the like with granular material such as sand, thereby to form a core which later is used in the foundry arts. Heretofore, considerable difficulty has been encountered in the mass production of cores due to the fact that the blow head had to be perfectly centered about the opening leading into the core box, thus to prevent leakage of the material when the air pressure was applied. Also, difficulty has been encountered in the provision of a suitable valve for permitting the sand to flow from the blow head into the core box and for stopping such flow when the blow head is removed from the core box. Further, difficulty has been encountered in such apparatus used for resin coated sand inasmuch as when the blow head is brought into contact with the heated core box, flask or the like, heat is transferred from the core box and the resin coated sand is polymerized to some extent, choking the prior apparatus. Likewise, the rubber seals heretofore provided have been subjected to overheating, resulting in rapid deterioration of the same and the necessity for replacing them quite often.

In view of the foregoing an object of my invention is to provide a blow head of the character designated which comprises an outer chamber having an opening in an end wall adapted to fit about the sand receiving opening of a core box or the like. An inner chamber having outer flexible walls is secured to the opposite side of the outer chamber and the end of the inner chamber opposite the end secured to the outer chamber is provided with a head having sand passages therethrough. A wall is interposed between the two chambers and a sand passage is provided centrally thereof. The opening in the wall between the two chambers is controlled by a valve, the valve having a stem attached to the head of the inner chamber. The entire blow head may be suspended from the outer end of the piston rod of a fluid pressure cylinder and sand may be supplied to the inner chamber through the head thereof by means of a flexible conduit. A coil spring surrounds the stem of the valve and exerts compressive forces tending to hold the inner chamber elongated, thereby to urge the valve toward its seat. The outer chamber may be provided with a coolant passage in its walls and means is provided to circulate water or the like through said passage.

In view of the foregoing the object of my invention is to provide an improved blow head which is characterized particularly by being self-aligning when brought down onto the core box or the like, this feature being afforded by the flexible walled inner chamber.

Another object is to provide apparatus of the character designated which, when the blow head is brought into operative contact with a flask to be filled with sand, automatically opens the valve, permitting sand to be blown from the inner chamber, into the outer chamber and thence into the core box or the like. Similarly, when the device is removed from the core box the valve automatically closes due to the effect of the spring pushing it against its seat.

Apparatus illustrating features of my invention is shown in the accompanying drawings forming a part of this application in which:

FIG. 1 is a somewhat diagrammatic, fragmentary, sectional view illustrating the method of providing sand and air under pressure for blowing the same into the blow head forming the subject of my invention;

FIG. 2 is a side elevational view, broken away and partly in section illustrating my invention in position ready to be placed into contact with a core box or the like;

FIG. 3 is a front elevational view of the same; and

FIG. 4 is an enlarged detail sectional view taken generally along line 4–4 of FIG. 2.

Referring now to the drawings for a better understanding of my invention I show in FIG. 1 a hopper or the like 10 in which is stored a quantity of the sand or the granular material to be blown into the mold. The bottom of the hopper is provided with a sand opening 11 under control of a valve 12. The valve 12 is provided with a stem 13 connected as at 14 to the piston rod 16 of a fluid pressure cylinder 17. Pressure may be supplied through line 18 to open the valve and through line 19 to close the same, such pressure being from any suitable source, not shown.

Beneath the hopper and connected by a conduit 21 is a sand receiver 22. The outlet 23 of the sand receiver is connected by a flexible conduit 24 to a metal transition piece 26 which leads to my improved blow head indicated generally by the numeral 27 and which will be described in detail later.

At 28 I show an air tank which receives air under pressure through a conduit 29 from a source not shown. The top of the tank is provided with an opening 31 and this opening is under control of a valve 32, the outlet 33 of which is connected by conduit 34 to the top of the tank 22.

The valve 32 may be a pressure operated valve and is under control of a valve 36. Operating pressure for the valve 32 may be supplied from a line 37 to the valve 36 and thence a line 38 to the valve 32. Thus, when valve 36 is open valve 32 opens, subjecting the top of sand tank 22 to the pressure contained within tank 28.

Also connected to the top of the sand tank 22 is a pressure relief valve 39. A pressure line 41, between valve 36 and valve 32 is connected to the valve 39. Valve 39 is spring biased toward open position, thus to vent the tank 22 to atmosphere. However, when pressure exists in line 38, the same pressure also exists in line 41 and valve 39 is closed.

What has been so far described in connection with the sand supply and pressure means is old in the art and is illustrated herein for the purpose of explanation of my invention which will now be described.

It will be seen that the entire apparatus including the air tank 28 and sand tank 22 may be supported on a vertical support member 42. Outstanding from the side of the member 42 is a horizontal support member 43. Mounted on top of the member 43 are sleeves 44 through which are slidably mounted pins or rods 46. The rods 46 carry a crosshead 47. A fluid pressure cylinder 48 having inlets 49 and 51 for fluid under pressure and for exhausting the same on the strokes of the cylinder has its piston rod 52 connected to the crosshead 47.

The crosshead 47 is slotted as indicated at 53 and a T-headed member 54 has its lower end connected to the transition piece 26.

My improved blow head 27 comprises an outer or lower chamber indicated generally by the numeral 56 and the inner or upper chamber indicated generally by the numeral 57.

The lower chamber 56 may be of circular configuration and may be formed of steel, cast iron or the like. Thus, the lower chamber may have an inner, centrally disposed opening 58 and its outer face may be provided with a groove 59 to receive an O-ring type seal 61. A removable plate 62 provided with an opening 63 at its center may be secured to the outer end of the outer chamber by means of studs or the like 64. When the studs 64 are drawn up, seal 61 is compressed, sealing between the plate 62 and the end of the outer chamber 56.

O-ring seals 66 may be provided in the outer surface of the plate 62 thereby to seal against the surface of the core box F or the like as will later appear.

The outer chamber also may be provided with a continuous water passage 67 in its outer walls. Coolant such as water may be introduced through a flexible hose 68 and discharged through flexible hose 69, thus to cool the outer chamber.

Opposite the end of the chamber which carries the plate 62 is a wall 71. The wall 71 has an opening 72 adjacent its center and this wall is adapted to be closed by a valve 73.

The inner chamber 57 may have bellows-like outer walls of flexible material such as heavy duty reinforced rubber or the like. Thus, I illustrate a double thickness of such wall material

by the numeral 74. At the end adjacent plate 71 I provide an annular flange 76 secured to the plate 71 in turn to which the lower end of the wall 74 is secured by a clamping collar 70 and a bolt 75. The upper end of the inner chamber is secured by a similar clamp and bolt to the lower end of the transition piece 26.

The lower end of the transition piece 26 is adapted to fit inside the upper end of chamber 57 and is secured thereto by any suitable means. Inside the transition piece I provide a perforated wall for the inner chamber in the form of a plate member 77 having openings 78 therein for the passage of sand as will appear. The plate 77 is provided with a central solid portion 79 and a valve stem 80 is secured to this central portion. The valve 73 proper is held to the stem by means of a nut 81 on a threaded section 82 of the stem. A spring 83 surrounds the stem 80 and rests with one end on top of the wall 71 and with the other end under the inner surface of the plate 77, thus to force the valve toward seated position, this being accomplished by tending to elongate or stretch the outer walls 74 of the inner chamber 57.

From what has now been described the construction and use of my invention will become apparent. With the apparatus suspended from the column 42, fluid under pressure is admitted through the line 51 and exhausted through line 49, whereby the entire blow head is moved downwardly and forced into contact with the top surface 84 of the flask, and with the opening 63 surrounding the sand receiving opening 86 in the flask F. When the cylinder 48 lowers the crosshead and thence the entire apparatus onto the top of the flask or core box F, it will be seen that the seal 66 seals between the contacting surfaces. Further, the downward movement of the transition piece 26 moves the plate 77 downwardly, this being permitted by the flexible walls 74 of the inner chamber 57. This motion opens the valve 73 by moving it downwardly relative to the seat provided at the inside of opening 72. With the parts thus positioned control valve 36 is opened from a period of from four to ten seconds whereupon air under pressure from tank 28 enters tank 22, forcing the sand through the flexible conduit 24, through chamber 57 and into the chamber 58, thence into the core box. Sand under pressure thus is blown from the tank 22 through the two chambers, passing through the opening 72 and into the core box. Upon admitting fluid through the line 49 and exhausting it through the line 51 the entire device is raised back to the position of FIGS. 2 and 3. This movement away from the core box permits the spring 83 to close the valve, thus shutting off all of the sand. Of course, the small amount of sand in the lower chamber will be spilled out on top of the core box. However, I have found that this is an advantage inasmuch as if it is attempted to exactly fill the core box the withdrawal of the apparatus would suck some of the sand from the top of it, leaving a slight concave in the opening 86. In the event resin coated sand is being blown, water or other coolant is circulated through the opening 67 of the outer chamber. This prevents polymerization of the sand inasmuch as in this case one would be using a heated core box or flask. Further, this preserves the seals 61 and 66, assuring long life for these parts.

In view of the foregoing it will be apparent that I have devised an improved blow head for granular particles and the like.

While I have shown my invention in but one form it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

I claim:

1. In a blow head for filling core boxes and the like with granular material such as sand,

a. inner and outer chambers, the outer of which is adapted for one end to be pressed against the core box with an end opening therein in communication with a sand receiving passage in the core box, said inner chamber having outer walls of non-rigid material,

b. a perforate wall for the end of the inner chamber opposite the end in contact with the outer chamber,

c. means to supply granular material to the inner chamber,

d. normally closed sand controlling valve means interposed between the inner and outer chambers and connected to said perforate wall, whereby when the blow head is brought into operative contact with a core box or the like to be filled, the perforate end wall of said inner chamber is moved toward the outer chamber, whereby the valve means is opened to permit sand to pass from the inner chamber to the outer chamber and thence into said mold box.

2. Apparatus as defined in claim 1 in which the valve means is provided with a stem secured to the perforate wall, and a coil spring surrounding said stem and effective to urge said valve means resiliently toward its seat.

3. In apparatus for blowing resin coated sand or the like into a core box for forming cores therein,

a. a hollow blow head comprising an outer chamber and an inner chamber,

b. said outer chamber being defined by rigid material having an opening in one end wall disposed to contact a core box in sand supply communication with a sand receiving passage leading into the core box,

c. said inner chamber being defined at least in part by an outer flexible wall joined to the outer chamber on the end opposite said one end wall,

d. a wall between said chambers and having a sand passage therethrough,

e. a valve controlling the flow of sand through said sand passage from the inner to said outer chamber,

f. means urging the valve toward closed position,

g. means associated with the inner end of the inner chamber to press the blow head against a core box in position for sand to pass from the blow head into the core box, and

h. means responsive to pressing the blow head against the core box to shorten the length of said inner chamber as permitted by its flexible wall to thereby open said valve, whereby while so pressed against the core box sand may be supplied through said chambers to the core box and upon removing the blow head from contact with the core box the flow of sand from the inner to the outer chambers is cut off by the closing of said valve.

4. In a blow head for filling core boxes and the like with granular material such as sand,

a. an outer chamber having a sand discharge opening in one end wall adapted to engage against a core box with said opening in communication with a sand receiving passage in the core box,

b. an inner chamber defined in part by an outer wall of flexible material and a perforate end wall,

c. a wall between said chambers having a sand passage therein,

d. a valve adapted to control the flow of sand through the passage in the wall between said chambers,

e. a stem on the valve projecting into the inner chamber and having its end opposite the valve operatively connected to the perforate end wall of the inner chamber,

f. means urging the valve toward closed position, and

g. movable support means supporting said chambers from the end of the inner chamber removed from the outer chamber, whereby upon moving the open end of the outer chamber into contact with a core box, continued movement of the supporting means toward the core box shortens the length of said inner chamber, thereby opening said valve and conversely permits the valve to close when the blow head is withdrawn from the core box.