April 23, 1957 W. F. McKEE 2,789,325

CORE BLOWING APPARATUS

Filed March 5, 1953 4 Sheets-Sheet 1

FIG. 1.

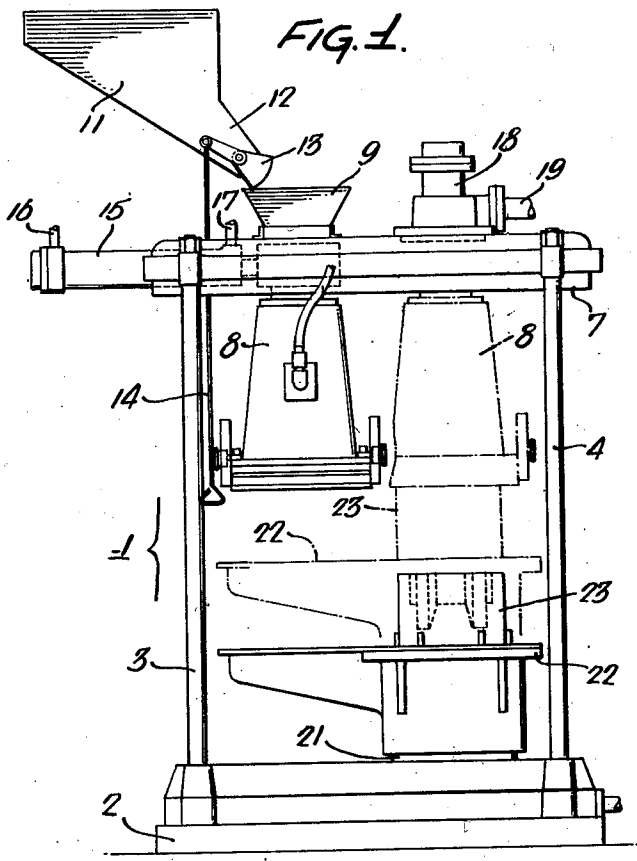
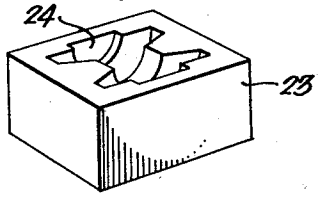


FIG. 4.



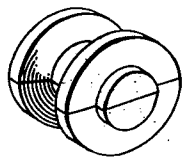


FIG. 5.

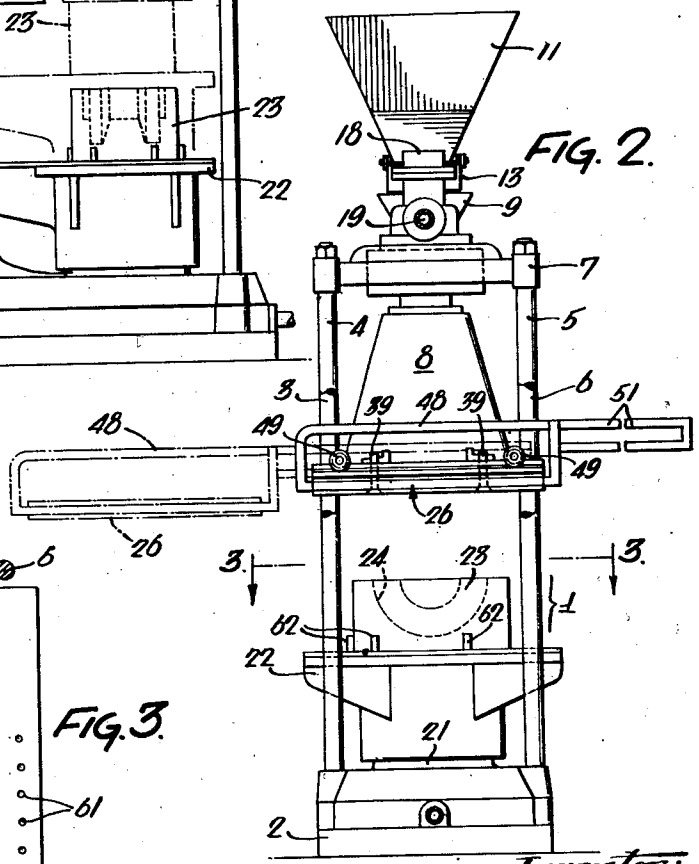


FIG. 2.

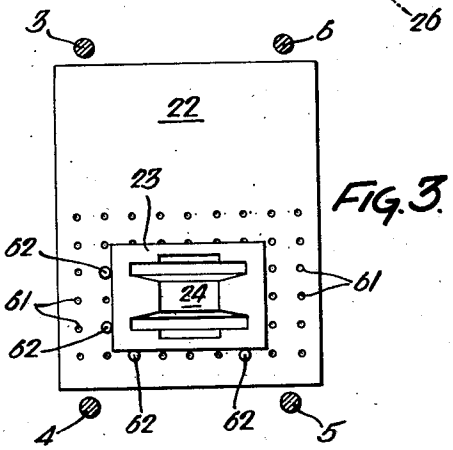


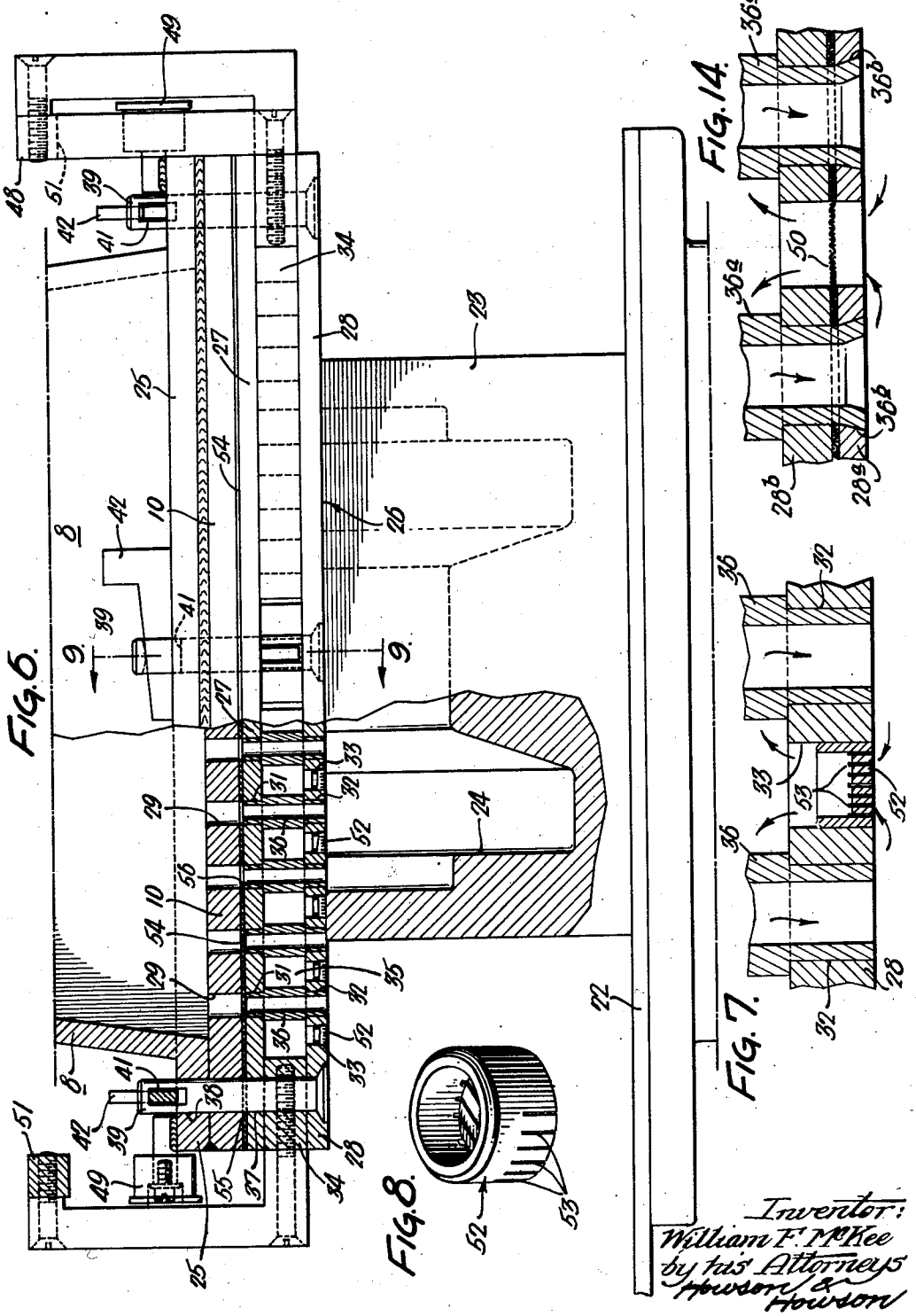
FIG. 3.

Inventor:
William F. McKee
by his Attorneys
Howson & Howson

April 23, 1957 W. F. McKEE 2,789,325

CORE BLOWING APPARATUS

Filed March 5, 1953 4 Sheets-Sheet 2



April 23, 1957 W. F. McKEE 2,789,325

CORE BLOWING APPARATUS

Filed March 5, 1953 4 Sheets-Sheet 3

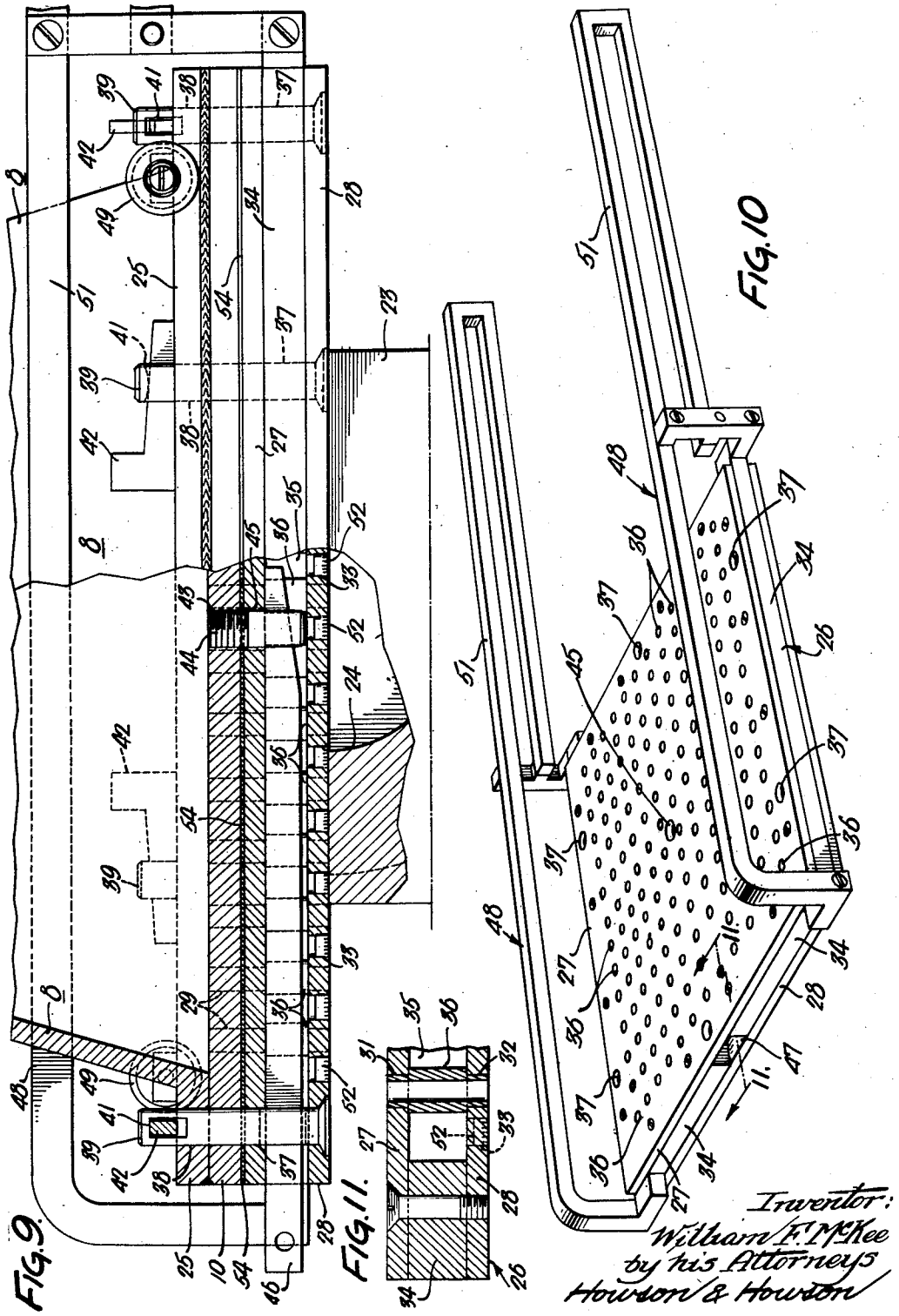


FIG. 9.

FIG. 11.

FIG. 10

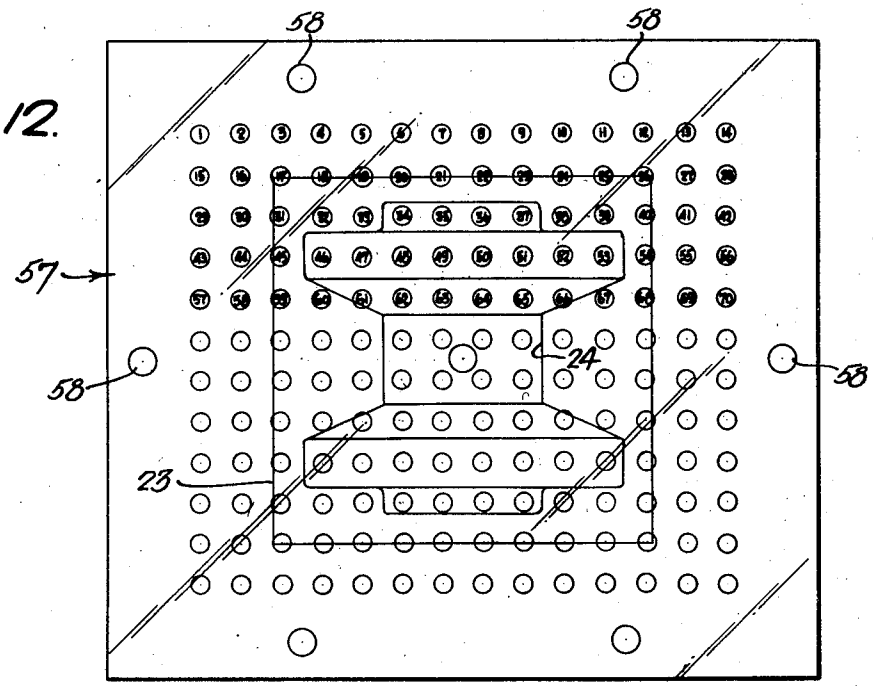
Inventor:
William F. McKee
by his Attorneys
Howson & Howson

April 23, 1957 W. F. McKEE 2,789,325

CORE BLOWING APPARATUS

Filed March 5, 1953 4 Sheets-Sheet 4

FIG. 12.



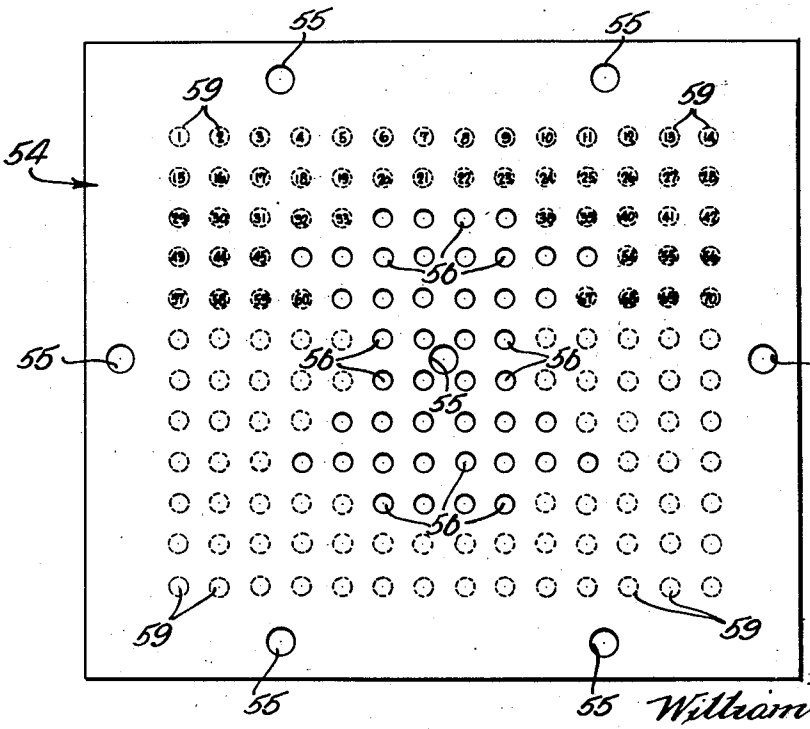


FIG. 13.

Inventor:
William F. McKee
by his Attorneys
Howson & Howson

United States Patent Office 2,789,325 Patented Apr. 23, 1957

2,789,325

CORE BLOWING APPARATUS

William F. McKee, Palmyra, N. J.; Ruby Gibson McKee, executrix of said William F. McKee, deceased, assignor to Dodge Steel Company, Philadelphia, Pa., a corporation of Pennsylvania

Application March 5, 1953, Serial No. 340,475

14 Claims. (Cl. 22—10)

This invention relates to improvements in core blowing apparatus, and a principal object of the invention is to provide a simple and efficient device for preparing or setting up the apparatus for blowing cores of different sizes and shapes.

Core blowers of the type to which the invention relates consist essentially of a means for injecting sand by pneumatic pressure into the cavity of a core box together with other means for venting and cavity for escape of the air displaced by the injected sand. A principal advantage of this type of apparatus, aside from its economy and high rate of production, resides in its ability to produce cores which are solid and homogeneous and substantially free from voids and soft spots. The efficiency of the apparatus depends in part upon the number and distribution of the blow holes, i. e. the ports through which the sand is injected into the mold cavity, and of the vent holes which provide for the escape of the displaced air from the cavity.

In a conventional core blower, sand is confined at one side of a foraminous plate and may, at will, be placed under pneumatic pressure which acts to force the sand through the holes in the plate into the mold cavity of a core box at the opposite side. The edges of the core cavity are sealed against the plate and suitable means is provided for venting the air displaced from the cavity by the injected sand. The face area of the plate is sufficiently large to accommodate different sizes and shapes of core and core box within a given range and in order to set up the apparatus for blowing of the cores of different sizes and shapes means must be provided for sealing off those of the holes in the plate which are not required in the blowing of the specific core. Such sealing off, heretofore has required closing the holes by means of individual plugs, and the operation of changing over the apparatus from one shape or size of core to another has been both complicated and time consuming and has involved unnecessarily long "lay over" periods during which the apparatus is unproductive.

The present invention contemplates a simple and effective device for eliminating the major part of the time and labor losses in the aforesaid change over operations, and to provide apparatus wherein it is economically practicable and profitable to set-up for and to make a single or any required number of cores.

More specifically stated, a primary object of this invention is to provide a simple and effective means for closing off those of the holes of the aforesaid plate which are not necessary to the formation of the particular core under production.

Still more specifically, the invention has for a primary object the provision of a control means in the form of a simple gasket that may be readily produced in conformity with the character of the individual core, together with means for detachably installing the gasket in the core blowing apparatus, to the desired end of confining the discharge of sand through the foraminous plate to the core cavity.

The invention resides also in certain details of apparatus hereinafter described and illustrated in the attached drawings wherein:

Figure 1 is a more or less diagrammatic side elevational view of a conventional core blowing machine;

Figure 2 is a front elevation of the machine;

Figure 3 is a sectional view on the line 3—3, Figure 2;

Figure 4 is a view in perspective of a typical core box;

Figure 5 is a view in perspective of a core of the character adapted to be produced in the box shown in Figure 4;

Figure 6 is an enlarged fragmentary sectional elevational view of a portion of the machine shown in Figure 1;

Figure 7 is an enlarged fragmentary sectional view illustrating a structural detail of the apparatus;

Figure 8 is a view in perspective of an element of the structure illustrated in Figure 7;

Figure 9 is a fragmentary enlarged sectional elevational view of the machine, the said section being taken on the line 9—9, Figure 6;

Figure 10 is a view in perspective of a portion of the apparatus separate from the machine;

Figure 11 is a fragmentary sectional view on the line 11—11, Figure 10;

Figure 12 is a top face view of an element of the gasket processing portion of the apparatus;

Figure 13 is a top face view of one of the gasket elements; and

Figure 14 is a fragmentary sectional view, similar to Figure 7, illustrating a modification within the scope of the invention.

With reference to the drawings, the apparatus therein illustrated comprises a frame, designated by the reference numeral 1, having a suitable base 2, four uprights 3, 4, 5 and 6, a cap structure 7, the function of which will be hereinafter described. A hopper 8 is mounted in the cap structure 7 for movement transversely between alternative positions shown respectively in solid and in broken lines in Figure 1. In the first of these positions shown in full lines the open top of the hopper registers with the bottom of a funnel 9 fixed in the cap structure, above which is a supply hopper 11. Sand is directed from the hopper 11 into the funnel 9 through a chute 12, which may be closed or opened by a suitable valve 13, this valve being connected to a depending operating handle 14. When therefore the hopper 8 is in the full line portion shown in Figure 1 it may be supplied with core sand from the supply hopper 11, by manipulation of the valve 13. The hopper 8 may be shifted from the filling position to the broken line position by an actuating cylinder 15 to the opposite ends of which fluid pressure may be admitted, selectively, through pipes 16 and 17. In the broken line position the upper end of the hopper registers with a fitting 18, which is connected to a source of fluid pressure, not shown, and through which fluid pressure may be admitted to the upper end of the hopper by way of the pipe 19. Suitable valve means, not shown, affords control of the admission of the fluid pressure to the hopper.

Mounted in the base 2 is a fluid pressure cylinder 21. This cylinder is in operative association with a platform 22, which may be elevated by application of fluid pressure to the cylinder. The cylinder 21 immediately underlies the hopper 8 when the latter is in the aforesaid broken line position. The platform 22, which will be described in detail below, constitutes a support for a core box of the character shown, for example, in Figure 4 and indicated in the reference numeral 23. The open top of this box, by actuation of the cylinder 21, may be brought into an operative position at the under side of the hopper 8 so that the core cavity 24 of the box may receive sand discharged from the hopper. The apparatus insofar as de-

scribed is conventional and requires no more detailed explanation.

The hopper 8 is provided in the present instance with a perforated bottom wall 10, and in the present instance this wall is permanently attached to the body of the hopper as shown in Figures 6 and 9. The lower edge of the body portion of the hopper is provided with a peripheral flange 25, and the edge portions of the bottom plate 10 are properly secured to the undersurface of this flange. In accordance with the present invention I provided a false or lower bottom plate structure designated generally by the reference numeral 26. This structure is shown in perspective in Figure 10 and is illustrated in detail in Figures 6 and 9 inclusive. It consists of two plates, 27 and 28 respectively, corresponding in size and shape to the bottom plate 10 and having therein aligned apertures which, when the plate 27 is placed against the under side of the bottom wall 10, will register accurately with the apertures 29 of the bottom wall. The apertures in the plate 27 are designated by the reference numeral 31; and those in the lower plate 28 by the reference numeral 32. The lower plate 28 has an additional set of apertures 33 which are interspersed with the apertures 32 and which function for a purpose hereinafter described.

Plates 27 and 28 are spaced apart by strips 34, which extend continuously around the edges of the plates and which form in effect a chamber 35 between the plates 27 and 28. The apertures 33 of the plate 28 communicate with the chamber 35, whereas the apertures 31 and 32 of the plates 27 and 28 respectively are connected by suitable nipples 36 which in effect form a set of ducts or passages extending through the chamber 35 from the underside of the plate 28 to the upper surface of the plate 27. When this false bottom plate structure is placed against the underside of the bottom wall 10 of the hopper, the upper ends of these passages register with the apertures 29 of the bottom wall. The bores of the nipples are of the same diameter as the apertures 29, and while subject to variation, a diameter of approximately 3/8" is suitable.

The plate structure 26 is provided at its edges with a series of apertures 37, which pass through the plates 27 and 28, and through the spacer elements 34; corresponding apertures 38 are formed in the flanged lower edge and bottom wall of the hopper 8. These apertures receive retaining pins 39 which extend upwards from the underside of the plate 28 through and beyond the upper surface of the flange of the hopper body. The upper ends of these pins are slotted, as indicated at 41, and these slots are arranged so that they are intersected by the upper surface of the flange 25. The slots are adapted for reception of wedge elements 42, which, when driven into the slots, operate to draw the plate structure 26 upwardly against the underside of the bottom wall of the hopper and to retain it in that position. This is clearly shown in Figures 6 and 9 of the drawings.

The bottom wall 10 of the hopper 8 is provided with a central aperture 43, and this aperture is threaded for reception of the upper threaded end of a pin 44, which projects downward to the under surface of the said bottom wall. A registering aperture 45 is provided in the upper plate 27 of the plate structure 26. The pin 44 is slotted for reception of the tapered end of a wedge element 46, which may be inserted through an opening 47 in one of the spacer elements 34, as best illustrated in Figures 6, 9 and 10. This wedge element, when driven into the slot of the pin 44, functions to support the center portion of the plate structure 26 solidly against the underside of the bottom wall 10 so as to preclude any possibility of sagging of the plate structure at the center.

The plate structure 26, in addition to the elements described above, comprises a bracket 48 at each side as best illustrated in Figure 10. These brackets are adapted to cooperate with a plurality of rollers 49 mounted on the flange 25 of the hopper to provide a running support for the plate structure 26 on the hopper by means of which the structure may be shifted readily from a position underlying the hopper to an outboard position beyond the side of the frame of the machine. This outboard position is illustrated in broken lines in Figure 2. When the plate structure 26 is in the operative position at the underside of the hopper 8, as shown in Figures 6 and 9, the upper rail 51 will be elevated above the rollers, as well shown in Figures 6 and 9. In this position the plate structure 26 is supported entirely by the wedges 42 and 46, and the associated pins 39 and 44. When the wedges are withdrawn, however, the pins 39 are released and the plate structure is permitted to move downwardly away from the bottom of the hopper until the underside of the rails 51 engage the rollers 49. The entire plate structure 26 may then be shifted laterally on the rollers until the plate structure occupies the broken line position shown in Figure 2. This exposes the upper surface of the plate structure as well as the bottom wall 10 of the hopper.

By reference to Figures 6 and 9 it will be noted that when a core box, such as 23, is elevated by the cylinder 21, it will engage the underside of the plate 28 of the plate structure 26, the upper flat surface of the box lying flush against the surface of the plate. The core cavity 24 will then register with a certain number of the apertures 32 and 33 in the plate 28. The core cavity will thereby be in direct communication, through the nipples 36 and apertures 29, with the interior of the hopper, and will also be in communication with the chamber 35 of the plate structure 26 through the apertures 33. If fluid pressure is applied to the top of the hopper by way of the fitting 18, as described above, the sand in the hopper will be forcibly discharged through the apertures 29 and nipples 36 into the cavity, and simultaneously the air displaced by the incoming sand will escape from the cavity through the apertures 33. In order to preclude discharge of entrained sand through the apertures 33 each of these apertures is provided with a suitable strainer .One such strainer is shown in Figures 7 and 8 and consists of a cup shaped element 52 fitting the apertures 33 and having in the bottom thereof a plurality of narrow slots 53. Another strainer of suitable form is shown in Figure 14 and consists of a mesh screening element 50 contained between two plates 28^a and 28^b which together, are the substituted equivalent of the plate 28 shown in the preceding plate structure 26. Nipples 36^a may be utilized to secure the sub-assembly as by swaging, indicated at 36^b. Fifty mesh stainless steel wire screen is suitable.

It is apparent that unless some provision were made for sealing off those of the apertures 29 and registering nipples 36 which are not in communication with the core cavity 24, or which are not already closed by the confronting surfaces of the core box, sand would be projected through these unsealed apertures from the hopper to the areas outside of the core cavity. For this purpose my invention contemplates the provision of a gasket 54, which in the present instance is interposed between the bottom wall 10 of the hopper and the plate structure 26. Obviously this gasket will be confined under pressure between the confronting surfaces of the bottom wall and the plate structure. The gasket is provided with apertures 55 which register with the pin receiving apertures 37, 38 and 45 in the plate structure and in the hopper flange so that the gasket is accurately positioned by the pins 39 and 44 between the wall 10 and the plate structure. The gasket is provided also with a set of apertures 56 which register with those of the openings 29 of the bottom wall of the hopper which, through the aligned nipples 36 of the plate structure are in communication with the core cavity 24 of the core box. The gasket thereby functions to seal off those of the apertures 29 which are not in communication with the core cavity.

The pattern of the apertures 56 of the gasket 54 will vary with the shape and size of the individual core cavity and I have provided a means whereby the pattern may be readily determined and the apertures readily

formed in the gasket for each individual core. This device comprises a transparent sheet or plate **57**, see Figure 12, which is dimensioned to conform with the bottom wall **10** of the hopper, and with the upper face of the cooperating plate structure **26**. This plate is provided with apertures **58** arranged for registration with the pin receiving apertures **37** and **38** of the plate structure and hopper flange. The transparent plate has etched or otherwise marked thereon a series of circles corresponding in number and location to the apertures **29** in the bottom wall **10** of the hopper. The holes are preferably numbered in series as illustrated in Figure 12.

The gasket **54** is formed originally with a series of scored circles, indicated in Figure 13 by the reference numeral **59** and corresponding in number and disposition with the apertures **29** of the bottom wall **10**, these scored circles thereby corresponding also with the etched circles of the transparent sheet or plate **57**. The gasket **54**, therefore, while originally imperforate except for the apertures **55**, may readily be provided with additional apertures by displacement of the circle portions within the scored lines **59**.

In providing a gasket for any given core, the plate **57** is placed on the top of the core box in the same relative position that the plate structure **28** would assume with respect to the core box when the latter has been brought into operative position with the plate structure preparatory to sand injecting operation. Any suitable means may be employed for obtaining the proper relative positioning of the plate **57** and the core box for this operation, said means including in the present instance apertures **61** in the platform **22** of the elevator cylinder **21** and pins **62** for insertion in the apertures as positioning abutments for two sides of the core box. The numbers of the etched circles of the plate **57** which now register with the core cavity of the box correspond with the numbers of the scored circles of the gasket **54** which must be displaced from the gasket in order to provide the maximum number of apertures for injection of sand to the core cavity. Figures 12 and 13 clearly show the manner in which the transparent plate **59** and the gasket **54** are correlated to afford the desired result. Displacement of the small circular areas of the gasket is materially facilitated by the presence of the scorings at their peripheries.

After a gasket has been perforated for a particular core cavity it is placed in the machine as described above, and as illustrated in Figures 6 and 9, and the machine is then operated to produce the desired number of cores. There is no material wear upon the gaskets in the core blowing operation and they may be used indefinitely and may be stored for subsequent use in the production of like cores. The composition of the gasket may obviously vary widely but since no great tensile strength is required it may be formed economically from Kraft paper of suitable weight and stiffness.

The multiple advantages of this device will be apparent to those familiar with the art. It is highly economical, materially increases the productivity of the core blowing machine, and provides a simple and effective means for regulating to maximum advantage by selective perforation of the gasket the distribution of sand to different areas of the core cavity.

I claim:

1. In a core blower of the type having provision for discharge of sand by pressure from one side of a foraminous member through one or more holes in the latter into the mold cavity of a core box positioned at the opposite side of said member, means for confining said discharge to holes of said member registered with the cavity and required in the blowing operation, said means comprising a discharge controlling gasket of sheet material covering the foraminous area of the member and having a ported area in registration with the said cavity-registered holes so as to permit discharge of sand to the

said cavity, said gasket closing those of the holes of the member not registered with the cavity or not required for the blowing operation, and readily releasable means for detachably retaining the gasket in operative position with respect to said member.

2. In a core blower, the combination with a foraminous member and means for confining sand under fluid pressure against one face of said member for discharge through the holes in the latter, of means for positioning a core box at the opposite side of the member with the core cavity of said box registered with the confronting holes in said member, a discharge-controlling gasket of sheet material operatively associated with the member and embracing the foraminous area of the latter, said gasket having a ported area conforming with the open side of the said cavity and registering with the cavity-registered holes of said member so as to permit discharge of sand to the cavity and having adjoining imperforate areas sealing off the holes of the member which are not registered with the cavity, readily releasable means for detachably retaining the gasket in operative position with respect to said member, and means for venting the cavity for escape therefrom of air displaced by the entering sand.

3. In a core blower, a receptacle for sand having a foraminous wall and means for applying fluid pressure in the receptacle to discharge contained sand through the holes in said wall, means for positioning a core box with an open side of its core cavity in confronting relation to said wall for reception in said cavity of sand so discharged, a gasket of sheet material formed to cover the foraminous area of the wall and having a ported area conforming with the said open side of the core cavity and through which sand may pass to the said cavity, readily releasable means for detachably securing the gasket against a face of the wall with the said ported area of the gasket in registration with the holes of the wall which communicate with the core cavity and with the adjoining areas of the gasket in sealing relation to the holes in the foraminous wall not in communication with the cavity, whereby the said discharge of sand is confined to the cavity, and means for venting the cavity for escape therefrom of air displaced by the entering sand.

4. In a core blower, a receptacle for sand having a foraminous bottom wall and means for applying fluid pressure in the top of the receptacle to force contained sand through the holes of the said wall, means for positioning a core box with its cavity in operative confronting relation to said bottom wall for discharge into said cavity of sand from the receptacle, the cross sectional dimensions of the open side of the cavity presented to the said wall for reception of the sand not exceeding the dimensions of the confronting face of the wall, and a gasket of sheet material detachably interposed between the wall and the box and covering and sealing off some of the holes of said wall including at least all of the holes not embraced within the area of the confronting face of the core box so that the said discharge of sand is confined to the said cavity, and means for venting the cavity for escape of air displaced by the sand.

5. In a core blower, the combination with a foraminous member and means for confining sand under fluid pressure at one side of said member for discharge through holes in the latter, of means for positioning a core box at the other side of said member with the core cavity of said box registered with and exposed to the confronting holes in said member, a discharge controlling gasket of sheet material having a ported area conforming with the exposed area of the core cavity, readily releasable means for detachably securing said gasket in operative position with respect to said foraminous member and to the core box with the ported area of the gasket in registration with the cavity-registered holes of said member and with the unported areas of the gasket in sealing relation to those of the holes of said member not registered with

said cavity, whereby the said discharge of sand is confined to the core cavity, and means for venting the cavity for escape therefrom of air displaced by the entering sand.

6. A core blower according to claim 5 wherein the said venting means comprises a duct in said foraminous member in communication with the atmosphere.

7. A core blower according to claim 6 wherein the venting duct is connected with a plurality of holes in the core box confronting face of the foraminous member differing from and interspersed with the sand discharge holes first named.

8. In a core blower according to claim 5 wherein the foraminous member comprises spaced foraminous walls defining an intermediate venting chamber, the holes of the wall at the pressure side of the member being connected to corresponding holes in the other of said walls by nipples intersecting said chamber, and the last named wall having additional holes interspersed with the nipple connected holes and communicating with the venting chamber.

9. A core blower according to claim 5 wherein the foraminous member comprises separable foraminous elements and means for clamping said elements together on opposite sides of said gasket.

10. A core blower according to claim 9 wherein one of said foraminous elements comprises a venting chamber with apertures opening to the side of the element remote to the gasket.

11. In a core blower of the type having provision for discharge of sand by pressure from one side of a foraminous member through one or more holes in the latter into the mold cavity of a core box positioned at the opposite side of said member, means for confining said discharge to at least one hole of said member registered with the cavity, said means comprising a discharge controlling gasket of sheet material adapted to cover the foraminous area of the member and having one or more holes arranged to register with the cavity registered hole or holes of the foraminous member required for the flowing operation, said gasket being operative to close those of the holes of the member not required in said operation, and readily releasable means for detachably retaining said gasket in operative position with respect to said member.

12. For use in core blowers of the type wherein said is discharged by pressure from one side of a foraminous member through holes in the latter into the mold cavity of a core box positioned at the opposite side of said member, and in conjunction with said foraminous member to control the discharge of sand through the holes of said

member and the admission of sand to the mold cavity, a gasket of sheet material having an area as great at least as the foraminous area of said member and having localized surface markings corresponding in number and relative arrangement to the holes of said foraminous member so as to register with said holes when the gasket is placed in face-to-face relation with said member, said sheet material having sufficient tensile strength to resist rupture by the pressure employed in the core blowing operation and being susceptible of rupture by manual force in the localized marked areas to provide openings for discharge of sand through pre-selected holes of the foraminous member communicating with said mold cavity and into the latter.

13. A gasket according to claim 12 wherein said localized surface markings are individually identified by distinctive indicia.

14. In a core blower of the type wherein said is discharged by pressure from one side of a foraminous member through holes in the latter into the mold cavity of a core box positioned at the opposite side of said member, the combination with said foraminous member of a gasket of sheet material conforming in shape and size to said member so as to cover the foraminous area of the latter and having localized surface markings corresponding in number and relative arrangement to the holes of said foraminous member so as to register with said holes when the gasket is placed in face-to-face relation with said member, said basket adapted to be apertured at said markings by manual force to provide a plurality of holes therethrough in accordance with the shape of the core cavity so as to leave unobstructed for discharge of sand through the holes in said gasket and through said foraminous member only those holes thereof which register with said cavity and which are deemed necessary to properly distribute sand into said cavity, said gasket having sufficient tensile strength to resist rupture by the pressure employed in the core blowing operation.

References Cited in the file of this patent

UNITED STATES PATENTS

823,530	Hewlett	June 19, 1906
893,174	Lacey	July 14, 1908
915,279	Donnell	Mar. 16, 1909
975,887	Newton	Nov. 15, 1910
2,112,910	Jeffery	Apr. 5, 1938
2,259,768	Naylor et al.	Oct. 21, 1941
2,598,621	Taccone	May 27, 1952
2,636,230	Morton	Apr. 28, 1953