

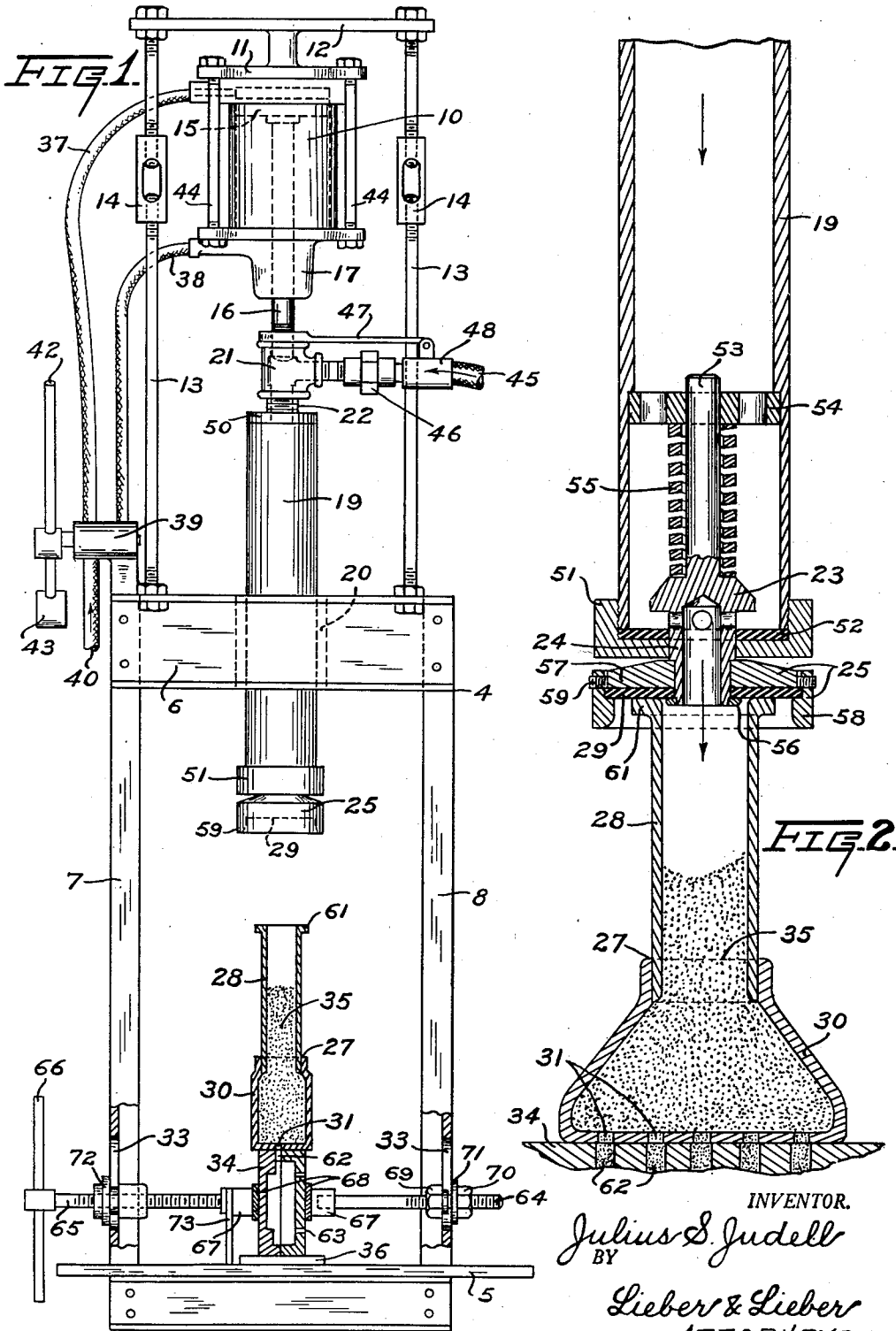
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CORE BLOWER

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CORE BLOWER

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1 Claim. (Cl. 22—10)

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This invention relates in general to improvements in the art of manufacturing cores for foundry work, and relates more specifically to improvements in the construction and operation of sand core blowing devices or mechanisms.

The primary object of the present invention is to provide a new and useful sand core blower, which is simple and durable in construction, highly efficient and reliable in operation, and flexible in its adaptations.

It has heretofore been common commercial practice to manufacture sand cores for diverse purposes, by utilizing compressed air to blow the bulk sand into a mold and to compress the sand mass within the molding or forming cavity; and while this method of producing such cores has proven quite successful and practical, the prior mechanisms for carrying on the blowing method are all objectionable for various reasons. Most of these prior mechanisms are relatively complicated and cumbersome, and are therefore costly and require considerable space for installation thereof; while some are difficult to operate or manipulate, and cannot be readily utilized for the production of cores of different shapes and sizes. In some of the previous core blowers, it has also been proposed to supply the sand to the molds directly from successive cartridges each adapted to hold a batch of sand sufficient to fill a limited number of molds; and while this mode of sand supply is desirable and facilitates the production of relatively small cores in rapid succession, the prior cartridge type machines required the use of a number of rather complicated manually operable compressed air control valves and were therefore rather difficult to manipulate.

The present invention therefore contemplates the provision of an improved cartridge sand supply type of core blower which is semi-automatic in action and wherein the successive cores may be rapidly and effectively produced with minimum effort on the part of the operator.

Another object of this invention is to provide an improved sand core blowing unit which is simple and compact in structure, and which is also adapted to cooperate most efficiently with molds of various sizes and shapes.

A further object of my invention is to provide an improved core blowing assemblage wherein the compressed air is automatically admitted to a sand supply cartridge associated directly with the mold, only after the cartridge has been clamped to the mold, and in which the air supply is promptly interrupted when the clamping pressure is released.

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Still another specific object of the invention is to provide an improved sand batch supply cartridge for core blowers, from which the sand is adapted to be most effectively delivered to the successive molds, and which is not susceptible to undesirable clogging.

These and other objects and advantages of this invention will be apparent from the following detailed description.

A clear conception of the several features constituting my present improvement, and of the mode of constructing and operating sand core blowers embodying the invention, may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the two views.

Fig. 1 is a somewhat diagrammatic and part sectional front elevation of a typical cartridge type sand core blowing unit embodying my invention, showing a typical core mold and a sand supply cartridge resting loosely thereon, both in section; and

Fig. 2 is an enlarged fragmentary central vertical section through the cartridge clamping and compressed air supply mechanism, a fragment of a mold, and the sand supply cartridge, the section through the latter being taken at right angles to the plane of section of Fig. 1.

While the invention has been shown and described as being advantageously applicable to a typical vertically disposed unit for producing relatively small cores in rapid succession, it is not my desire or intention to thereby unnecessarily restrict the scope or utility of the improved features by virtue of this limited disclosure.

Referring to the drawing, the improved sand core blower shown therein by way of illustration comprises in general a main approximately rectangular open frame 4 having a base plate 5 and a pair of spaced upper cross-beams 6 firmly secured to the plate 5 by means of laterally separated opposite side channel beams 7, 8 respectively; a compressed air actuated power cylinder 10 having an upper head 11 and being vertically adjustably supported above the cross-beams 6 by means of a bracket 12 and upright sectional rods 13 having turnbuckles 14 therein, the cylinder 10 also having therein a reciprocable piston 15 provided with a vertically movable piston rod 16 which penetrates the lower cylinder head 17; a vertically reciprocable elongated compressed air supply tube 19 slidable in a guide bearing 20 confined between the cross beams 6 and being suspended at its upper end from the piston 16 by

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means of a compressed air supply T-fitting 21 and an air admission nipple 22, while its lower end is provided with a compressed air discharge valve 23 having an integral tubular lower projection 24 to which a cartridge clamping plate 25 is secured; one or more sand batch supply cartridges 27 each having an upwardly open upper tubular section 28 communicable with the valve projection 24 and engageable with the plate 25 through a resilient sealing disc 29, and being provided with a downwardly spreading tapered lower mold contacting section 30 having a series of sand discharge openings or orifices 31 therein; and adjustable mechanism associated with elongated slots 33 formed in the frame side channels 7, 8 and being cooperable with molds 34 of different sizes and shapes to properly position and hold the molds while being blown full of sand 35.

The main frame 4 may be constructed of structural steel beams welded or otherwise united to provide a rigid assemblage, and the base plate 5 should preferably be provided with a flat upper work supporting surface upon which the molds 34 may be mounted through intervening plates or blocks 36 of suitable thickness. The power cylinder 10 has a piston stroke of definite length, and is therefore preferably firmly but adjustably supported upon the main frame 4 so that vertical bodily adjustment of the cylinder 10 is possible, and the turn-buckles 14 associated with the cylinder mounting rods 13 provide for such cylinder adjustment. This vertical adjustability of the power cylinder 10 is desirable in order to permit operation with molds 34 of different heights, and without disturbing the position of the base plate 5.

Compressed air for actuating the piston 15 of the power cylinder 10, may be supplied from any suitable source through flexible conduits 37, 38 communicating respectively with the upper and lower piston displacement chambers of the cylinder 10 and with a common control valve 39 mounted upon the main frame 4. This air supply and exhaust valve 39 may be of any suitable type adapted to alternately admit compressed air to the piston displacement chambers from a supply pipe 40, and to exhaust the spent air from the inactive chambers when the piston 15 and rod 16 are moved down and up; and the valve 39 is manually operable to lower the piston 15 and rod 16 by means of a lever 42 having thereon a weight 43 for automatically shifting the lever and valve to elevate the piston and rod whenever the lever 42 is released. As will be apparent from the subsequent description of the operation of the unit, downward swinging of the lever 42 is the only manual operation required to blow a core, all other operations being performed automatically.

The cylinder heads 11, 17 may be clamped to the ends of the cylinder 10 by means of bolts 44 as shown, and the lower head 17 is provided with the usual packing in order to prevent undesirable escape of air from the cylinder. The lower extremity of the piston rod 16 is rigidly attached to the T-fitting 21 in alinement with the nipple 22 which communicates with the air supply tube 19 and supports the same, and compressed air may be supplied to the fitting 21 and tube 19 from any suitable source through a flexible conduit 45 and a coupling 46. The air delivery end of the conduit 45 is supported from the piston rod 16 by means of a rigid arm 47 and a collar 48 embracing the conduit and pivotally suspended from the outer end of the arm, so that the end of the flexible conduit 45 will always be held in alinement with the

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coupling 46 and will not undesirably stress the T-fitting 21.

The upper end of the elongated compressed air supply member or tube 19 is provided with a cap 50 to which the nipple 22 is attached, and the lower end of this tube 19 is enclosed by a cap 51 having a flexible valve seating disc 52 clamped thereto by the tube end; see Fig. 2. The flexible discs 29, 52 may be formed of rubber or the like, and the tubular lower projection 24 of the valve 23 is slidable through aligned central bores in the cap 51 and disc 52, while the valve 23 also has an integral upwardly extending guide rod 53 coacting with a guiding bracket 54 secured within the tube 19. A helical compression spring 55 surrounds the guide rod 53 and coacts with the valve 23 and with the bracket 54 so as to constantly urge the valve 23 toward its seating disc 24; and the valve opening plate 25 which is firmly secured to the lower end of the hollow valve projection 24 by means of a nut 56, is composed of an inner flat circular element 57 and an outer ring 58 which is fastened to the element 57 by set screws 59 and coacts therewith and with the nut 56 to firmly hold the resilient sealing disc 29 in place.

As previously indicated, each of the sand supply cartridges 27 comprises an upper tubular section 28 and a lower enlarged and downwardly tapered spreading section 30, cooperating to provide a relatively large chamber for confining a batch of sand 35 or the like, and the upper extremity of the tubular section 28 is provided with an annular flange 61 adapted to be clampingly and sealingly engaged by the disc 29. The interior of each cartridge 27 is entirely unobstructed and the spreading formation of the lower section 30 is desirable in order to permit the sand 35 to spread out and loosen so as to enable the air to mingle with and transport the sand particles into the molds 34 in a most effective and rapid manner. The sand discharge orifices 31 are preferably disposed uniformly throughout substantially the entire area of the flat bottom of the cartridge section 30 so as to insure uniform distribution of the sand flow and to prevent possible clogging, and the cartridges 27 may be periodically refilled from any suitable source of sand supply, through the upper openings in the tube sections 28.

The core molds 34 may be of diverse sizes and shapes and are usually formed of two cooperating sections one of which has a series of sand and air admission openings 62 therein, while the other is provided with a plurality of relatively small air escape openings 63. The sand laden cartridges 27 are adapted to be disposed upon and clamped to the molds 34 with a number of the cartridge discharge orifices 31 in open communication with a number of the mold inlet openings 62, and the air escape openings 63 should be in open communication with the atmosphere. The sand 35 which is blown into and ultimately completely fills the interior of each mold 34, is compressed and packed so as to produce a stable core readily removable by merely separating the two sections of the mold; and in order to prevent undesirable separation of the mold sections during the blowing operation, it is preferable to provide means for clamping these sections together.

As shown in detail in Fig. 1, I have provided improved adjustable mechanism for properly positioning and for holding the separable sections of the molds 34 together, and this mechanism comprises in general a horizontal reaction screw 64 adjustably mounted in the vertical slot 33 of

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the side beam 8, and a horizontal jack screw 65 likewise adjustably mounted in the vertical slot 33 of the opposite side beam 7, the jack screw 65 being disposed in approximately horizontal alignment with the screw 64 and being manipulable with the aid of a handle 66 secured to its outer end. The inner ends of the screws 64, 65 are formed for coaction with the adjacent sections of the intervening molds 34, through swivel blocks 67 and holding plates 68, and the reaction screw 64 is adapted to be clamped in adjusted position within the adjacent slot 33 by means of a special nut 69 having an integral extension projecting into the slot, and a nut 70 and washer 71 coacting with the beam 8 outwardly of the slot 33. The reaction screw 64 may therefore be locked in various positions along the slot 33 and may also be locked in various positions of axial or longitudinal adjustment, in order to insure proper cooperation with molds 34 of different sizes and shapes. The medial portion of the jack screw 65 has screw thread coaction with a bushing 72 which is vertically adjustable along the slot 33 of the side beam 7, and in order to support the inner end of the screw 65, a prop 73 of variable length may also be provided, thus likewise permitting both vertical and axial adjustment of the jack screw so as to insure proper cooperation with molds 34 of various sizes and shapes.

When the improved core blowing unit has been properly constructed and assembled, it may be quickly and conveniently adapted for cooperation with molds 34 of diverse sizes and shapes by merely manipulating the turnbuckles 14 to properly position the power cylinder 10 relative to the base plate 5, and by adjusting the screws 64, 65 so as to insure proper cooperation of the positioning plates 68 with the successive selected molds 34, whereupon the successive cores may be blown in rapid succession as follows. An empty mold 34 should then be positioned upon the block 36 between the holding plates 68, whereupon a cartridge 27 may be loaded with sand 35 and set upon the mold 34 with the orifices 31 in open communication with the sand inlet openings 62 of the mold. The air supply conduits 40, 45 should be connected to the compressed air supply, and when the lever 42 is subsequently manipulated to actuate the valve 39 so as to admit compressed air above the piston 15 and to release the air confined beneath this piston, the member or tube 19 will be promptly lowered to first bring the flexible disc 29 into clamping and sealing contact with the top flange 61 of the cartridge 27, and to thereafter open the valve 23 by compressing the spring 55.

When the compressed air supply valve 23 is thus opened, air under pressure is freely admitted from the supply conduit 45 through the coupling 46, fitting 21, nipple 22 and tube 19, into the upper sealed end of the cartridge 27, and quickly permeates the loose sand 35 within the cartridge and forces sand through the orifices 31 and openings 62 into the mold cavity in sufficient quantities to completely fill the mold 34. The sand 35 thus blown into the mold is thoroughly packed and compressed and the transporting air quickly escapes through the outlet openings 63, thus completing the core in but a very short period of time. The operator need only release the lever 42 after the core has been blown, whereupon the weight 43 will operate the valve 39 so as to admit air under pressure beneath the piston 15 and to permit the air to escape from above this piston, whereby

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the tube 19 will be promptly lifted away from the cartridge 27 and the air injection valve 23 will be quickly closed by the spring 55. The cartridge 27 may then be lifted from the mold 34 and set upon the base plate 5, and the mold 34 may thereafter removed and separated for withdrawal of the completed core, whereupon the cycle may be promptly repeated to produce subsequent cores in an obvious manner.

From the foregoing detailed description of the construction and operation of my improved sand core blowing unit, it will be apparent that the present invention provides an improved assemblage which besides being simple, compact and durable in construction, is capable of quickly and effectively producing cores in rapid succession. The operation is positive and automatic except for the manual actuation of the valve 39 to lower the piston 15 and tube 19, and this valve 39 may either be hand or foot actuated. The various parts of the assembly may be conveniently adjusted to produce large or small cores of various shapes, and the cartridges 27 may be made of sufficient capacity to fill a number of molds 34 in succession. By causing the disc 29 to seal the cartridge 27 before air is admitted thereto, undesirable escape of compressed air is avoided, and the spring 55 performs the dual function of closing the valve 23 and of clamping the cartridges 27 against the molds 34. The spreading lower sections 30 of the sand supply cartridges 27 also eliminate possible clogging and insure uniform distribution of the sand 35, and also provide maximum sand confining space within the cartridges. The invention has proven highly satisfactory and successful in actual use, and the mechanism is operable by a novice to produce perfect cores in rapid succession and at minimum cost.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

A core blower comprising, a rectangular frame having a fixed horizontal lower mold support and a pair of horizontal upper cross-beams rigidly connected with the support by upright side beams, a pair of upright rods extending upwardly from said cross-beams and having a vertically adjustable bracket secured to the upper ends thereof, an air actuated power motor suspended from said bracket and having a piston rod reciprocable within the space between said upright rods toward and away from said cross-beams, an elongated compressed air supply tube suspended coaxially from the lower end of said piston rod and being guided for vertical reciprocation between said cross-beams, an air delivery valve slidably confined within the lower end of said tube and having a tubular end protruding beyond the tube end, a combined sealing and clamping disc secured to said protruding tubular valve end, means for constantly resiliently urging said valve and disc downwardly, a sand supply cartridge insertible between said disc and a mold resting upon said lower mold support, and means for actuating said power motor to cause said disc to initially seal and clamp said cartridge and to thereafter open said valve to admit compressed air from said supply tube through said cartridge to the mold.

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