

H. P. MACDONALD.
 ROLL RAMMING APPARATUS.
 APPLICATION FILED MAR. 5, 1913.

1,084,157.

Patented Jan. 13, 1914.

3 SHEETS—SHEET 1.

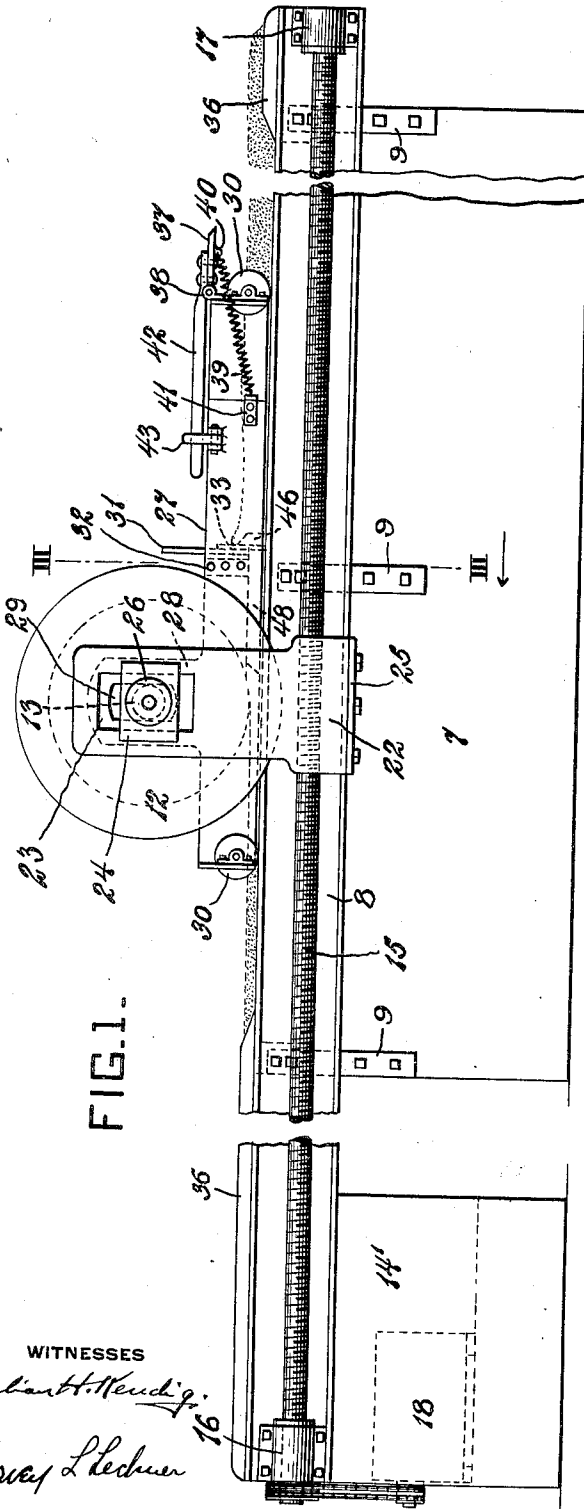


FIG. 1.

WITNESSES

Julius H. Hendig
Harvey L. Lechner

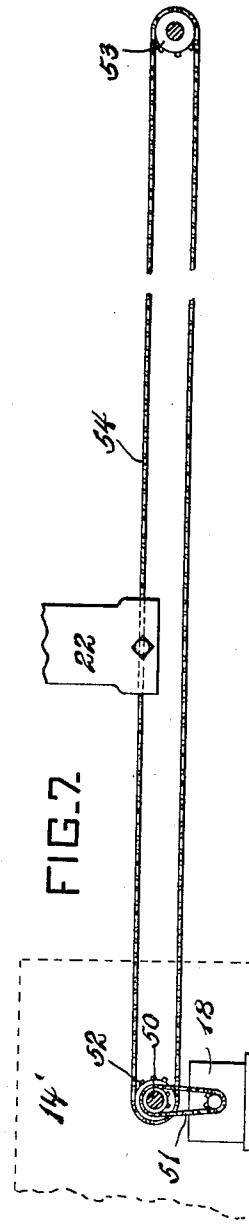


FIG. 7.

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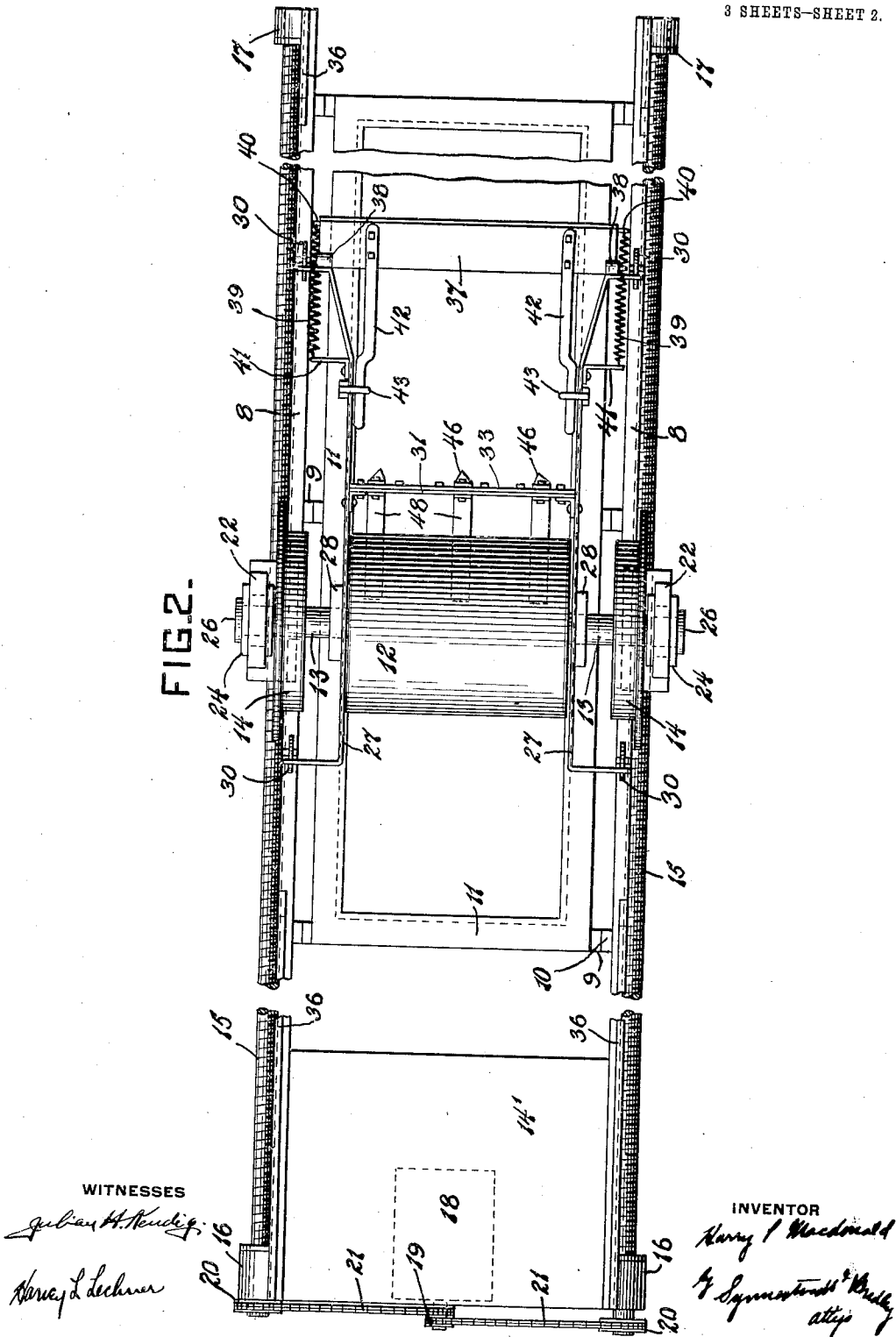
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3 SHEETS—SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

FIG.5.

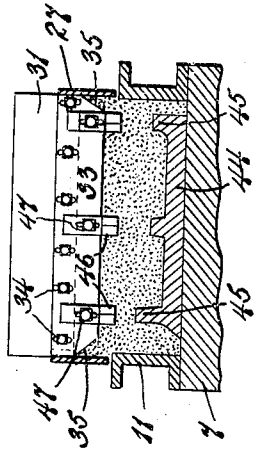


FIG.6.

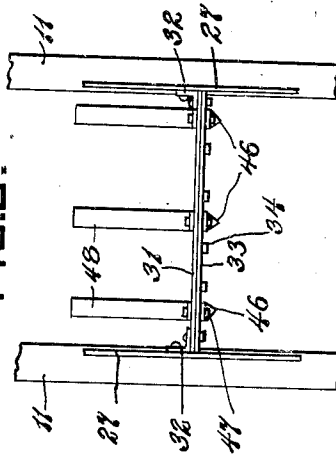
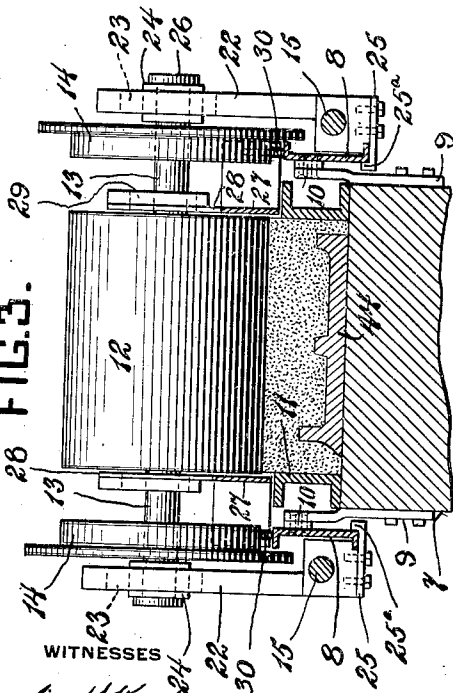


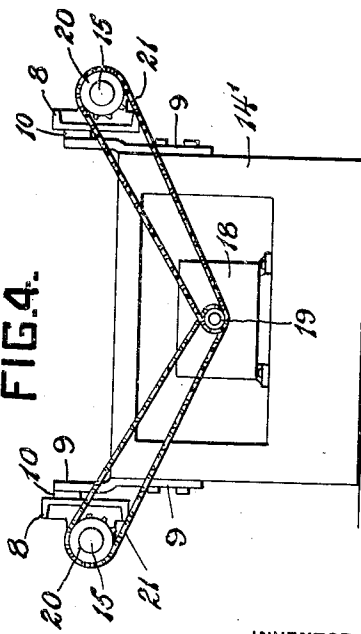
FIG.3.



WITNESSES

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FIG.4.



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UNITED STATES PATENT OFFICE.

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ROLL-RAMMING APPARATUS.

1,084,157.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HARRY P. MACDONALD, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Roll-Ramming Apparatus, of which the following is a specification.

This invention relates to that class of sand molding apparatus in which the sand is rammed or packed by passing a heavy roll over the flask. One of the chief objects of the invention is the provision of an improved mechanism for operating the roll in which a minimum amount of working space is required. My invention also contemplates the provision of means for preventing jolting or jarring as the roll leaves the flask, and also the provision of an improved mounting or support for the roll whereby the latter may have free vertical movement as it rides up on the sand but is held against lateral displacement relative to the flask.

Other objects of the invention reside in the provision of means for cleaning the sand from the joint or top surface of the flask whereby the flask may be readily inverted and rest evenly on the floor; the provision of improved strike-off means for striking off the sand to suitable depths; the provision of improved sand retaining means for retaining the sand in position over the flask as the sand is being rammed; and in general the simplification of apparatus of the character described.

These together with such other objects as may hereinafter appear or are incident to my invention, I attain by means of a construction which I have illustrated in preferred form in the accompanying drawings, wherein

Fig. 1 is a side elevation of my improved apparatus; Fig. 2 is a plan view of Fig. 1; Fig. 3 is a section of the apparatus taken on the line III-III of Fig. 1; Fig. 4 is an end elevation of Fig. 1 and illustrates the driving connections from the motor; Fig. 5 is a sectional view showing the strike-off mechanism; Fig. 6 is a plan view of Fig. 5; and Fig. 7 is a view showing a modified form of driving connection.

In carrying out my invention, I provide any suitable form of pattern drawing ma-

chine, the frame 7 of which I have shown in the drawings. On each side of the frame 7 I provide tracks 8 which are preferably of a channel form and which are secured to the frame 7 by means of the brackets 9 which are arranged at various intervals along the frame and by means of the filler blocks 10, the latter being provided so as to secure proper alinement of the tracks and frame. The brackets 9 and the tracks 8 are so arranged that the tracks project above the top of the frame 7 and are substantially on a level with the flask 11 which rests on the frame. The sand is rammed in the flask by means of a roll 12 which is provided with an axle 13, the axle having a flanged collar or wheel 14 on either side of the roll engaging and riding upon the tracks 8 and being adapted to maintain the roll in proper position with respect to the flask and tracks. The inner ends of the tracks 8 project beyond the frame 7 and are supported upon a framework 14' which is located adjacent the frame 7.

The roll is reciprocated by the following mechanism: Extending along each of the tracks 8 is a screw 15 which is mounted in bearings 16 and 17 which are located at the ends of the tracks. The screws are rotated from the motor 18 which is mounted in the framework 14', by means of the sprocket 19 on the motor shaft, the sprockets 20 which are keyed to the screws 15, and the sprocket chains 21 (see Figs. 1 and 4). Threaded to each of the screws 15 is a bracket or standard 22 provided with an aperture 23 in which is slidably mounted a bearing block 24 in which an end of the axle 13 is journaled. It will be apparent that when the screws are rotated the standards 22 will be advanced or retracted depending on which way the motor 18 is rotating, and will advance or retract the roll 12. In order to prevent the screws 15 from being bent or driven out of alinement as the roll is being moved, I provide the brackets 25 which are bolted to the bottom of the standards 22 and which are provided with upturned ends 25^a which engage the tracks 8 on the inside while at the same time permitting the standards 22 to freely slide along the tracks as the screws are being rotated. The upturned ends 25^a prevent outward lateral displacement of the screws 15, and the tracks pre-

vent inward lateral displacement of the standards 22. The construction just above described thus affords an adequate support or bearing for the screws 15 regardless of the position of the roll.

By mounting the roll 12 in the brackets or standards 22 so that the roll has relative vertical movement with respect to the standards, the roll can freely ride up on the sand without binding. In order to prevent lateral displacement of the brackets 22 with respect to the roll, I provide plates 26 which are fastened to the ends of the axle 13 and are adapted to bear against the bearing 24 and thus secure the upper ends of the brackets in position.

The sand above the flask is held in position and prevented from spreading over the sides of the flask by means of a sand retaining frame 27 which is hung from the axle 13 by means of the brackets 28 which are slotted as indicated at 29 so that the vertical displacement of the roll as it rides onto the sand will not effect a like displacement of the sand retaining frame. The frame is supported in desired relation with respect to the flask by means of the wheels 30 which are arranged in pairs at each end of the sand retaining frame and which are adapted to ride upon the tracks 8. By this construction the sand retaining frame is carried along by the roll but nevertheless is maintained in proper relation with respect to the flask. Mounted in the sand retaining frame immediately in advance of the roll is a strike-off member which is adapted to level off the sand in the flask to any predetermined level. The strike-off member comprises the fixed plate 31 which is secured to the sides of the sand retaining frame by means of brackets 32, and the variable strike-off plate 33 which is adjustably secured to the plate 31 by means of the nuts 34. By varying the vertical position of the plate 33 the depth of the sand left above the flask will be correspondingly changed. In ramming flasks by the roll ramming method, it has been found that the sand is packed to a greater degree of hardness in the central portions of the flask than at the edge portions thereof, and to overcome this difficulty I have cut away or notched up the ends of the plate 33 as indicated at 35 whereby the sand at the edges of the flask is of greater depth than at the central portion of the flask. As the roll advances to ram the flask the sand will be packed uniformly both at the edges and at the center of the flask by reason of the additional quantities of sand at the edges.

In practice the roll is usually elevated slightly above the level of the tracks by the sand in the flask, and it will be clear that as the roll rides from off the flask onto the

tracks there will be a decided jolt or jar which will cause the sand in the mold to fall out as the pattern is being drawn or cause some other defect in the draw. In order to eliminate this difficulty I provide pads or bars 36 which are arranged in pairs at the ends of the tracks and are of such length that their inner ends lie substantially against the ends of the flask. The said inner ends of the pads 36 are tapered off so that the roll will ride gently onto the sand in the flask and will also ride from off the flask without any jarring. This construction is of particular value inasmuch as it is necessary with this form of ramming apparatus to pass the roll back and forth twice over the flask. It will be apparent that the length of the pads may be readily varied so as to adapt the device for flasks of different lengths.

After the ramming process a small quantity of sand will remain on the upper surface of the flask left after the passage of the strike-off and the roll, and to remove such deposit of sand I provide means for scraping off the top surface of the flask, such means comprising a plate 37 which extends transversely of the flask and is hinged to the ends of the sand retaining frame by means of the hinges 38. The scraper is normally held in operative position by means of the springs 39 the ends of which are secured to the pins 40 which are mounted in the plate 37, and the other ends of which are secured to the brackets 41 riveted to the sand retaining frame. It will be apparent, however, that it is not desirable to have the scraper in operative position throughout the ramming operation and I have therefore provided a trip mechanism for releasably locking the scraper in inoperative position, such mechanism comprising the bars 42 secured to the plate 37 and the latches 43 carried on the sand retaining frame. The ends of the sand retaining frame are flared outwardly and bent at substantially right angles to the body of the frame to provide a secure mounting for the scraper plate 37. This construction is clearly illustrated in Fig. 2.

Referring now to Fig. 5 it will be seen that the pattern 44 is provided with flanges 45 on its upper surface. It is desirable to have the sand in the flask above said flanges of a less depth so that the roll will not compress the sand at such point to a greater degree of hardness than other points in the flask, and to this end I provide adjustable members 46 which are carried by the plate 33 of the strike-off and which project downwardly and are adapted to plow furrows in the sand substantially above the flanges, the noses of the members 46 being turned so as to throw the sand aside. The members

46 are secured to the plate 33 by means of nuts 47. To prevent the sand turned out of the furrow from rolling back into it, I provide follower pieces 48 made of wood or
 5 some other like material and secured to the back edge of the strike-off member. The followers fill up the grooves and prevent the sand from rolling back and filling them.

In addition to being simple and effective,
 10 the mechanism for operating the roll is particularly advantageous in that the amount of head room or operating space required by the apparatus is reduced to a minimum, this being of considerable importance and
 15 advantage where the apparatus is intended for making long flat castings. It will also be apparent that the operating mechanism is so arranged as to prevent binding or distortion of the parts, and that the parts may
 20 be readily assembled or replaced.

One of the chief advantages of providing a movable sand retaining frame carried by the roll is that the sand retaining member can be greatly reduced in size and is therefore less cumbersome and that one form of
 25 frame will serve for a variety of different flasks. Another of the advantages of this construction is that the sand retaining frame can be readily combined with the strike-off
 30 member and also with the plate for scraping off the edges of the flask. This arrangement of parts effects a saving in time and labor.

The construction as a whole tends to secure greater uniformity in the packing of
 35 the sand and thus reduces the number of losses occasioned through what are termed drops, runouts, or other imperfections. The term drop is applicable to such cases where the sand falls out of the flask bodily upon
 40 the drawing of the pattern, this occurring chiefly because of the fact that the sand at the edges of the flask is not packed to a sufficient degree of hardness, while the term runout is applicable to such cases in which
 45 the metal runs out along the joining of the mold because the sand surfaces do not contact properly. By my improved arrangement of parts this defect is overcome.

The operation of the apparatus is substantially similar to that of the general
 50 class of roll ramming apparatus to which my invention pertains, but for the purpose of clearness it will be stated that when in inoperative position, the roll 12 is retracted
 55 and rests on the tracks above the frame 14'. After the pattern and flask have been placed in position and the flask has been filled with sand, the motor 18 is actuated to advance the roll which rides from off the pads 36
 60 onto the sand and compresses the sand. The roll is usually passed back and forth over the flask twice and on the last movement, the one toward inoperative position, the trip mechanism is operated to release the scrap-

ing-off plate 37 which, as the roll is being
 65 retracted, scrapes off the upper surface of the flask so that when inverted the flask will rest in a level position. The pattern is then drawn in the usual manner and the flask removed.
 70

Attention is again directed to the sand retaining frame, the front ends of which are bent or flared outwardly from a point slightly in advance of the strike-off. It will be apparent that in making molds for
 75 large flat castings difficulty will be encountered in retaining a sufficient quantity of sand over the central portions of the flask to secure the proper ramming of the mold. The sand, which is heaped up over the flask
 80 has a tendency to slide off sideways and works over the flanges of the flask. By flaring out the ends of the frame, the sand on the flanges is carried inwardly from off the flanges over the open parts of the flask,
 85 thus disposing the sand in such manner as to effect the proper ramming of the mold. It will be seen that in this respect, such arrangement of the sand retaining frame co-operates with the strike-off to secure proper
 90 disposition of the sand.

In Fig. 7 I have illustrated in somewhat diagrammatic form, a modified arrangement of driving mechanism. In this form the
 95 motor 18 drives a shaft 50 extending transversely of the frame 14' by means of the sprocket chain 51. The shaft 50 is provided at each end with a sprocket 52 and on either side of the tracks 12 at the front end of the machine there are idler sprockets 53. A
 100 sprocket chain 54 passes around the sprocket 52 and the sprocket 53 on each side of the machine and is secured to the standard 22. This construction involves no difference in the general operation of the
 105 apparatus, but simply the substitution of a chain drive for a screw drive. One of the advantages of this construction resides in its simplicity.

Having thus described my invention and
 110 illustrated its use what I claim as new and desire to secure by Letters Patent is the following:

1. A roll ramming apparatus comprising in combination a roll, a support therefor, a
 115 pair of screws arranged on opposite sides of the support and extending longitudinally thereof, a pair of brackets carried by the roll having threaded engagement with the screws, and means for turning the screws,
 120 said brackets having a loose fit on the roll permitting relative substantially vertical movement of the roll and brackets.

2. A roll ramming apparatus comprising in combination a roll, a support therefor, and an operating means for the roll comprising a screw member extending longitudinally of the support, a nut member, and

means for turning one of the members, said nut having a loose engagement with the roll permitting relative substantially vertical movement of the roll and nut.

5 3. A roll ramming apparatus comprising in combination a substantially horizontal support, a roll carried thereby, and mechanism for operating the roll, said roll having substantially vertical sliding engagement
10 with the operating mechanism.

4. A roll ramming apparatus comprising in combination a support, a roll carried thereon, a pair of screws extending longitudinally of the support and arranged on
15 opposite sides thereof, a pair of nuts having threaded engagement with the screws and engaging the ends of the roll, and means for turning the screws, said roll having relative vertical movement with respect to
20 the nuts.

5. A roll ramming apparatus comprising in combination a support, a roll carried thereon having an axle, a pair of screws extending longitudinally of the support and
25 on opposite sides thereof, a bracket having threaded engagement with each screw and provided with an aperture, and bearing blocks engaging the axle and mounted in the apertured brackets for relative vertical
30 movement with respect thereto.

6. A roll ramming apparatus comprising in combination a flask, a roll for ramming the flask, a support for the roll adapted to support the roll over the flask, and means
35 adjacent an end of the flask maintaining the roll above the normal level of the support thereby preventing jolting of the flask as the roll rides onto and from off the sand.

7. A roll ramming apparatus comprising
40 in combination a flask, a roll for ramming the flask, a support for the roll adapted to support the roll over the flask, and inclined means on the support whereby the roll is carried onto and from the sand in the flask
45 without jarring.

8. A roll ramming apparatus comprising in combination a flask, a roll for ramming the flask, a support for the roll adapted to support the roll over the flask, and an inclined pad on the support whereby the roll
50 rides onto and off the sand in the flask without jarring.

9. A roll ramming apparatus comprising in combination a flask, a roll for ramming
55 the sand in the flask, means for supporting the roll over the flask, and means adjacent an end of the supporting means maintaining the roll above the normal level of the supporting means thereby preventing jolting
60 of the flask as the roll rides onto and off the sand in the flask.

10. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, a track for support-

ing the roll over the flask, and pads on the track adjacent the ends of the flask adapted
65 to carry the roll onto and off the sand in the flask without jolting the flask.

11. A roll ramming apparatus comprising in combination a flask, a roll for ramming
70 the sand in the flask, and means actuated with the roll adapted to engage the flask and clean the sand therefrom, and a trip mechanism for releasably locking said means in inoperative position clear of the
75 flask.

12. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, means actuated by the roll adapted to engage the upper surface
80 of the flask and clean the sand therefrom, and trip mechanism for releasably locking said means in inoperative position clear of the flask.

13. A roll ramming apparatus comprising
85 in combination a flask, a roll ramming mechanism for ramming the sand in the flask, operating mechanism for actuating the roll, means operated by one of the said mechanisms adapted to engage the surface
90 of the flask and clean the sand therefrom, and trip mechanism for releasably locking said first means in inoperative position clear of the flask.

14. A roll ramming apparatus comprising
95 in combination a flask, a roll for ramming the sand in the flask, a frame carried by the roll, and a plate mounted on said frame and adapted to engage the top surface of the flask and clean the sand therefrom, means
100 for normally holding said plate in engagement with the flask, and means for releasably locking the plate in inoperative position.

15. A roll ramming apparatus comprising
105 in combination a flask, a roll for ramming the sand in the flask, a frame carried by the roll, and a plate mounted on said frame and adapted to engage the top surface of the flask and clean the sand therefrom, said
110 frame and the roll having relative vertical movement.

16. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, means for actuating the
115 roll, and a sand retaining member adapted to retain the sand in position over the flask, said member being actuated or moved with the roll.

17. A roll ramming apparatus comprising
120 in combination a flask, a roll ramming mechanism for ramming the sand in the flask, mechanism for operating the roll, and a movable sand retaining member adapted to retain the sand in position over the flask,
125 said member being moved by one of said mechanisms.

18. A roll ramming apparatus comprising

in combination a flask, a roll for ramming the sand in the flask, means for moving the roll longitudinally of the flask, and a sand retaining frame adapted to retain the sand in position over the flask carried by the roll, said frame being of shorter length than the flask.

19. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, means for moving the roll longitudinally of the flask, and a sand retaining frame of shorter length than the flask adapted to retain the sand in position over the flask carried by the roll, the frame and the roll having relative vertical movement with respect to one another.

20. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, a support for the roll, and a movable sand retaining frame supported on the support and actuated by the roll.

21. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, a support for the roll, and a movable sand retaining frame riding on the support and actuated by the roll, said frame having relative vertical movement with respect to the roll.

22. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, means for moving the roll longitudinally of the flask, and a sand retaining frame of shorter length than the flask adapted to retain the sand in position over the flask and carried by the roll, and a strike-off means carried by said frame.

23. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, means for moving the roll longitudinally of the flask, and a sand retaining frame of shorter length than the flask adapted to retain the sand in position over the flask carried by the roll, and a member carried by said frame adapted to clean off the sand on the top of the flask.

24. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, means for moving the roll, and a sand retaining frame of shorter length than the flask adapted to retain the sand in position over the flask carried by the roll, a strike-off means carried by said frame, and a member mounted on said frame adapted to clean off the sand from the top of the flask.

25. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, a strike-off preceding said roll, means on the strike-off for plowing a furrow in the sand, and a member carried by the strike-off adapted to prevent the sand from rolling back into said furrow.

26. A roll ramming apparatus comprising

in combination a flask, a roll ramming mechanism for ramming the sand in the flask, mechanism for operating the roll, a moving strike-off carried by one of said mechanisms, means on the strike-off for plowing a furrow in the sand, and a member mounted on the strike-off adapted to prevent the sand from rolling back into the furrow.

27. A roll ramming apparatus comprising in combination a flask, a roll ramming mechanism for ramming the sand in the flask, mechanism for operating the roll, and a moving strike-off member carried by one of said mechanisms having its corners cut away to leave a deeper portion of sand at the edges of the flask.

28. A roll ramming apparatus comprising in combination a flask, a roll adapted to ram the sand in the flask, means for moving the roll, and a sand retaining frame moved with the roll, said frame being flared outwardly.

29. A roll ramming apparatus comprising in combination a flask, a roll adapted to ram the sand in the flask, means for moving the roll, and a sand retaining frame moved with the roll, said frame being open at one end and having its sides adjacent such end flared outwardly.

30. A roll ramming apparatus comprising in combination a flask, a roll adapted to ram the sand in the flask, means for moving the roll, and a sand retaining member moved with the roll, said member being arranged to direct the sand inwardly as the member is advanced.

31. A roll ramming apparatus comprising in combination a roll, a support therefor, an operating screw for driving the roll extending longitudinally of the support, means for turning the screw, and an operative connection between the screw and the roll, said connection being slidably mounted on the support for free vertical movement with respect thereto.

32. A roll ramming apparatus comprising in combination a flask, a roll for ramming the flask, and a track for the roll adapted to support the roll over the flask, said track having an elevation adjacent one end whereby the roll is lifted above the normal level of the track.

33. A roll ramming apparatus comprising in combination a flask, a roll for ramming the sand in the flask, a frame carried by the roll, and a member mounted on said frame adapted to engage the top surface of the flask and clean the sand therefrom, said frame and the roll having relative vertical movement.

34. A roll ramming apparatus comprising in combination a ramming roll, a flask, a supporting frame adapted to support the roll over the flask, relatively fixed mecha-

nism for operating the roll mounted on the frame and extending longitudinally of the flask, and an operative connection between the roll and the operating mechanism, the roll having vertical movement relative to the operating mechanism.

In testimony whereof I have hereunto

signed my name in the presence of the two subscribed witnesses.

HARRY P. MACDONALD.

Witnesses:

J. F. ARNOLD,

C. C. GREENLEE, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."