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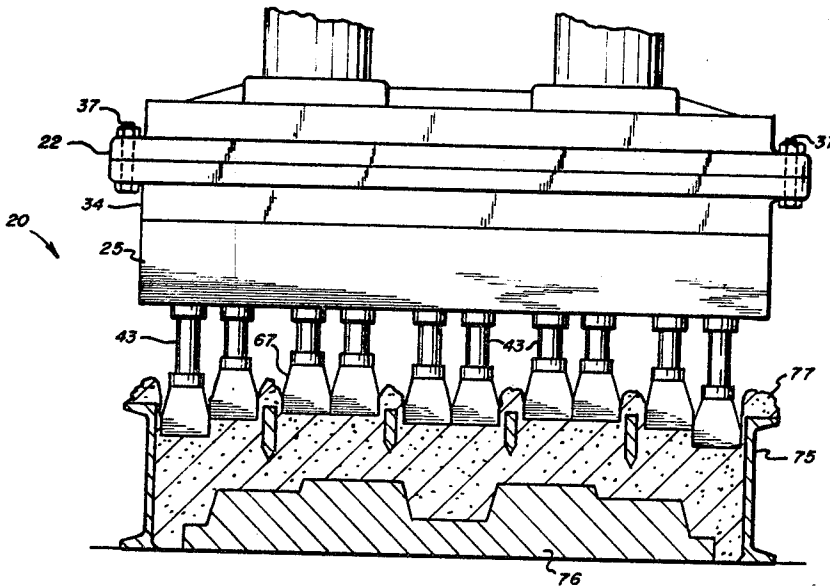
[54] FOUNDRY SQUEEZE MECHANISM 4 Claims, 8 Drawing Figs.

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 100/237, 100/269, 164/37, 164/207
 [51] Int. Cl..... B22c 15/08
 [50] Field of Search..... 164/37,
 207, 170, 172, 173; 100/237, 269

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ABSTRACT: A foundry squeeze mechanism which includes a head having a plurality of cavities within which are positioned sleeve members. Rod members are positioned in the sleeve members and are normally held in a fixed position by an interference fit between the sleeve and rod members. One end of the rod members have feet for engaging sand in a foundry flask. Fluid passage means provide for the introduction of fluid pressure between the rod members and the sleeve members at the area of the interference fit and when so introduced the sleeve members are forced outwardly releasing the interference fits. Fluid pressure or other means on the other end of the rod members causes them to be extended. Seal means are provided on each side of the area of the interference fits and stop members are provided on the rod members to limit their extended movement.



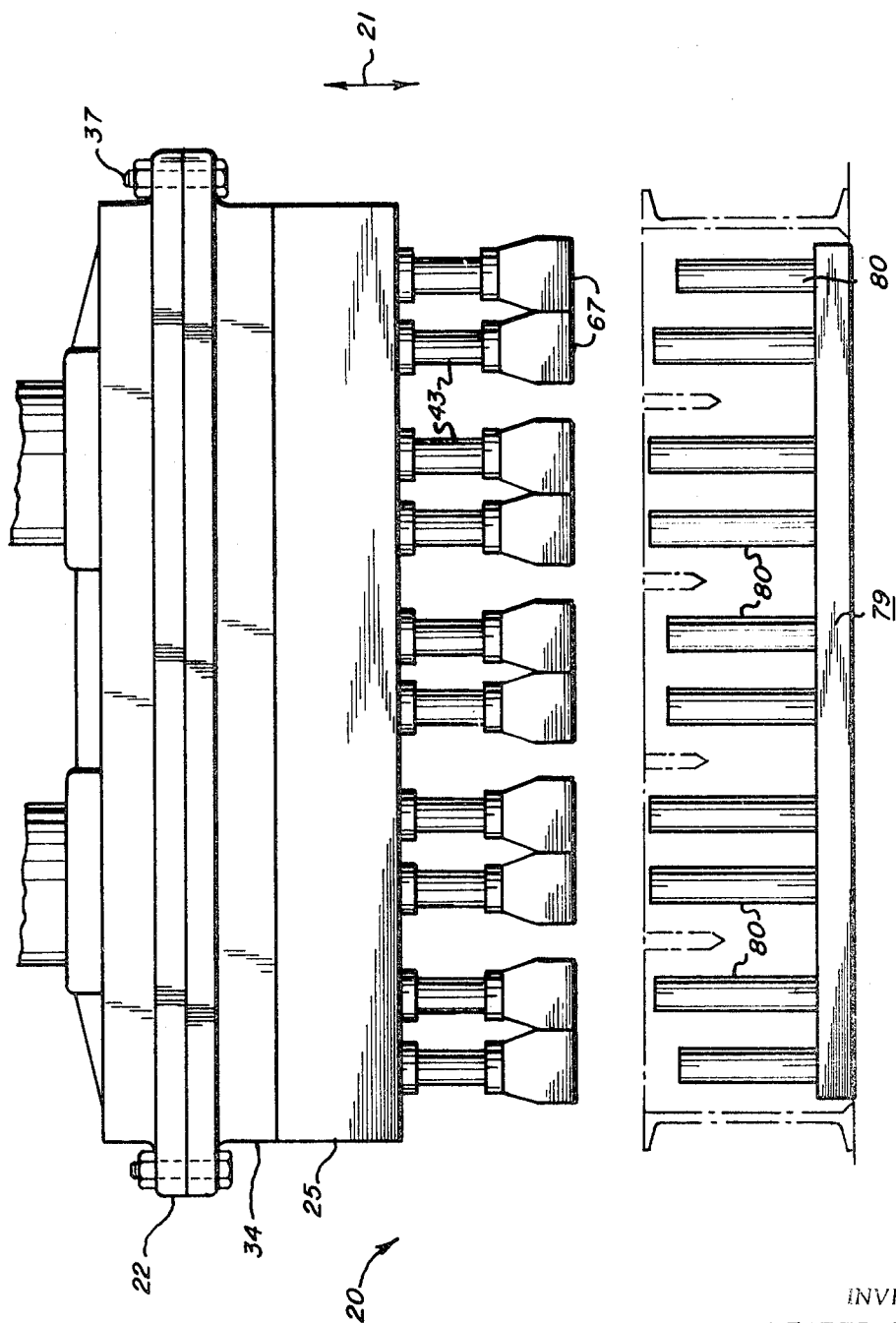
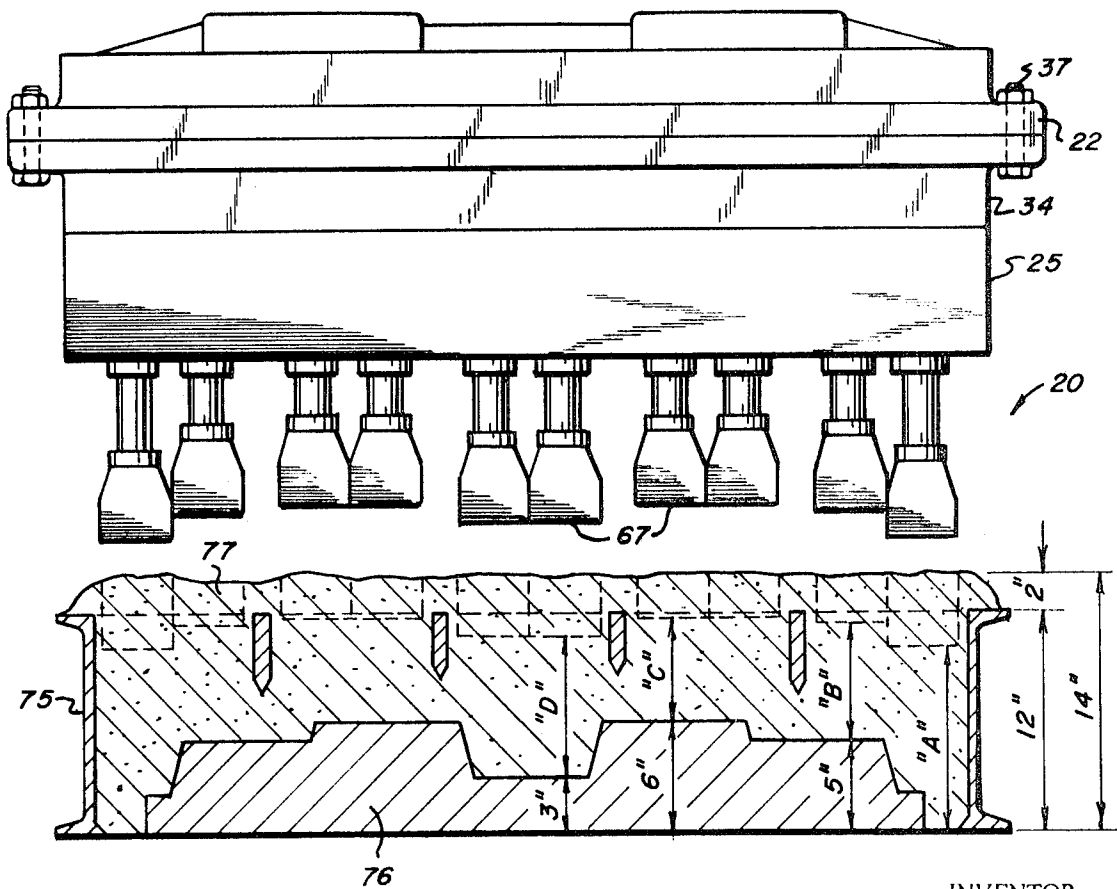
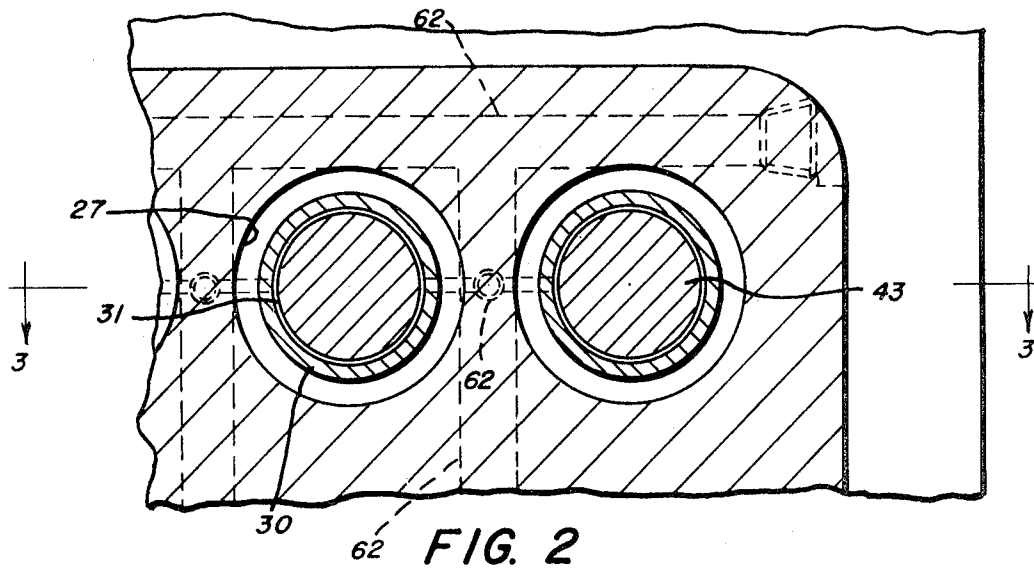


FIG. 1

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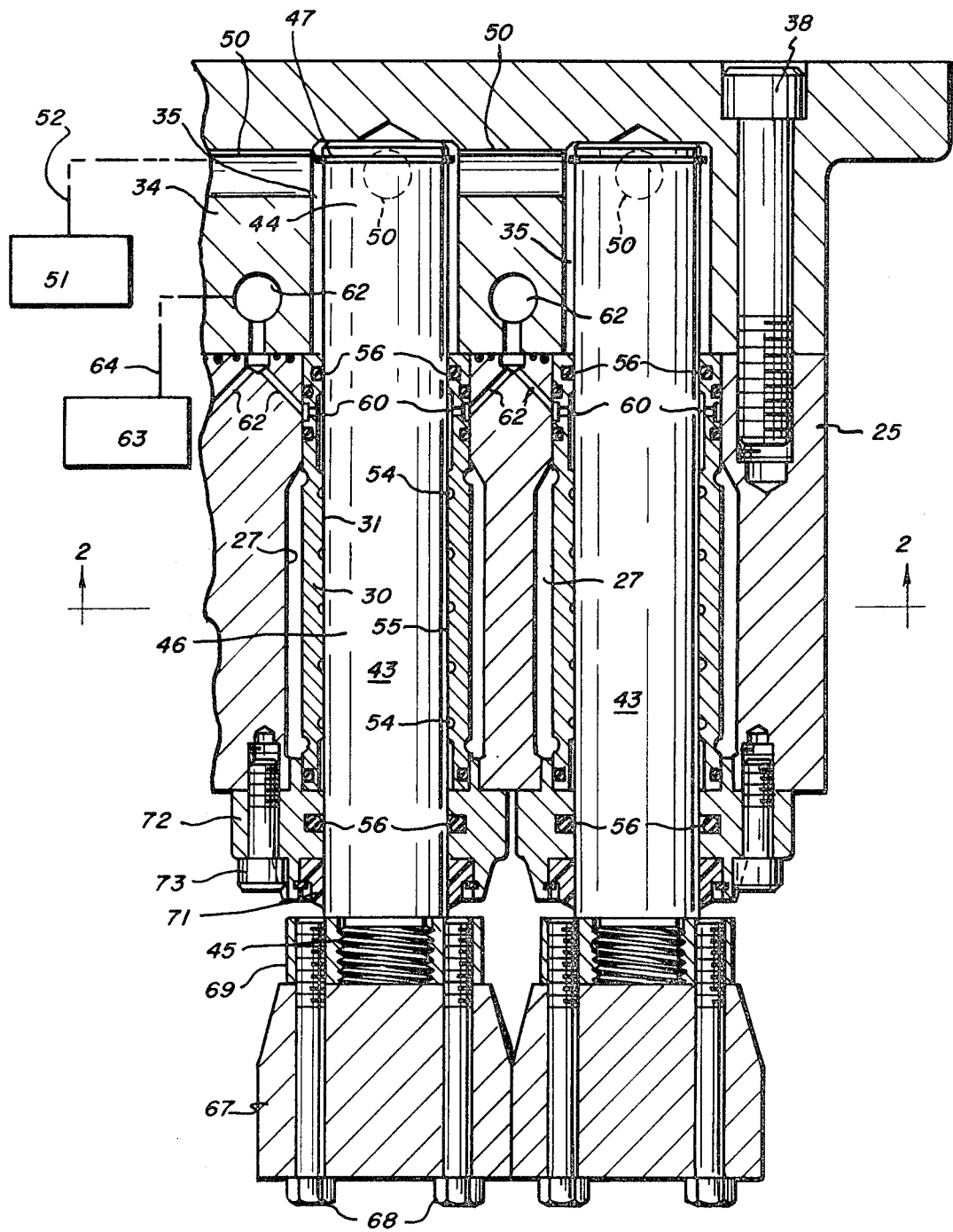


FIG. 3

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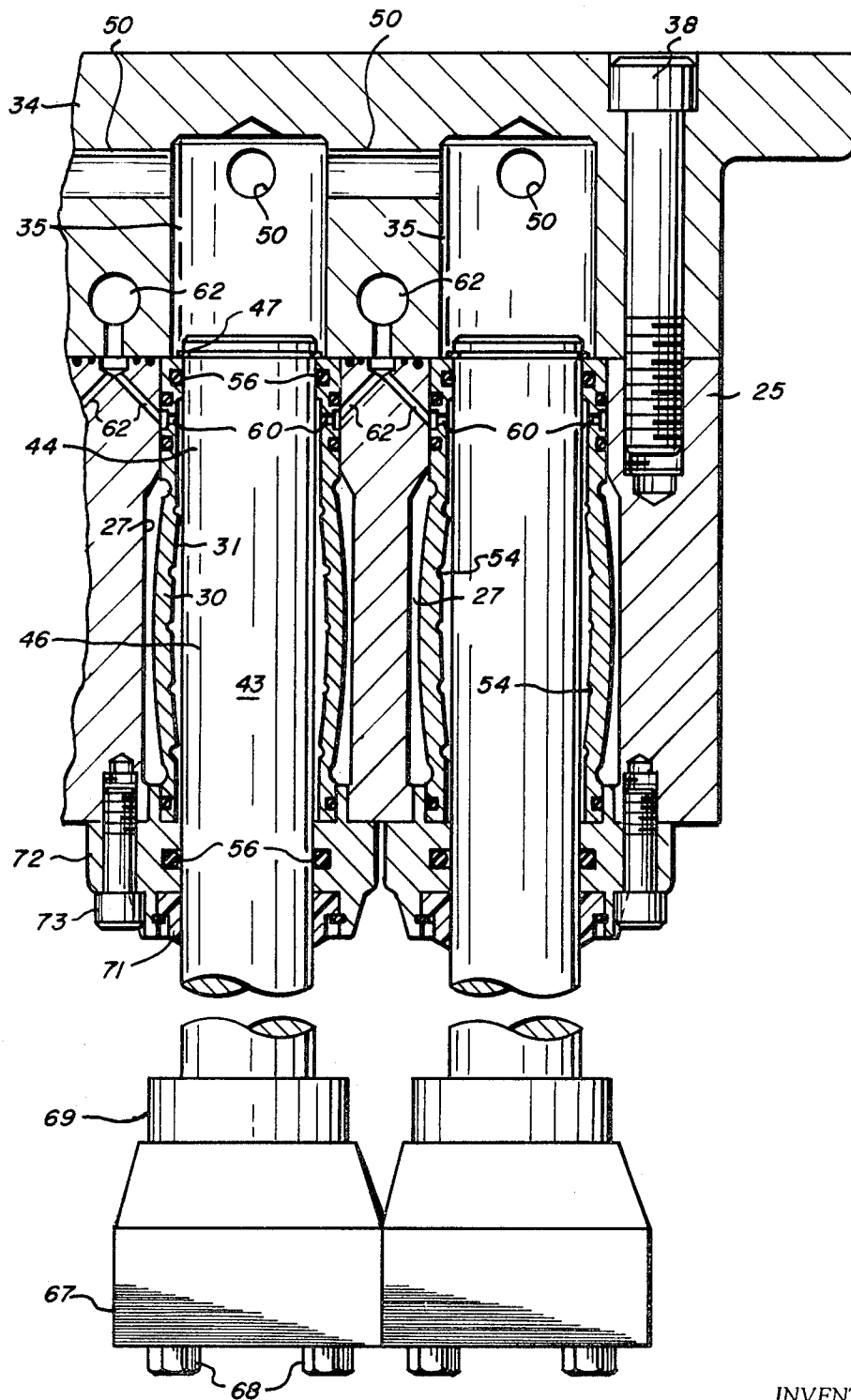


FIG. 4

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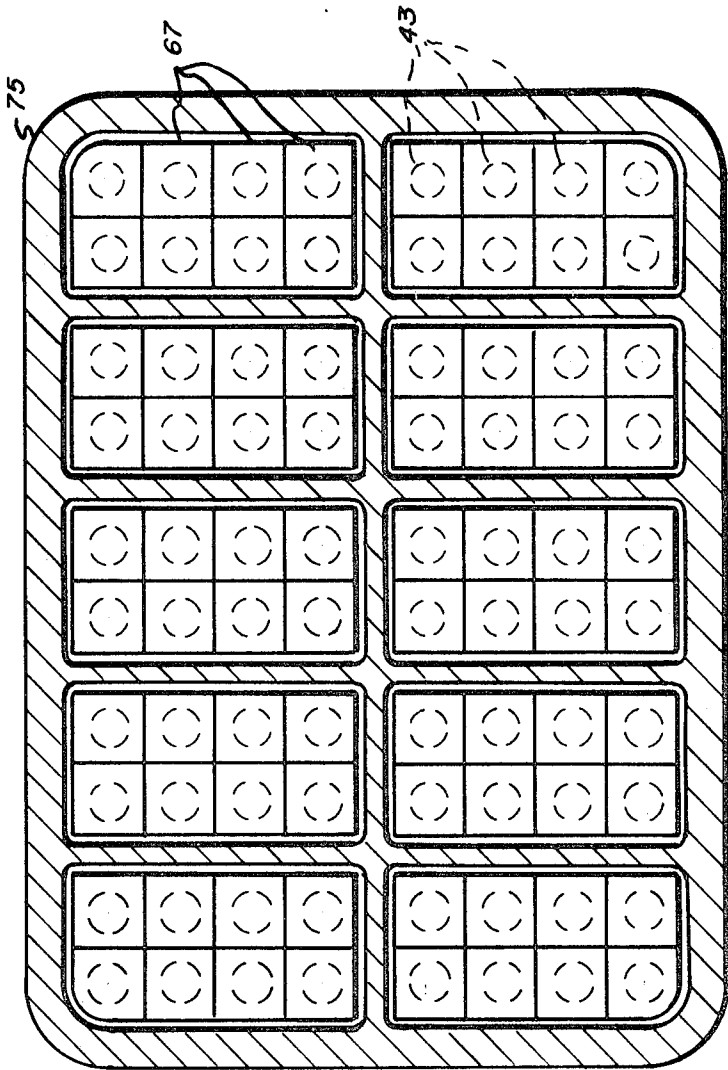
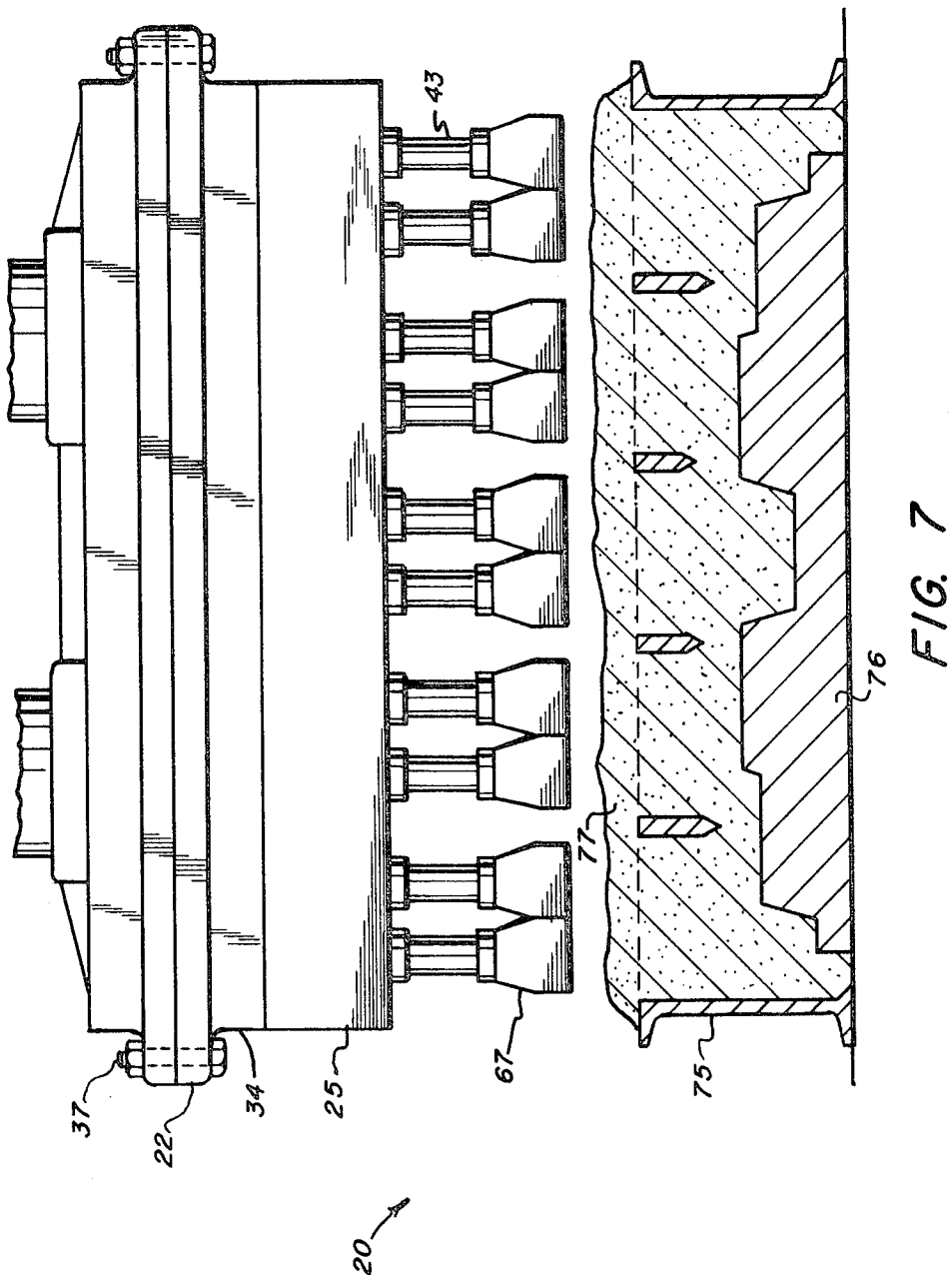


FIG. 6

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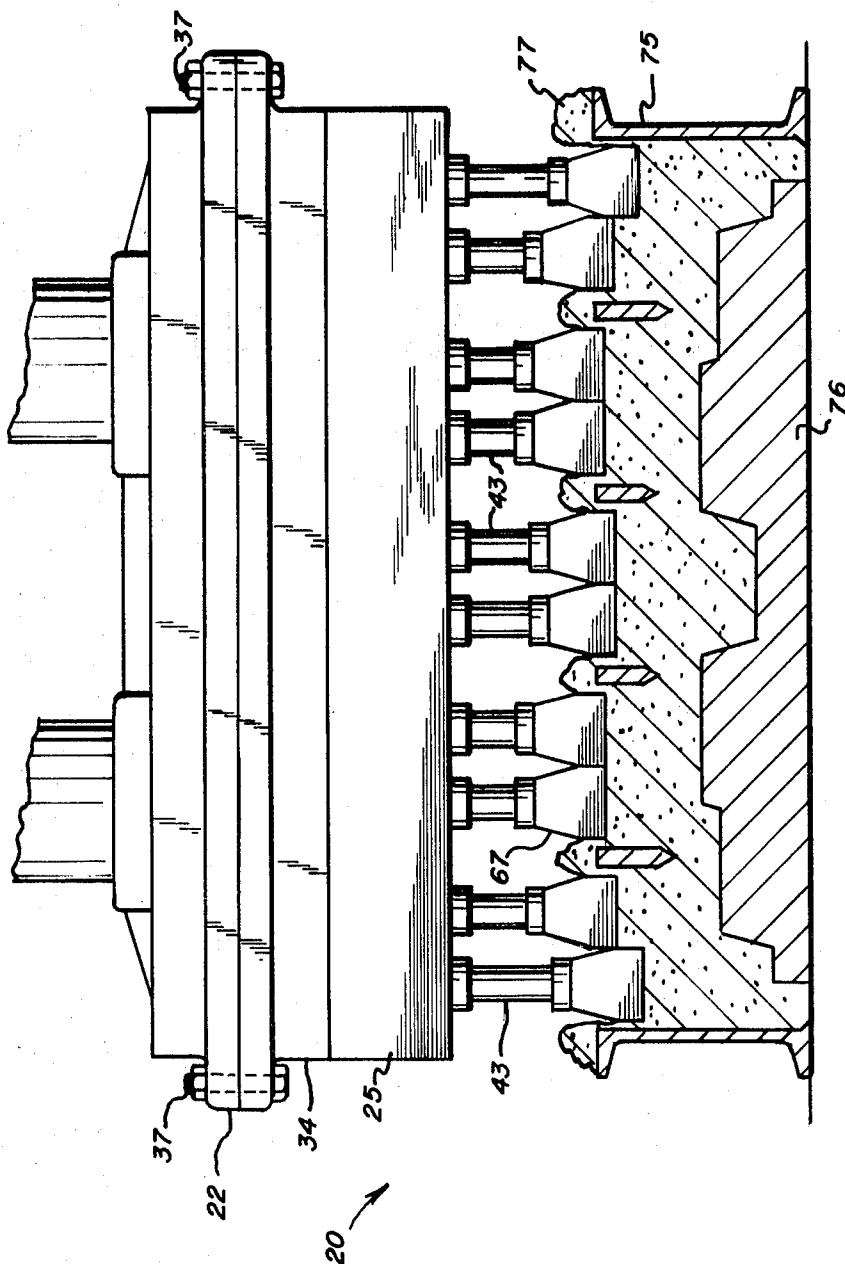


FIG. 8

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FOUNDRY SQUEEZE MECHANISM

It is usually desirable to squeeze sand in a foundry flask to substantially the same degree over the entire surface of the flask. This has been done in the art by utilizing feet held in extended position by hydraulic pressure whereby when the squeeze head is brought down the hydraulic pressure equalizes the engagement pressure of the feet. It will thus be seen that each time the squeeze head cycles the feet are caused to move or stroke which causes wear and other disadvantages. Wear usually results in leakage of hydraulic fluid and contamination of the foundry sand. Because of the constant stroking of the feet, sand sometimes becomes wedged therebetween and this mechanically prohibits the feet from assuming their proper position. It is also desired at times to compress a given portion of sand in a flask to a greater degree than other portions and it is not possible to accomplish this when hydraulic pressure exerts the same force on each foot.

It is therefore an object of the present invention to provide a squeeze head which has feet which are hydraulically or otherwise extended and as a result can be individually forced in a retracted direction for the desired positioning of the same. The feet can then be mechanically locked in position and will not be moved in compressing sand around a given pattern design for a given production run. When the pattern design is changed the feet can be mechanically unlocked and readjusted to suit the changed design.

Another object of the present invention is to provide an arrangement and cooperation of structural parts which will facilitate accomplishing the above result.

Another object of the present invention is to provide a reliable and convenient means to assemble and disassemble the sleeve and rod members and feet with respect to the squeeze head.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is an elevational view of a foundry squeeze mechanism constructed in accordance with the teachings of the present invention with all the sand-engaging feet thereof fully extended;

FIG. 2 is an enlarged view taken generally along the line 2-2 of FIG. 3;

FIG. 3 is a view taken generally along the line 3-3 of FIG. 2 showing the rods to which the feet are connected being in a locked condition;

FIG. 4 is a view like FIG. 3 but showing the rods in an unlocked condition;

FIG. 5 is a side elevational view in section of a pattern located in a foundry flask and this view is used in describing how to determine the extended position of the feet;

FIG. 6 is a sectional plan view of the flask shown in FIG. 5;

FIG. 7 is an elevational view of the foundry squeeze mechanism of the present invention showing the sand-engaging feet located over a foundry flask filled with sand; and

FIG. 8 is a view similar to FIG. 7 but showing the squeeze mechanism as being in a lowered position so as to have the feet engage the sand in the flask in positioning the feet at the proper height prior to locking them in a fixed position.

The foundry squeeze mechanism of the present invention has been indicated generally by the reference numeral 20 and the mechanism is movable between upper and lower positions (clearly shown in FIGS. 1, 7 and 8) in a longitudinal direction indicated by arrow 21. The squeeze mechanism includes a head plate 22 carried by the motive power means which serves to raise and lower the mechanism in a manner well known to those skilled in the art and which has not been described in discussing the present invention. A squeeze head 25 is provided and has therein a plurality of cavities indicated by the reference numerals 27 and last seen in FIGS. 2, 3 and 4. A cylinder 30 is located in each of the cavities as shown and is provided with a wall which defines an opening 31 which ex-

tends completely therethrough. The openings in all of the cylinders extend generally parallel to the longitudinal direction of movement 21 of the squeeze mechanism 20. A squeeze head cover 34 is secured by bolts 37 to the head plate 22 and is secured to the squeeze head 25 by bolts 38. The cover 34 has a plurality of generally cylindrically shaped openings 35 equal in number to the cavities 27 and in axial alignment with respective openings 31 in the cylinders 30. In considering the invention the head 25 and cover 34 may be considered as one piece.

A rod 43 is provided in each of the cylinders 30 and is provided with first and second end portions 44 and 45, respectively, and an intermediate portion 46. These rods are adapted for movement between an extended position shown in FIGS. 1, 4 and 7 and a retracted position shown in FIG. 3. The first end portion 44 of each of the rods is adapted for travel essentially in the openings 35 in the cover 34 and a snap ring 47 is provided on this end of the rods to limit the extended movement thereof by engagement of the snap ring with the upper end surface of its respective cylinder 30 as seen in the drawings. The intermediate portion of each of the rods makes an interference fit with the cylinders in their normal condition. This prevents movement of the rods.

A plurality of openings 50 are provided in the cover 34 and have been referred to as first hydraulic passageway means. These openings 50 serve to hydraulically interconnect all of the openings 35 (there being 80 such openings in this embodiment) in cover 34. The passages 50 are all connected hydraulically to a hydraulic pressure source means 51 by means of the dot-dash line 52 as shown in FIG. 3. A plurality of fluid ports 60 are provided through the walls of cylinders 30 and serve to introduce hydraulic fluid pressure to the juncture formed by the outer surface of the rods 43 and the inner surfaces 31 of the cylinders 30. This hydraulic fluid which is adapted to be introduced at this juncture is transmitted along essentially the entire axial length of the inner surface of the cylinders 30 by means of a plurality of annular grooves 54 interconnected by an axial groove 55. These might also comprise a helically extending groove and it might also be on the surface of the rod depending on the stroke thereof. First and second seals 56 are provided at this referred to juncture surface so as to retain hydraulic fluid pressure along the interface of these recited elements. Second hydraulic passageway means 62 are provided and take the form of passages extending both in the cover 34 and the head 25 so as to transport fluid pressure to the ports 60. Appropriate seals are provided at mating surfaces to prevent hydraulic fluid leakage and have not been identified otherwise. The passageway means 62 are all connected to a second hydraulic pressure source means 63 by means of a dot-dash line 64.

Sand-engaging feet 67, sometimes referred to as peen feet, are secured to the second end portion of each of the rods 43 by means of bolts 68 connected to an adapter 69 which in turn is threadably connected to the rods 43. A cylinder retainer 72 is secured to the head 25 by bolts 73 to retain the cylinders 30 in position as shown and a rod wiper 71 is located between the retainer 72 and the adapter 69.

FIG. 3 shows the rods 43 positioned within their respective cylinders and with the cylinder wall exerting its normal interference fit with the rod. In order that this interference fit be removed, it is necessary that hydraulic pressure be introduced to the ports 60 which causes the walls of the cylinder to be forced outwardly into the respective cavities within which they reside which releases the interference fit. The releasing of the interference fit is demonstrated in FIG. 4 and has been slightly exaggerated for more ease in understanding. With the interference fit removed or with the mechanism in the unlocked condition of FIG. 4, the rods and attached feet can be extended by introducing hydraulic pressure from the source 51 through the passageway means 50 into the openings 35. This hydraulic pressure acts upon the upper ends of the rods 43 causing them to be extended to the limits afforded by the position of the snap rings 47. This might also be accomplished by springs located in openings 35.

FIG. 5 is a view which demonstrates the way the extended positions of the feet and rods are determined for squeezing sand in a foundry flask for a given pattern construction. A foundry flask 75 has been shown within which is located a pattern 76 and loose sand 77 is introduced into the foundry flask to the height shown, which in the following specific illustration is to a height of 14 inches. The flask height is 12 inches. The reference letters A, B, C and D are the heights of compressed sand which are to be determined or in other words the distance between various ones of the feet and the pattern. The height of the pattern at the lettered positions is indicated. The following is the procedure used in determining the lettered distances. The free sand weight or unsqueezed sand weight is assumed to be 70 pounds per cubic foot compared to 100 pounds per cubic foot of squeezed sand. This gives a volume factor of 70/100 or 0.7. A confined vertical column of sand has been assumed with minimum side displacement. The following, then, is a chart showing the calculations at various positions:

	Free sand height, in.	Pattern height, in.	Times factor= answer, in.
Packed sand:			
A.....	14	0	.7 equals 9.8.
B.....	14	5	.7 equals 6.3.
C.....	14	6	.7 equals 5.6.
D.....	14	3	.7 equals 7.7.

In order to set the extended positions of the rod and feet at these predetermined heights, the gauge mechanism 79 of FIG. 1 is utilized which has a plurality of gauge pins 80 located in a base so as to physically preposition the extended position of the rods and feet. With the feet in their extended position shown in FIG. 1 and located above the respective gauge pins 80, the squeeze mechanism is lowered with the rods in their unlocked and extended positions of FIG. 4 until the bottoms of the feet engage a respective gauge pin. As the head is brought toward its lowermost position, the highest gauge pins serve to push against the hydraulic pressure in openings 35 to retract the rods and feet. When the squeeze mechanism has been brought to its lowermost position the hydraulic pressure from source 63 is removed from the ports 60 causing the cylinder walls to assume the position of FIG. 3 to firmly mechanically lock the rods 43 in position. The hydraulic pressure from source 51 is then removed from openings 35.

It is then possible to remove the gauge mechanism 79 and consistently squeeze the sand in foundry flasks any number of times with the same results. If it is found that the sand in a given area is not being compressed to a desired degree or in the alternative, is being compressed too much, it is a very simple matter to return the gauge mechanism 79 to the position just described and readjust the extended positions of the rods and feet by simply changing the height of the gauge pins at the positions desired.

FIGS. 7 and 8 serve to point out another method of setting the extended positions of the rods 43 and 67. FIG. 7 shows the squeeze mechanism in the up position with the rods and feet extended. It is then necessary to select the proper sand pressure desired and a corresponding hydraulic pressure is applied to the openings 35 which tends to hold the rods and feet in extended position. The squeeze mechanism is then brought down slowly to compress the sand and as the sand pressures increase, the feet and rods tend to retract thereby selecting their own desired height. The rods are then locked as shown in FIG. 3 and the squeeze mechanism is then moved to its up position. Pressure is then removed from the openings 35. The mechanism is then in condition to be repetitively used in the production of foundry flasks by squeezing sand about given patterns. The position of the rods 43 in FIG. 6 are shown in the dotted circles. It will be therefore clearly observed by those skilled in the art that the advantages hereinbefore discussed are carried out in a convenient and economical manner.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in

the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What I claim is:

1. A foundry squeeze mechanism movable back and forth in a longitudinal direction and including in combination a squeeze machine head plate, a squeeze head having a plurality of cavities, a cylinder in each cavity having a generally cylindrically shaped opening which extends therethrough and which is generally parallel to the longitudinal direction of movement of the squeeze mechanism, a squeeze head cover secured to one side of said squeeze head and having a like member of generally cylindrically shaped and parallel openings in axial alignment with respective openings in said cylinders, said squeeze head cover being secured to said head plate, a rod residing in each of said cylinder openings and having first and second end portions and being movable between extended and retracted positions. Said first end portions of said rods being movable into and out of respective openings in said squeeze head cover, first hydraulic passageway means interconnecting said openings in said squeeze head cover in fluid-conducting relationship, first hydraulic fluid pressure source means connected to said first hydraulic passageway means, spaced seal means surrounding spaced portions of said rod, each said rod residing in its respective cylinder opening and making an interference fit therewith between said spaced seal means, hydraulic fluid port means at the juncture of each of said rods and the cylinder opening within which it resides and between said spaced seal means, second hydraulic passageway means interconnecting all said hydraulic fluid port means in fluid conducting relationship, second hydraulic fluid pressure source means connected to said second hydraulic passageway means, application of hydraulic fluid pressure at said juncture through said port means causing the wall of each of said cylinders to expand outwardly into its respective cavity releasing the interference fit between the rod and the cylinder opening and the application of hydraulic fluid pressure to said openings in said squeeze head cover causing said rods to be extended, peen feet attached to said second end portions of said rods for engaging sand in a foundry flask, and stop means on said rods for limiting the extended movement thereof.

2. A foundry squeeze mechanism including in combination a squeeze head having a plurality of cavities therein, sleeve members positioned in said cavities and providing a space between the outer surfaces thereof and the walls of said cavities, a rod member positioned in each of said sleeve members and having first and second end portions and an intermediate portion therebetween, said first end portions of said rod members communicating with one end of said cavities, peen feet attached to said second end portions of said rod members and adapted to engage sand in a foundry flask, said intermediate portions of said rod members residing in said sleeve members and normally making an interference fit therewith to mechanically lock said rod members in position, first hydraulic fluid pressure means in communication with said one end of each of said cavities and said first end portions of said rod members, second hydraulic fluid pressure means in communication with each of said sleeve members at said intermediate portions of said rod members, seal means at the outer surface of said rod members on either side of where said second hydraulic fluid means communicates with said sleeve members, introduction of fluid pressure into said second hydraulic fluid pressure means causing said sleeve members to expand outwardly slightly into said cavities to release the mechanical lock on said rod members and introduction of fluid pressure into said first hydraulic fluid pressure means causing said rod members to be extended from said sleeve members.

3. A foundry squeeze mechanism including in combination a squeeze head having a plurality of cavities therein, sleeve members positioned in said cavities and providing a space between the outer surfaces thereof and the walls of said cavities, a rod member positioned in each of said sleeve members and having first and second end portions and an intermediate

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portion therebetween, said first end portions of said rod mem-
bers communicating with one end of said cavities, peen feet
attached to said second end portions of said rod members and
adapted to engage sand in a foundry flask, said intermediate
portions of said rod members residing in said sleeve members
and normally making an interference fit therewith to mechan- 5
ically lock said rod members in position, force means acting on
said first end portions of said rod members tending to extend
the same, hydraulic fluid pressure means in communication
with each of said sleeve members at said intermediate portions 10
of said rod members, seal means at the interface of the outer
surface of said rod members on either side of where said
hydraulic fluid means communicates with said sleeve mem-
bers, introduction of fluid pressure into said hydraulic fluid
pressure means causing said sleeve members to expand out- 15
wardly slightly into said cavities to release the mechanical lock
on said rod members and said force means causing said rod
members to be extended from said sleeve members.

4. A foundry squeeze mechanism including in combination
a head, a plurality of sleeve members carried by said head, rod 20

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members located within each of said sleeve members, means
carried by one end of said rod members for engaging sand or
the like, each said sleeve member having first and second axi-
ally spaced portions, first and second seal means at said first
and second axially spaced portions to prevent fluid pressure
leakage from between said sleeve member and said rod at said
first and second axially spaced portions, said sleeve member
and said rod normally making an interference fit between said
first and second axially spaced portions thereby preventing
relative axial movement between said sleeve member and said
rod, fluid passageway means communicating with the juncture
of said rod member and said sleeve member between said first
and second axially spaced portions, means for applying fluid
pressure to said fluid passageway means to cause said sleeve
member to expand between said first and second axially
spaced portions releasing said interference fit, and means for
exerting a force on said rod member to axially extend the same
from said sleeve member when said interference fit is released.

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