June 27, 1950 O. OSTERMANN ET AL 2,512,871

CORE BLOWING MACHINE

Filed March 29, 1944 2 Sheets-Sheet 1

FIG. 1.

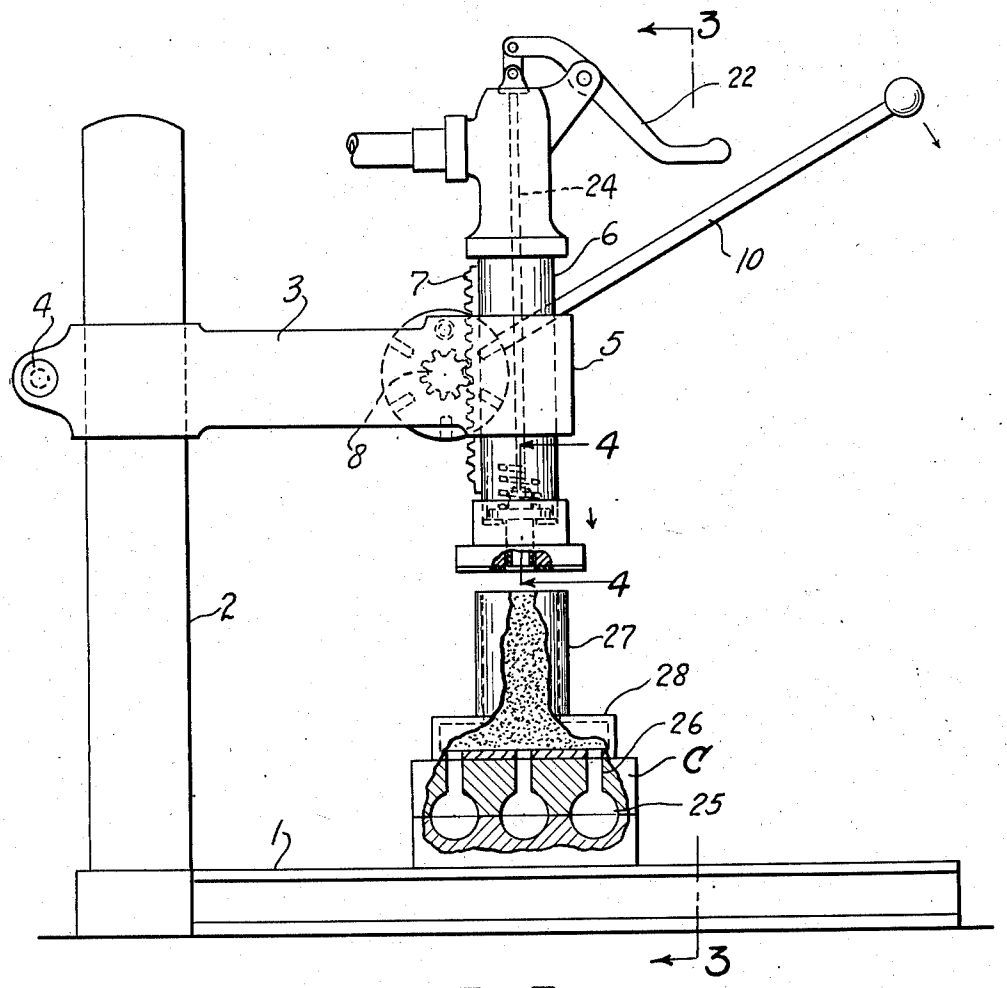

FIG. 2.

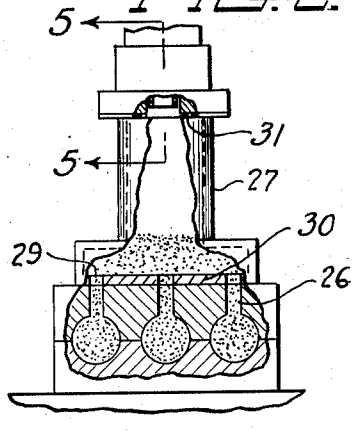

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FIG. 3.

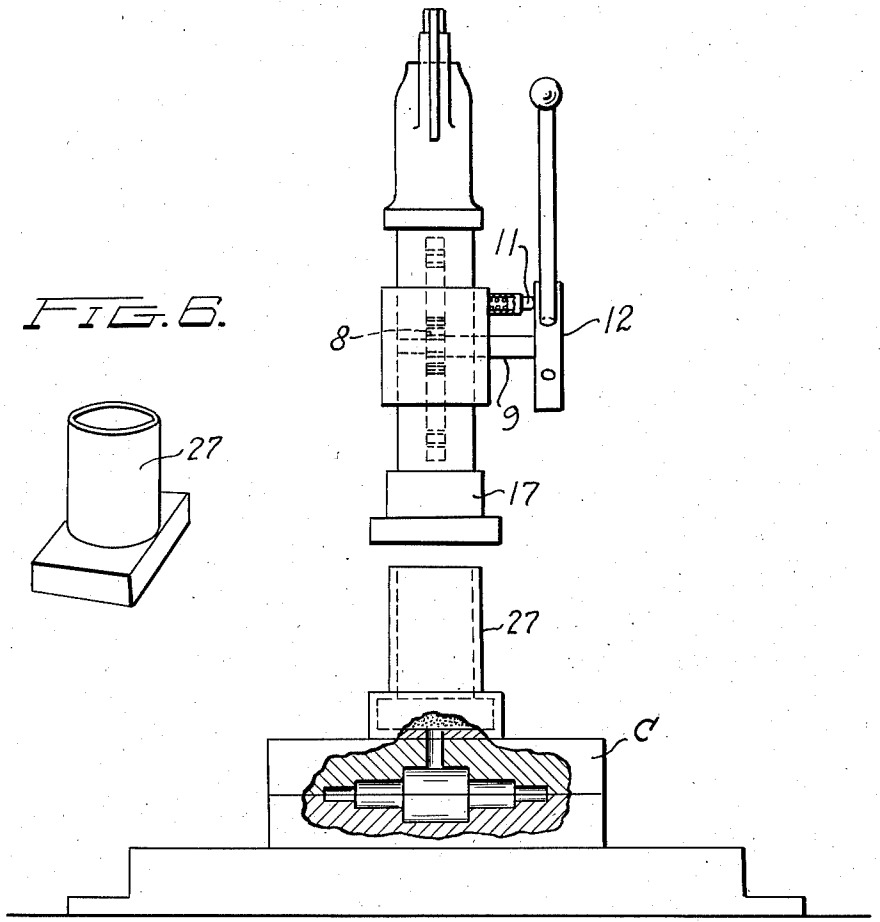
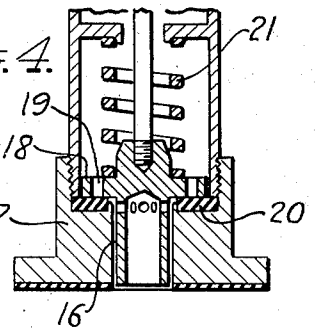


FIG. 6.

FIG. 4.



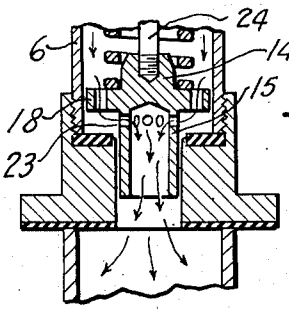


FIG. 5.

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CORE BLOWING MACHINE

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Application March 29, 1944, Serial No. 528,608

4 Claims. (Cl. 22—10)

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This invention relates to a method and apparatus for blowing cores.

Many types of core blowing machines have been proposed in the prior patented art and core blowing machines are now in extensive use in industry. These machines are rather large machines that involve the use of magazines for containing sand and distributing heads for distributing the sand to the cavities of the core mold or box.

These core blowing machines are subject to certain shortcomings which it is the object of our invention to overcome. One of these shortcomings is the sand distributing head has to be provided with different bottom plates for different style core boxes. These plates have to be changed each time a different style core box is blown, and time consuming adjustment of the machine may have to be made to accommodate core boxes of different heights. Another serious handicap has been that if the moisture content of the sand is too high, the apparatus will not work to form proper cores. Only sand of very low moisture content can be used in blowing intricate cores. For instance, if the sand has a moisture content of say more than two per cent, the conventional type of core blower will not effectively carry the sand into the core box. We believe this to be due to too great diffusion of the air blast which is allowed to expand and lose its propulsive effect particularly in core blowing machines that have the usual downwardly flaring type of core blowing head. We do not have to so closely control the moisture content of the sand used in blowing with our machine. Sand with a moisture content of from two to five per cent can be used without difficulties.

We propose to use a cartridge which contains for discharge only the necessary amount of sand for each core box. There is at the lower end an enlargement or a base for spanning the openings into the core box. In this base is packed a mass of sand which will resist diffusion of the air streams. This concentrates the air and causes the same to pack the sand tightly in this constricted chamber used to span the core box openings. The air blast here operates on the piston propulsion principle rather than sweeping the sand along in the wake of the air blast as is the principle of operation, we believe, of core blowers of the prior art. Hence, in our new and novel type of core blower the moisture content of the sand is not as critical as is the case with conventional core blowers. Sand with more than two per cent and up to five per cent or more of moisture can be successfully used.

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The machine is a small, simple, and hand-operated machine that may be set on a bench and operated with a minimum of skill. No magazines and sand distributing reservoirs are needed, with their valves, controls, etc. There is simply a hand-operated air reservoir which can be raised and lowered with one hand, while the outlet valve in the reservoir is opened with the other hand to allow the air blast to pass out. The sand cartridge and the core-box-opening-spanning base is a metal shell, that can be made of welded metal parts or of a casting.

Instead of the usual raising of the core box support mechanically or by fluid pressure, our machine provides a stationary core box support which may rest directly on the work bench. The relative movement to bring the air supply, the sand supply and the core box together is secured by simply raising and lowering the air reservoir by means of a hand operation, transmitted through a pinion and rack or any other convenient mechanical device. The sand container or cartridge is plunged or dipped into a pile of sand on the bench each time to get a charge or refill. This achieves simplicity and a saving in supplying and handling the core sand.

Referring to the drawings:

Fig. 1 is a side elevation of the machine showing the sand container and the core box partly broken away.

Fig. 2 is a view showing the air reservoir clamped on the sand container or cartridge.

Fig. 3 is a front elevation of the machine.

Fig. 4 is a section on the line 4—4 of Fig. 1.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a perspective of the sand cartridge.

1 designates the platform at the base of the machine, 2 the upright post on which the arm 3 may be adjusted by a bolt 4 which passes through a split sleeve. The arm carries a sleeve 5 at the outer end in which is slidably guided the cylinder 6 which has a rack 7 secured to the side. This meshes with the pinion 8 on the shaft 9 which may be rocked by means of the crank 10. A drag type of detent 11 bears against the circular head 12 which is provided with sockets 13 for the insertion of the end of the crank 10.

Cylinder 6 forms an air reservoir with a valve 14 at the bottom. This valve has a pilot sleeve 14 for guiding it in the opening in the interiorly threaded cap 17 at the end of the cylinder. The valve has a flange 18 with perforations 19. The flange is arranged to seat on the gasket 20 at the lower end of the cylinder and is held in this position by the air pressure and also by the helical

spring 21. When the valve is raised by means of pressing down on the lever 22, this allows the air blast to pass through the openings 19 and the openings 23. A valve stem 24 connects the valve with the lever 22. This specific type of valve and valve operating mechanism, of course, is not at all essential, but it is found to be an efficacious one.

The core box is designated C and is provided with several core cavities 25 with openings 26 leading into the cavities.

The usual core blowing machine has a rather large sand distributing head which flares out toward the lower end for fitting over the core box and spanning the openings in the core box and forming a seal therewith. Usually each time the type of core box is changed a heavy plate has to be detached from the bottom of the sand distributing head and exchanged for another plate with openings suitably located to register with the openings in the new type of core box. Furthermore, the machine parts may have to be rearranged or adjusted to take a differently shaped core box of perhaps different height.

To obviate this we propose to use a small cartridge containing sand and provide it on its lower end with a laterally extending base of restricted dimensions for concentrating the air blast to pack the sand in the base so that it will be propelled piston-like into the openings in the cavities of the core box. The cartridge proper is designated 27. The restricted base and core-opening-spanner is designated 28. The bottom of the base has openings 29 for registering with the openings 26 in the core box. The operator presses down on the crank 10 which causes the cylinder 6 to descend on the top of the cartridge 27 where the sealing ring 31 forms an air seal. Thereupon the operator presses down on the lever 22 with the other hand. This opens the air valve. The charge of sand in the cartridge is carried down into the base 28 and in this restricted chamber the air, instead of being diffused as in previous designs of core blowing machines, is concentrated and serves to pack the sand in the base of the cartridge. The sand from the charge-containing part of the cartridge is blown through openings 29 in the sand packed base with a piston-like propulsion and into the openings in the core box. Sand is left packed in the enlarged base after the blow, as shown in Fig. 2. The air passes out through screened vents in the core box which are not here shown as they are well known in the art.

We find in practice that the size of the cylindrical or charge-containing portion of the cartridge need be just enough to contain one charge of sand for the core box. Of course, it can be made larger, but we believe it is better to make it substantially of the volume of the core box cavities and openings. If it is made smaller than the volume of the core box some of the sand in the base is carried into the core box and the machine loses its effectiveness.

In place of charging hoppers, which have to travel back and forth to large sand reservoirs which in turn have to be re-supplied at regular intervals by elevating the sand to the top of the machine, all that our machine requires is a pile of loose sand on the bench. At the end of each blow the attendant raises the air reservoir. He refills the cartridge by simply plunging it into the sand pile at his side. Another core box is placed on the platform, the reloaded cartridge is inserted between the reservoir and the core box and again the cartridge is pinched in air-sealed relation between the air reservoir and the core box. Then another blast of air is directed into the cartridge to clear the charge contained in the upper charge-containing chamber.

We find that a suitable diameter for the tubular hopper part of the cartridge is six times the diameter of the valve opening in the air reservoir. We do not give these dimensions as any way limiting our invention, but to afford desirable specifications.

It is desirable to always have a residuum of sand in the base of the cartridge as this forms a protective plug of solid sand to protect the contents of the core box and the core box against the blast of high pressure air. If a suitable protecting plug is not afforded the air blows through the bottom of the sand reservoir or cartridge and forms craters in the sand of the core box. This is most undesirable.

This interchangeable cartridge can blow almost any type, size or shape of core box on the machine without changing the machine set up. One simply picks up the correct cartridge for the core box and inserts it between the new core box and the air reservoir. With machines now in use, this usually requires a change of the core-box-openings-spanning plate on the bottom of the sand hopper, to make the openings register and also it may entail some rather tedious adjustments to get the parts to the proper height to handle the new core box.

This machine is particularly useful in packing core boxes for intricate cores. That is very often done by hand. On the bench we find that one operator can use this simple machine to make four times as many cores as he can when he has to pack the core boxes by hand.

It will be noted, in taking a side elevational view of the cartridge, shown in Figs. 1 and 2, that the general contour of the cartridge is that of an inverted T. Or if one were to slice down through the cartridge at the center in a plane longitudinally of the base, or what we term longitudinally of the cartridge, the longitudinal section would be of T shape. We have given this description for the purpose of using the same in the claims in order to more particularly describe the cartridge and distinguish from the prior art.

It will be understood in the claims, when referring to the core box, that the core box may include one or several cores. The drawings show the core box having several cores. On the other hand, the several core boxes could be abutted, one against the other, and held in this position for one blow with one cartridge, so we want it understood the claims cover these several things.

What we claim is:

1. A sand holding cartridge for interposition between an air discharge reservoir having a discharge port controlled by an air valve and a core box and supporting platform of a machine for blowing cores, said cartridge comprising a charge holding body portion of substantially uniform cross section and having a capacity to contain substantially only a charge for one core box blow, and a hollow sand-distributing base portion expanding the cartridge abruptly at the end of the body portion and serving to span the core box and blow holes therein, and having a limited thickness, the cartridge, when viewed in side elevation, or in longitudinal section, being of substantially inverted T shape, the body forming the upright bar of the T and the hollow base the cross bar of the T.

2. A sand holding cartridge for interposition

between an air discharge reservoir having a discharge port controlled by an air valve and a core box and supporting platform of a machine for blowing cores, said cartridge comprising a charge-holding columnar body portion and having a capacity to contain substantially only a charge for one core box blow, and a hollow sand-distributing base portion expanding the cartridge abruptly at the end of the body portion and serving to span the core box and blow holes therein, said base portion having in its bottom blow holes to register with the blow holes in the core box and having a limited thickness, the cartridge, when viewed in side elevation, or in longitudinal section, being of substantially inverted T shape, the body forming the upright bar of the T and the hollow base the cross bar of the T, with the base of the cartridge or the cross bar of the T of substantially less thickness than the body of the cartridge or upright of the T.

3. A machine for charging a core box with sand, having in combination a platform for supporting the core box, an air reservoir, an upright and laterally extending frame member for supporting the reservoir above the platform to allow one relative movement with respect to the other, means for giving the reservoir and the platform relative movement, and a portable cartridge separate from other parts of the machine and adapted after each operation to be removed from the machine and manually loaded and then replaced between the reservoir and the core box on the platform and pinched between the same when relative movement occurs between the two, said cartridge having a hollow upright column dimensioned to contain substantially only one charge for the requirements of one blow of core or cores and having a laterally extended shallow base for spanning all the core box openings and to provide openings in the bottom of the base to register with the core box openings, said base having little depth to concentrate the air pressure and leave after a blow a light-weight protective plug of sand in the base which will protect the core box contents from direct contact with the high pressure air and will not materially interfere with ease of handling the cartridge in removing it from the machine, reloading it and replacing it in the machine.

4. A bench machine for charging a core box with sand, having in combination a platform which can be set on a work bench for supporting the core box, an air reservoir, an upright member supported on one side of the platform and having a laterally extending arm for supporting the air reservoir for relative movement with respect to the platform, means for giving the reservoir relative movement with respect to the platform, and a removable cartridge interposed between the reservoir and the core box resting on the platform and pinched between them when relative movement occurs between the two, the said cartridge comprising a hollow upright columnar portion dimensioned to contain substantially only one charge of sand for the core box and a laterally extending shallow base containing surplus sand that is packed in the base, the said base acting as a core-box-opening-spanner and having little depth relative to its other dimensions to concentrate the pressure on the sand delivered to the core box openings and retain a light load of sand in the base to protect the core box contents from the high pressure air.

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