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2,490,559

CORE BLOWING MACHINE

Filed July 6, 1946

3 Sheets-Sheet 1

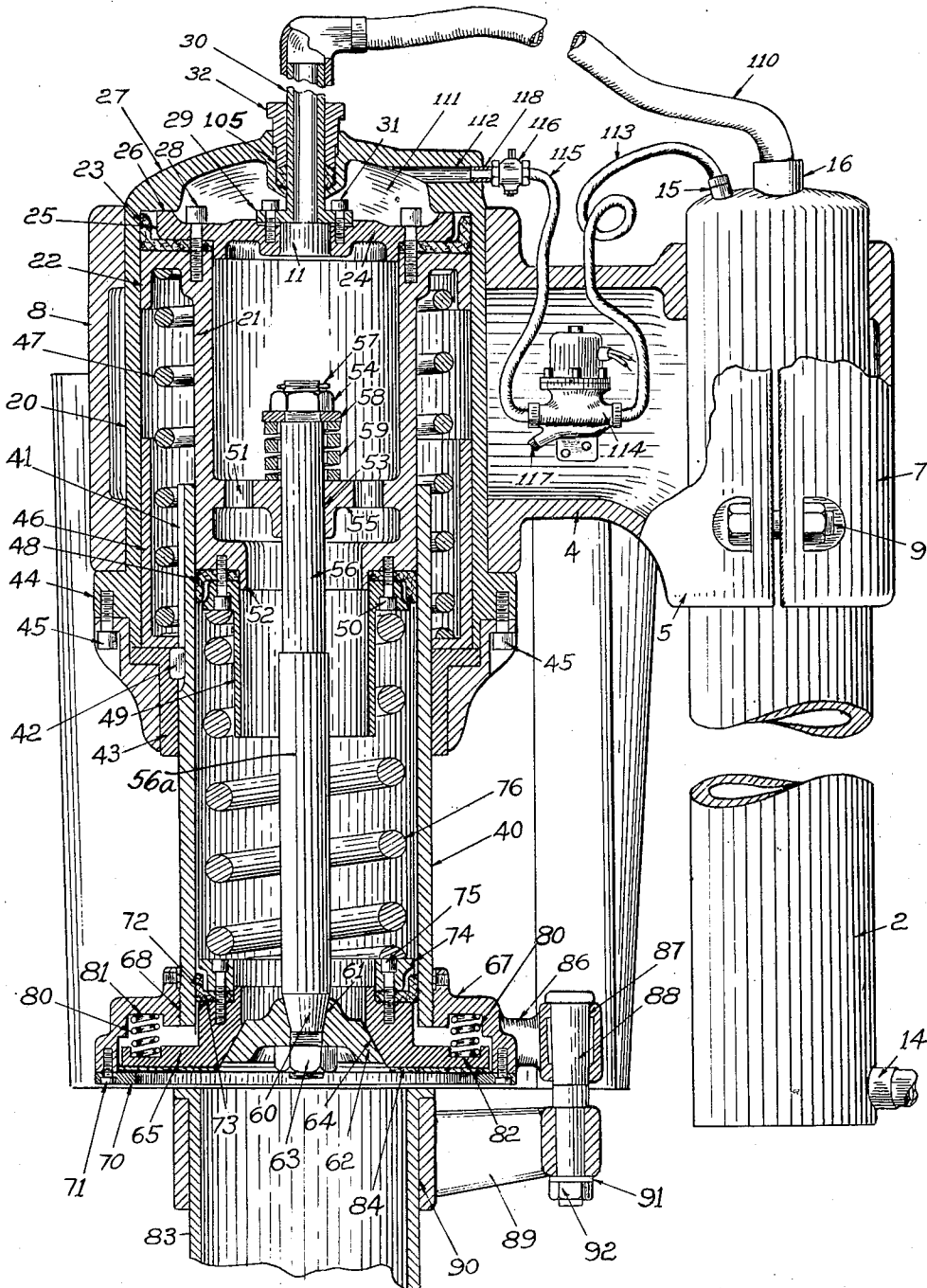


Fig. I

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3 Sheets-Sheet 2

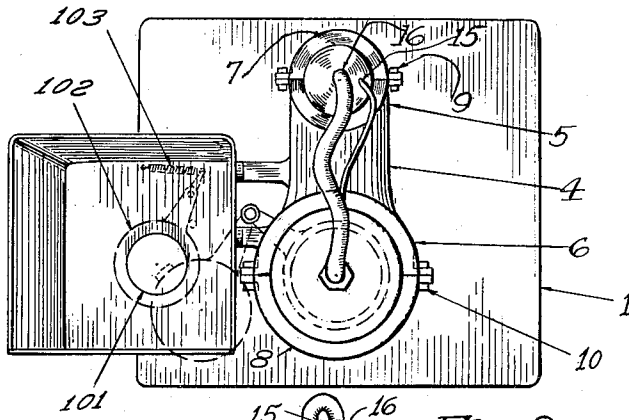


Fig. 2

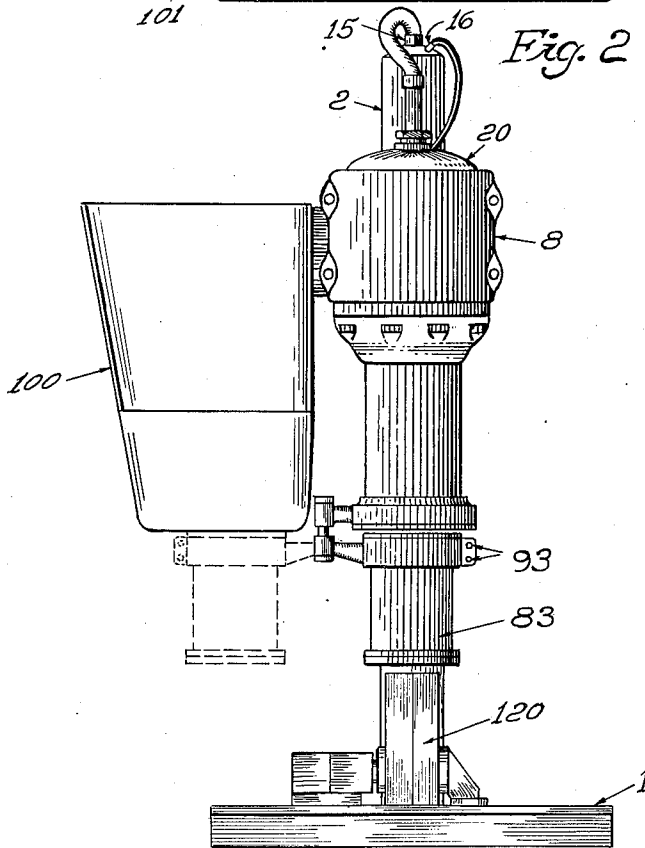


Fig. 3

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3 Sheets-Sheet 3

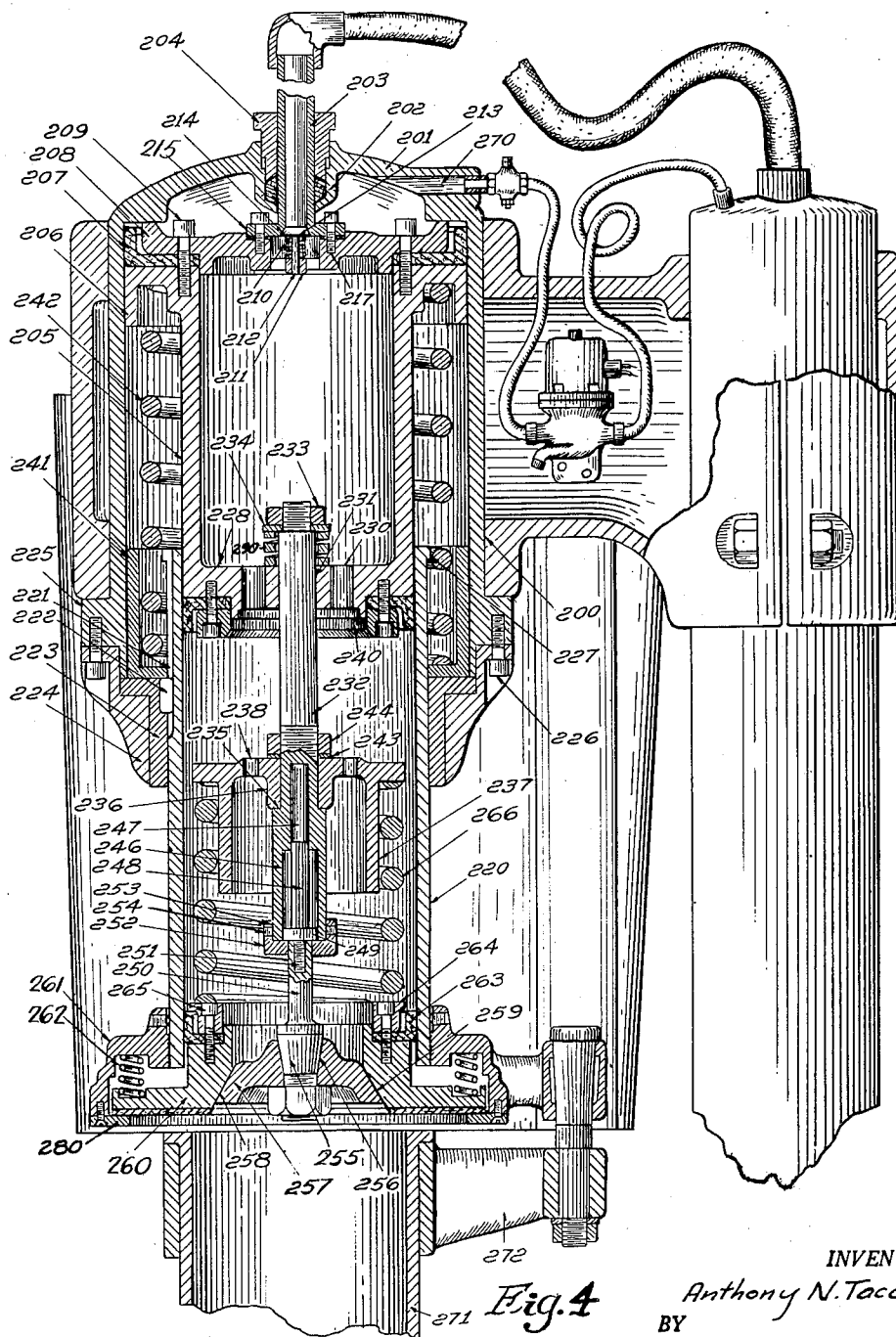


Fig. 4

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CORE BLOWING MACHINE

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16 Claims. (Cl. 137-153)

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This invention relates generally to core making machines, and more particularly to machines which blow sand into core molds.

Devices of this type, made according to the teachings of the prior art, and with which I am familiar, provide a jet of air through the center of a sand holder, leaving a large portion of the sand in the sand holder clinging to the walls thereof, because of the viscous nature of the sand for making cores. The bottom of the sand holders have a sieve-like structure and great difficulty has been experienced in blowing the sand from the sand holder. Inverted V-shaped sand holders have been tried, but the sand still clings to the side of the holder. None of these prior machines have provided automatic shut-off means for the air. No means has been provided on the prior machines for fully engaging the sand holder automatically with the result that sand was blown in the face of the operator and the machine and the sand holder are forced out of alignment.

It is, accordingly, an object of my invention to overcome the above and other defects in machines for blowing sand into a mold, and it is more particularly an object of my invention to provide a machine for blowing sand into a mold which is simple in construction, automatic in operation, easy to operate, and economical in cost.

Another object of my invention is to provide a machine for blowing sand into a mold which disperses the air throughout the entire area of the sand holder.

Another object of my invention is to provide an automatic means for shutting off the air supply in a machine for blowing sand into a mold.

Another object of my invention is to provide a machine for blowing sand into a mold which requires a minimum of air pressure for operation.

Another object of my invention is to provide means for increasing the pressure of the air in a machine for blowing sand into a mold.

Another object of my invention is to provide automatic universal seating means between a sand blowing machine and a sand holder.

Another object of my invention is to provide a novel means for disposing a sand holder in alignment with a sand blowing machine.

Other objects of my invention will become evident from the following detailed description, taken in conjunction with the accompanying drawings, in which

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operating cylinder of my novel machine for blowing sand into molds.

Fig. 2 is a plan view of my novel machine.

Fig. 3 is a front elevational view of my novel machine, and

Fig. 4 is a vertical sectional view of an alternative form of my novel machine.

Referring now to the drawings, Figs. 1, 2, and 3 show a base 1 with a vertically disposed hollow cylindrical member 2 extending upwardly on the back side thereof. A bracket 4 with oppositely disposed semi-cylindrical portions 5 and 6, engaged by outer semi-cylindrical clamp members 7 and 8 through bolt and nut assemblies 9 and 10, engage the cylindrical member 2 and an inverted cylindrical member 20, respectively. The hollow cylindrical member 2 has an inlet 14 and outlets 15 and 16, and forms a reservoir for air. A cylindrical piston 21, has a depending flanged portion 22 on the upper end thereof for engagement with the inner side of the cylindrical member 20. An annular L-shaped washer 23 is disposed on the upper end of the piston 21 and is held in position by a cap member 24 having an upwardly extending marginal portion 25 for engaging an inner abutting portion 26 formed in the domed head 27 of the cylindrical member 20. Screw bolts 28 secure the cap member 24 to the piston 21. Cap member 24 has a central opening 11 over which is disposed and secured the flanged end 29 of a slidable bushing 30 by means of screw bolts 31 secured to cap member 24. A gland member 32 in a recessed portion 105 of the domed head 27 seals the bushing 30. The lower end of the piston 21 is telescopically disposed in a sleeve 40, which is secured against rotation by a keyway 41 in one side thereof and a key member 42 engaging complementary flanged collars 43 secured to an outwardly extending projecting portion 44 of the cylindrical member 20 by screw bolts 45. An L-shaped sleeve 46 is disposed in the lower portion of the cylindrical member 20 to receive a coil spring 47 which is nested at its upper end in the outwardly extending depending flanged portion 22 of the piston 21. An annular L-shaped gasket 48 is disposed in the bottom portion of the piston 21, and engages the inner surface of the cylindrical sleeve 40 and is secured by flanged spring retaining member 49 and screw bolts 50. The piston 21 has a depending portion 52 on the lower end thereof for engagement with the inner side of the spring retaining member 49. Apertures 51 in the wall 55 of the piston

Fig. 1 is a vertical sectional view through the 55

21 permit the passage of air from the piston 21 to the sleeve 40. A centrally disposed aperture 53 in wall 55 of the piston 21 has disposed therein a longitudinally extending shaft 56 with a reduced threaded portion 57 on the upper end thereof and an enlarged portion 56a on the lower end thereof forming an intermediate shoulder. The upper reduced portion of the shaft 56 slides in the aperture 53 in wall 55. A spring 59 engaging the wall 55 and surrounding the shaft 56 is held in position by engagement with a washer 58 held by a nut 54 engaging the threaded portion 57 of the shaft 56. The lower end of the shaft 56 has a tapered portion 60 for receiving a tapered aperture 61 in a valve head 62 which is secured to the bottom of the shaft 56 by nut 63. The periphery of the valve head 62 is tapered to engage a tapered seat 64 in seating member 65. The seating member 65 is held in position by a threaded annular collar 67 threadedly engaged to the threaded portion 68 on the lower end of the sleeve 40 and an annular ring 70 secured to the bottom of the collar 67 by screw bolts 71. A gasket 72 is disposed on the upper cut-away portion 73 of the seating member 65 and is held in position by an annular ring 74 secured to the seating member 65 by screw bolts 75. A coil spring 76 is disposed in the sleeve 40 between the ring 74 and the flanged spring retaining member 49. Vertically extending coil springs 80 are disposed in annular grooves 81 and 82 formed in the seating member 65 and the collar 67, respectively, to permit universal movement of the seating member 65 upon engagement with a sand holder 83. An annular member 84, of a suitable composition, is disposed on the bottom of the seating member 65 to prevent scarring of the top of the sand holder 83. The collar 67 has an outwardly extending arm 86 with a vertically extending tapered aperture 87 for receiving tapered shaft 88, which mounts an arm 89 having a cylindrical portion 90, on the lower end thereof, secured by washer 91 and a nut 92. The sand carrier 83 is disposed in the cylindrical portion 90 of the pivoted arm 89 and screw bolts 93 are provided to secure the sand carrier 83. A sand hopper 100 is disposed laterally of the cylindrical member 20 and has an aperture 101 in the bottom thereof, normally closed by a pivoted cylindrical cover member 102, urged to a closed position by spring 103. The bottom of the hopper 100 is substantially in a horizontal plane with the bottom of the seating member 65 so that the sand carrier 83 may be pivoted on the arm 89 to a position underneath the hopper 100 by merely swinging it around to the dotted position shown in Fig. 3. The sand holder 83 forces the cover member 102 against the force of the spring 103, away from the aperture 101, so that the sand carrier 83 is directly beneath the aperture 101, whereby sand flows in the sand holder 83. When the sand holder 83 is pulled away from the bottom of the hopper 100, the spring 103 pulls the cover member 102 to a position covering the aperture 101 in the bottom of the hopper 100.

The hollow column member 2 with inlet 14 and outlets 15 and 16 for air provides air to the bushing 30 through outlet 16 and hose 110 connected to the upper end of the bushing 30 and outlet 16. There are no valves in this line, and it is an open line from the reservoir 2 to the piston 21. The domed head 27 of the cylindrical member 20 and the cap 24 forms a chamber 111 in the upper end of the cylindrical member 20,

and an aperture 112 extends into this chamber where air is introduced from outlet 15 through hose 113, fitting 114, hose 115, pet cock 116 and pipe line 118. The pet cock 116 controls the amount of air passing into the chamber 111. The fitting 114 has an exhaust port 117, which is automatically connected to the hose 115 and chamber 111 when a solenoid in the fitting 114 (not shown) is deenergized. When the solenoid is energized by a suitable switch (not shown) the exhaust port 117 is closed and the air is free to flow from reservoir 2 through outlet 15, hose 113, fitting 114, hose 115, pet cock 116, pipe line 118, to the chamber 111. The sand holder 83 fits over and engages a mold box 120, as shown in Fig. 3, wherein the sand may be blown from the sand holder 83 to the mold 120.

In operation, the sand holder 83 is swung beneath the hopper 100 and filled with sand and then swung back to the position underneath the seating member 65, as shown in Figs. 1 and 3. Solenoid member (not shown) in fitting 114 is then energized, whereupon air passes from the reservoir 2 through outlet 15, hose 113, fitting 114, hose 115, pet cock 116, pipe 118, into chamber 111, thereby causing downward movement of the piston 21 against the force of coil springs 47 and 76. The force of the air in chamber 111 against the cap member 24 causes the piston 21 to move downwardly. The downward movement of the piston 21 exerts a downward force on the spring 76 which moves the sleeve 40 downwardly inasmuch as it exerts a downward pressure on the seating member 65 retained by ring 70 in annular collar 67 secured to sleeve 40. The downward movement of the piston 21 also compresses the spring 47. The piston 21 and sleeve 40 move downwardly until the seating member 65 engages the top of the sand holder 83 and it is in seating engagement with the top thereof. The continued downward movement of the piston 21 forces the shaft 56 and the valve head 62 thereon downwardly, wherein the valve head 62 passes into the interior of the sand holder 83 a predetermined distance. Since the air continuously enters the piston 21 through bushing 30, hose 110, and outlet 16, and passes down into the sleeve 40, it will be evident that this air, at a suitable pressure, passes to the sand holder 83 and is dispersed outwardly over the tapered seating portions of the valve head 62. The solenoid fitting 114 is then deenergized and exhaust port 117 opens, causing the coil springs 47 and 76 to return the piston 21 to its normal position as shown in Fig. 1, almost instantaneously. The shaft 56 also moves upwardly with the piston 21, and the valve head 62 seats on the seating surface 64 of the seating member 65. The operation of filling the sand holder 83 is again repeated, and the same operation followed as heretofore described.

The alternative construction shown in Fig. 4 of the drawings is substantially the same as that described in Fig. 1 except that a check valve is disposed in the top of the piston, the bottom of the piston is somewhat modified and the vertically extending shaft is modified. Referring now to Fig. 4, inverted cylinder member 200 has a dome shaped head 201 with a centrally disposed recess 202 for receiving a bushing 203 sealed by gland member 204. A piston 205, with a depending flanged portion 206 is disposed in the cylinder 200 and has a washer 207 and a cap member 208 secured to the top thereof by screw bolts 209. The cap member 208 has a central

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aperture 210 with an apertured web 211 for receiving the stem 212 of a valve 213 which seats on seat 214 in the flanged end 215 of the bushing 203, the flanged end 215 being secured to the cap 208 by screw bolts 217. A spring 300 is disposed between web 211 and the valve 213 to urge the valve 213 in seating relationship with the seat 214. The bottom end of the piston 205 is disposed telescopically in a sleeve 220 which has a key way 221 in the side thereof for receiving a key 222 in engagement with a keyed member 223 of a collar 224 secured to outwardly extending portions 225 on the bottom of the cylindrical member 200 by screw bolts 226. The top of the sleeve 220 has a flanged portion 227 to limit the vertical downward movement of the sleeve 220. The bottom portion 228 of the piston 205 has apertures 230 disposed therein and also has a centrally disposed aperture 231 for receiving a vertically extending shaft 232. A spring 290 is disposed between the bottom portion 228 of the piston rod 205 and the washer 234 and nut 233 on the upper end of the shaft 232. The shaft 232 has a shoulder 235 formed thereon for seating the internally flanged portion 236 of flanged spring retaining member 237. An outwardly projecting seating portion 238 is provided on top of the spring retaining member 237 to engage a seat 240 formed in the bottom portion 228 of the piston 205.

An annular L-shaped member 241 is provided in the cylinder member 200 to nest one end of coil spring 242 which is nested at the top end in the depending flanged portion 206 of the piston 205.

The flanged spring retaining member 237 is secured to the shaft 232 by washer 243 and screw nut 244. The bottom end of the shaft 232 has a cylindrical recess 246 and another continuing reduced recess 247 for receiving the stem 248 of piston 249 secured to a lower shaft 250 by screw thread portion 251. The shaft 250 has an enlarged head 252 for receiving the end 253 of the shaft 232. A lock screw 254 is provided in the head 252 to lock the shaft 250 against rotative movement relative to the shaft 232. The bottom end of the shaft 250 has a tapered portion 255 for receiving the tapered aperture 256 of a valve head 257, which has a beveled peripheral seating portion 258 for engaging beveled seat 259 in seating member 260. The seating member 260 is secured between a collar 261 and a locking member 280 with springs 262 therebetween the same as described for Fig. 1. A washer 263 is secured to the top of the seating member 250 by ring 264 and screw bolts 265. A spring 266 is disposed in the sleeve 220 between the spring retaining member 237 and the ring 264. The source of air through bushing 203 and through aperture 270 in the domed head 201 of the cylinder 200 is the same as that described in Fig. 1. The construction of the sand holder 271 on the pivoted arm 272 is identical with the sand holder described in Fig. 1.

In operation, air is provided through aperture 270 to the chamber in the domed head 201 to force the piston 205 downwardly. Upon downward movement of the piston 205, no air enters the piston 205 through the bushing 203 because of the check valve 213, thus compressing the air in the piston 205 and the sleeve 220. When the seat 240 on the bottom of the piston 205 engages the seating portion 238 on the spring retaining member 237, the shaft 232 moves downwardly carrying with it the valve head 257 which passes

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into the sand holder 271. The air which has been compressed and whose pressure has been greatly increased in the piston 205 and sleeve 220 is dispersed in the sand holder by the valve head 257. The air is then exhausted through aperture 270 from the upper portion of the cylinder member 200 by means as described in Fig. 1 and springs 242 and 266 cause the piston 205 to return to its normal position as shown in Fig. 4. In the upward movement of the piston 205, the check valve 213 opens because of the greater air pressure in the bushing 203 to fill the piston 205 and sleeve 220 with air through the bushing 203. The check valve 213 is normally open in that the spring 300 urging the valve 213 against the seat 214 is designed to permit the valve 213 to open under normal conditions.

The flanged portion 227 on the sleeve 220 limits the downward movement of the sleeve 220. The downward movement of the valve head 257 is limited by adjustment of the screw portion 251 of the piston 249 in the recessed portion 246 of the shaft 232. Initially, the seating member 260 seats on the sand holder 271 as described in Fig. 1.

The purpose of providing my modified construction is to permit the use of reduced pressures in the operation of my novel core blowing machine. It has been found that my novel machine will operate on less than one-half of the pressure required for the operation of present sand blowing machines.

It will be evident from the foregoing that I have provided a novel machine for blowing sand from sand holders which has universal automatic seating means, which disperses the air passing into the mold around the periphery of the sand holder to completely free the sand holder from sand, and which automatically increases the pressure of the air passing to the sand holder as part of the operation of my machine.

Various changes may be made in the specific embodiment of my invention without departing from the spirit thereof or from the scope of the appended claims.

What I claim is:

1. A machine of the type described, in combination, a cylinder, a sleeve telescopically disposed in said cylinder, a hollow piston engaging said cylinder and said sleeve, passage means connecting the interior of said piston with the interior of said sleeve, a seating member on the bottom of said sleeve, a valve in said seating member, a shaft movable with said piston having said valve attached thereto, a source of air connected to the interior of said piston, and means for moving said piston and sleeve longitudinally in said cylinder.

2. A machine as set forth in claim 1 wherein the seating member on the bottom of said sleeve is yieldable.

3. A machine of the type described, in combination, a cylinder, a movable sleeve telescopically disposed in said cylinder, a hollow piston engaging said cylinder and sleeve, passage means connecting the interior of said piston with the interior of said sleeve, a shaft movable with said piston, a valve head attached to said shaft, a seating member on the bottom of said sleeve having a seat for seating said valve, a source of air connected to the interior of said piston, and means for longitudinally moving said piston in said cylinder and for returning the piston in an opposite direction.

4. A machine as set forth in claim 3 wherein

said means for moving said piston in said cylinder is a source of air and means for returning said piston in an opposite direction is a spring member.

5. A machine for blowing sand into a mold comprising a cylinder, a sleeve telescopically disposed in said cylinder, a piston engaging said cylinder and said sleeve, a shaft movable with said piston, a valve attached to said shaft, a seating member on the end of said sleeve having a seat for seating said valve, a check valve in said piston, a source of air for moving said piston in said cylinder and said shaft, and means for returning said piston and shaft in an opposite direction.

6. A machine as set forth in claim 5 wherein said shaft has a means disposed intermediate thereof to engage the bottom of said piston when it moves a predetermined distance to unseat said valve.

7. A machine of the type described comprising an inverted open cylinder, a sleeve telescopically disposed in said cylinder, a hollow piston movable in said sleeve and engaging said cylinder, passage means connecting the interior of said piston with the interior of said sleeve, a shaft movable with said piston, a valve connected to said shaft, a movable seating member on the bottom of said sleeve having a seat for seating said valve, a source of air connected to the interior of said piston, spring means for urging said piston and sleeve in one direction, and means for moving said piston and sleeve in a direction opposite to said springs to unseat said valve.

8. A machine as set forth in claim 7 wherein said means for moving said cylinder against said spring means is a source of air and further means are provided to exhaust said air from said cylinder.

9. A machine as set forth in claim 7 wherein means are provided for limiting the movement of said valve.

10. A machine for blowing sand into a mold comprising a hollow cylinder providing a reservoir for fluid, a bracket movable on said cylinder, an inverted open cylindrical member disposed in said bracket, a sleeve telescopically disposed in said open cylindrical member, a piston engaging said open cylinder and movable in said sleeve, a fluid line from said hollow cylinder to said piston, a second fluid line from said hollow cylindrical member to a portion of said open cylinder above said piston, a shaft movable with said piston, a seating member on the bottom of said sleeve having a seat, a valve head carried by said shaft adapted to engage the seat of said seating member, and spring means for urging said piston and sleeve in one direction.

11. A machine as set forth in claim 10 wherein said second fluid line has a valve therein which passes air to the top of said open cylindrical member in one position thereof and exhausts air from the top of said open cylindrical member in another position thereof.

12. A machine as set forth in claim 10 wherein said piston has a check valve and said shaft has a means disposed intermediate thereof adapted to be engaged by the bottom of said piston upon a predetermined movement of said piston to move said valve longitudinally.

13. A machine for blowing sand into a mold comprising a cylinder, a hollow piston movable in said cylinder, a movable seating member having a valve seat, a valve rod movable with said piston, a valve on said rod adapted to engage the seat of said seating member, a source of air connected to the interior of said piston, passage means connecting the interior of said piston with said seating member, and means for moving said piston and attached valve a predetermined distance to unseat said valve whereby the air in said piston is released from said seating member.

14. A machine as set forth in claim 13 wherein means are provided for adjusting the length of said valve rod.

15. A machine as set forth in claim 13 wherein said seating member is mounted on annularly disposed spring members.

16. A machine for blowing sand from a sand holder into a mold comprising a cylindrical member, a hollow apertured piston movable in said cylindrical member, means for moving said piston, a source of air connected to the interior of said piston, an apertured seating member movable with said cylindrical member, passage means between said piston and said seating member, a valve for controlling the flow of fluid from said apertured piston through said apertured seating member, means for automatically opening said valve upon a predetermined relative movement between said piston and said cylindrical member whereby the air in said piston is passed through said apertured seating member, and means for moving said piston upwardly and returning said valve to a closed position.

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