

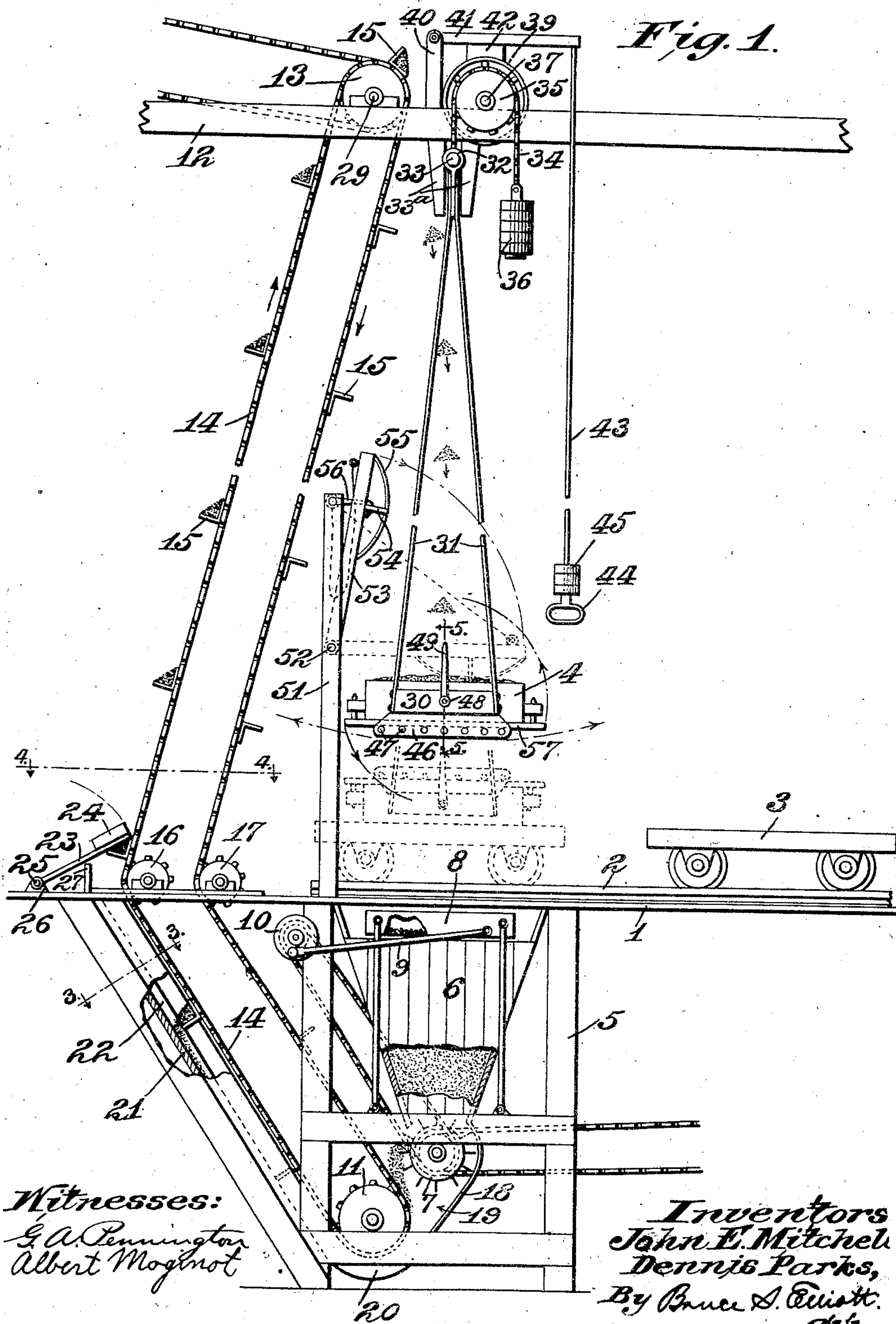
No. 840,789.

PATENTED JAN. 8, 1907.

J. E. MITCHELL & D. PARKS.  
GRAVITY MOLDING APPARATUS.

APPLICATION FILED JUNE 28, 1906.

2 SHEETS—SHEET 1.



*Witnesses:*

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Albert Moginot

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*Atty.*

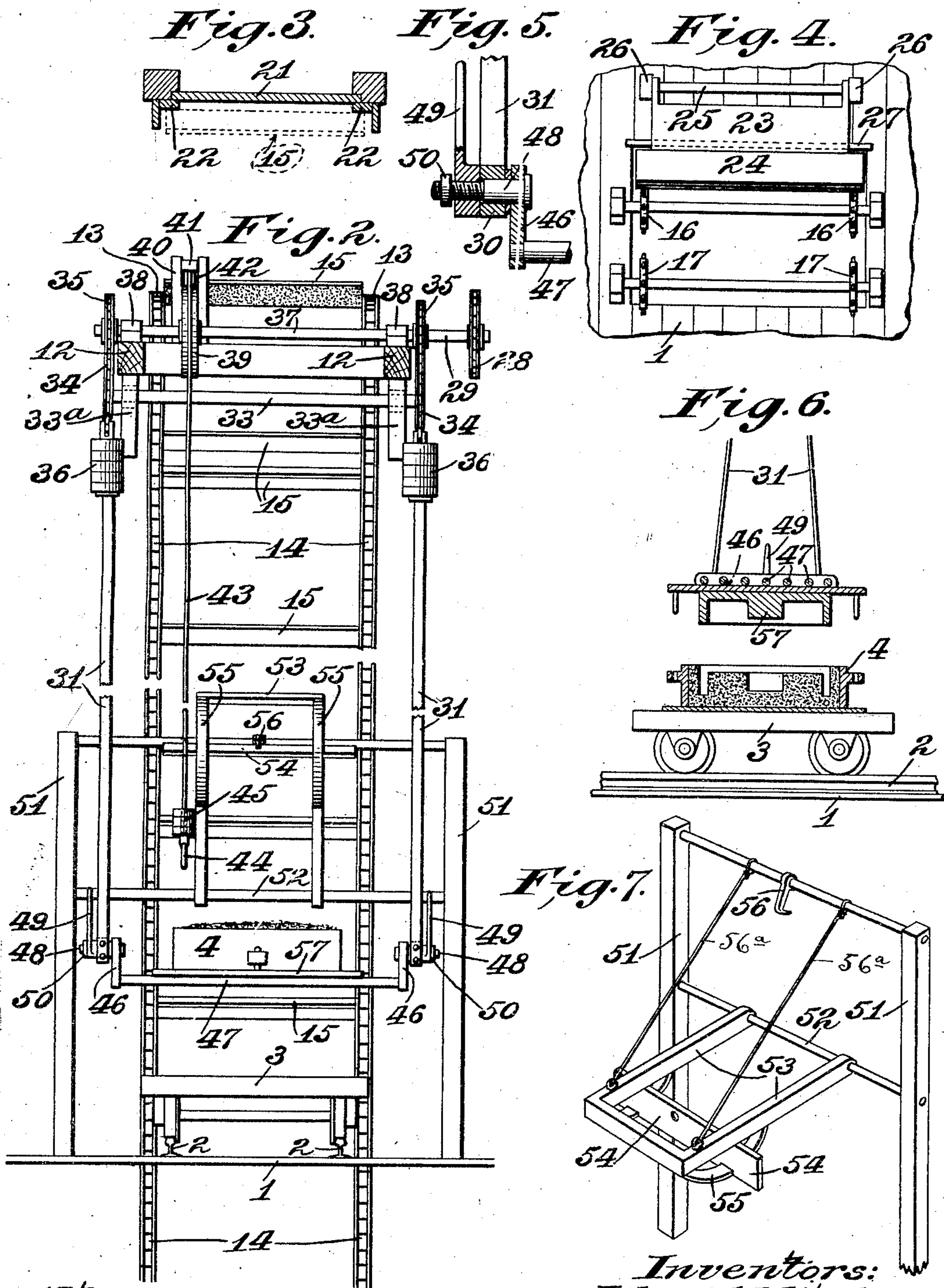
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# UNITED STATES PATENT OFFICE.

JOHN E. MITCHELL AND DENNIS PARKS, OF ST. LOUIS, MISSOURI, AS-  
SIGNORS TO MITCHELL-PARKS MANUFACTURING CO., OF ST. LOUIS,  
MISSOURI, A CORPORATION OF MISSOURI.

## GRAVITY MOLDING APPARATUS.

No. 840,789.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed June 28, 1906. Serial No. 323,911.

*To all whom it may concern:*

Be it known that we, JOHN E. MITCHELL and DENNIS PARKS, citizens of the United States, residing at St. Louis, in the State of Missouri, have invented new and useful Improvements in Gravity Molding Apparatus, of which the following is a specification.

This invention relates to an apparatus for use in the art of molding, and has for its objects to provide novel means for elevating and compressing the sand and finally discharging the same in separate unitary compact bodies at a point considerably above the flask, so that bodies of sand in falling through space will acquire a high degree of momentum and by impact with the flask and with bodies of sand previously discharged thereinto will firmly pack in the flask and about the pattern inclosed thereby; to provide novel means for supporting and manipulating the flask during the packing operation and for subsequently depositing the packed flask upon a suitable receiver and then removing the pattern therefrom, and to provide novel means for "topping off" or removing surplus sand from the flask.

In addition to the above-stated general objects of the invention other objects relate to details of construction and to combinations and operations of parts, all as hereinafter described, and particularly pointed out in the claims.

We have illustrated our invention in the accompanying drawings, in which—

Figure 1 is a view in side elevation, partly broken away, illustrating an apparatus embodying our invention. Fig. 2 is a view in front elevation of that part of the device above the floor-line. Fig. 3 is a section on the line 3 3 of Fig. 1. 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. 1. Fig. 6 is a view in side sectional elevation of a portion of the apparatus, showing the flask reversed and deposited on a truck and the pattern withdrawn from the flask; and Fig. 7 is a perspective view of the scraping device.

Referring now to the drawings, the numeral 1 indicates the floor of the molding-room; 2, a track thereon; 3, a truck mounted to travel on said track, and 4 a flask inclosing a pattern. Beneath an opening in the floor

is mounted a sand-receptacle 5, containing a hopper 6, the lower end of which is closed by a feed-roller 7, located, as shown, some distance above the bottom of the receptacle 5. At the top of the hopper 6 and immediately under the opening in the floor is suitably mounted a screen 8, which is agitated by means of a rod 9 and crank or eccentric 10, operated from any suitable source of power.

Mounted in the lower part of the receptacle 5 are two sprocket-wheels 11, and mounted on rafters or other supports 12, located at a suitable distance—say thirty feet—above the floor, are two similar sprocket-wheels 13. Two sprocket-chains 14 pass over the respective sets of sprocket-wheels 11 13 and are connected to form an endless carrier by a series of L-shaped buckets 15, which are of a length to pass freely between the respective pairs of sprocket-wheels 11 and 12 and between two pairs of guide-pulleys 16 17, mounted in suitable bearing on the floor 1.

The lower part of the receptacle 5 is provided with an inclined partition 18 to form a compartment 19 to receive the sand fed from the hopper by the feed-roller 7, and a curved depression 20 is provided in the floor of the compartment 19 to accommodate the troughs in passing around the sprocket-wheel 11.

In passing through the compartment 19 each bucket of the elevator will take up a quantity of sand, as will be understood. Said buckets then pass in succession through a trough 21, the outer edge of said buckets at each end resting upon rails 22, provided on the bottom of the trough at opposite sides thereof, so that the outer edge of each bucket will be maintained a slight distance—say an eighth of an inch—above the bottom of the trough to allow the surplus sand carried out by the buckets or sand falling therefrom to slide back into the compartment 19.

23 indicates a packing-plate which is weighted at its outer end, as indicated at 24, and mounted on a rod 25, which is pivotally supported in bearings 26, mounted on the floor 1.

27 indicates a support for the packing-plate. As each bucket passes out of the trough 21 and beyond the guide-pulley 16 its bottom assumes a substantially horizontal position, and immediately thereafter it



comes in contact with the under side of the packing-plate, which operates to press or pack the sand in the bucket. The packing-plate will be raised as the bucket travels upward, and as the latter passes from beneath it will fall back on the support 27 in position to be engaged by the next bucket. As each bucket passes around the sprocket-wheels 13 it will be turned gradually upside down, and when the bottom assumes a substantially horizontal position the wad of sand will be discharged therefrom and fall into the flask.

The guide-pulleys 16 and 17 are for the purpose of giving the proper inclination to the lower part of the endless elevator, so that the buckets will scoop up the sand as they pass through the compartment 19 and to the upper part, so that the wads of sand will be discharged outside the line of travel of the buckets and so that sufficient space will be afforded to permit the flask to be moved back and forth and to be otherwise manipulated, as hereinafter described.

For supporting and manipulating the flask and removing the pattern therefrom we provide what we term a "cradle," and this device and the means for operating the same will now be described.

The numerals 30 indicate two flat metal bars to opposite ends of each of which are secured the lower ends of two metal rods or hangers 31, the upper ends of which are secured, respectively, to two sleeve-supports 32, mounted on a shaft 33, near-opposite ends thereof. Said shaft is supported by means of two chains 34, which are secured at one end thereto and pass over sprocket-wheels 35 and have secured to their opposite ends, respectively, weights 36. The sprocket-wheels 35 are fast on a shaft 37, mounted in suitable bearings 38 on the supports 12. Fixedly secured on the shaft 37 is a brake-wheel 39. Pivotaly mounted on a support 40 is a brake-beam 41, having a brake-shoe 42, which normally bears upon the periphery of the brake-wheel 39 and prevents the shaft 37, and consequently the sprocket-wheels 35, from turning. Secured to and depending from the outer end of the brake-beam 41 is a rod 43, provided at its lower end with a handle 44. By placing a weight 45 on the rod 43 the brake-shoe 42 can be made to bear upon the brake-wheel with the requisite amount of pressure to prevent the latter from turning. By raising the rod 43 the brake-wheel will be released, as will be understood. The ends of the shaft 33 work between two sets of guides 33<sup>a</sup>, which prevent lateral movement of said shaft. The lower or supporting part of the cradle comprises two metal side members 46, which are connected by means of bars 47, secured at their ends in the side members, near the lower edges thereof, and forming an open support to permit sand falling from the

flask to pass through and to fall upon or in proximity to the screen 8. The bed of the cradle, formed by the side members and bars, as described, is pivotaly supported in the bars 30 by means of bolts 48, passed centrally through the bars and the side members 46, but near the upper edges of the latter. By thus having the bottom of the bed located considerably below the points of pivotal connection of said bed in the bars 30 we decrease the tendency of said bed to tilt over, as will be understood. The outer ends of the bolts 48 are screw-threaded and have applied to them screw-threaded brake-levers 49, which when turned home will bear upon the bars 30 and cause the side members 46 of the bed to bind against said bars, and thus lock the bed against turning. Jam-nuts 50 may be applied to the bolts and screwed up against the brake-levers to make the lock secure.

The scraping device comprises a support 51, located adjacent to the cradle, on which is pivotaly mounted, as indicated at 52, a frame 53, carrying toward its outer end on its under side a blade or scraper 54, which will be as long as the largest flask to be used with the apparatus is wide. At each end of the blade 54 curved guard-strips 55 are centrally secured and have their ends fastened to the frame 53 on each side of said blade, the purpose of these guides or guards being to prevent the blade 54 from striking against the side of the flask as the latter is swung to and fro. When not in use, the frame 53 may be swung up out of the way and held thus by a catch 56. Flexible supports for the frame are indicated at 56<sup>a</sup>, Fig. 7.

The operation of the device is as follows: The pattern-plate 57 is placed on the bed of the cradle and removably secured thereto, and the flask 4 is then placed over the pattern and also removably secured to the bed. The rod 43 is then pushed up by the operator and the cradle raised by the action of the weights 36. Sufficient weights are placed on the chains 34 to cause the cradle to rise when the flask is empty. Sand from the floor 1 is from time to time shoveled onto the screen 8 by the operator and passing into the hopper 6 is delivered by the feed-roller into the compartment 19 of the receptacle 5 and thence elevated by the buckets 15. As each bucket comes into contact with the packing-plate 23 the sand therein is compressed and is finally discharged from the bucket, as before stated. The wads of sand thus discharged will fall into the flask, the operator swinging the latter back and forth, so that the sand will be packed uniformly in all parts thereof. The discharge of the wads of sand continues until the sand has piled up somewhat above the flask, when the movement of the endless elevator is discontinued, as by throwing the driving-belt of the pulley 28 onto a loose pul-



ley in a manner well known. The frame 53 is now lowered, so that the scraper 54 will rest upon the sand piled up on the flask, and then by swinging the cradle back and forth a few times the surplus sand will be scraped off, so that the sand in the flask will be level with the top thereof. If the brake-levers 49 have been turned home, they are now loosened, and by pushing up on one end of the bed the latter, with the flask, may be readily turned over—that is, upside down—this motion being so gentle as almost entirely to obviate any tendency to loosen the sand in the flask by jarring or shaking. The truck 3 is now rolled beneath the cradle, and a bottom for the flask having been placed on the truck the operator pushes the rod 43 upward slightly and allows the bed and flask to descend gently until the latter rests upon the flask-bottom on the truck, the weight of the packed flask being sufficient to overcome the power of the weights 36.

It will be observed that the operator can control absolutely the rate of movement of the cradle in its descent by varying the pressure of the brake-shoe on the brake-wheel through the medium of the rod 43. The flask being deposited on the truck, the next step is to remove the pattern. This is done by removing the fasteners which held the flask to the bars 47 of the bed and then raising the bar 43, when the cradle will rise, carrying the pattern 57 with it. This position of the parts is shown in Fig. 6. Before raising the pattern, however, it is desirable to tighten the brake-levers 49, so as to insure the pattern being raised uniformly at each end. This latter is a highly important feature of our invention. Heretofore the inva-

riable practice has been to raise the pattern by hand; but, as is well known, it is practically impossible for two or more men standing on opposite sides of a flask to raise the pattern uniformly, as one man will raise his side a little faster than the other or push the pattern toward the other or otherwise displace the same, so that as a result the corners and edges of the molded sand are frequently broken off, necessitating considerable trowel-work after the pattern has been removed. This objection is entirely overcome by our method of raising the pattern absolutely in a straight line and uniformly at the sides and ends. After the pattern has been removed the flask containing one-half of the mold is lifted from the truck, the cradle-bed is reversed, a new flask is placed over the pattern, and the preceding operations are repeated.

By our system of molding the lower halves of any desired number of molds are first made in the manner just described and then the upper halves are made in a similar manner and conveyed by a crane or other means

to and deposited upon the lower halves, being turned in transit.

By means of our invention the flasks may be readily and rapidly manipulated with but slight exertion on the part of the operator and all of the movements being gentle and uniform with no tendency to shake or jar the molded sand.

It has been demonstrated that in order successfully to make use of gravity in packing sand in flasks the sand must be discharged in separate compact wads or bodies, and this our apparatus accomplishes in a rapid and effective manner.

We have illustrated in the drawings the best form of apparatus now known to us for carrying out our invention. We do not wish to be understood, however, as limiting ourselves to the precise form of apparatus shown, for in so far as the broad principles of the invention are concerned said apparatus might be varied in many respects without such changes constituting a real departure from the spirit of the invention as defined in the claims following.

We claim—

1. Gravity molding apparatus comprising, in combination with means for intermittently discharging into a flask from a suitable elevation compact wads of sand, a support for the flask movable back and forth across the line of fall of such wads.

2. In gravity molding apparatus, in combination with means for elevating sand and intermittently discharging into a flask from such elevation compact wads thereof, a support for the flask movable back and forth across the line of fall of such wads.

3. Gravity molding apparatus comprising, in combination with sand elevating, compressing and discharging mechanism, a pendant flask-support partially located in, and movable back and forth across the line of fall of the sand.

4. Gravity molding apparatus comprising, in combination with sand elevating, compressing and discharging mechanism, a reversible flask-support partially located in, and movable back and forth across the line of fall of the sand.

5. Gravity molding apparatus comprising, in combination with sand elevating, compressing and discharging mechanism, a pendant reversible flask-support partially located in and movable back and forth across the line of fall of the sand.

6. Gravity molding apparatus comprising, in combination with means for intermittently discharging into a flask from a suitable elevation compact wads of sand, a swinging flask-support partially located in and movable back and forth across the line of fall of such wads.

7. Gravity molding apparatus comprising.



in combination with means for intermittently discharging into a flask from a suitable elevation compact wads of sand, a pendent reversible flask-support partially located in and movable back and forth across the line of fall of such wads, and means for locking said support in adjusted positions.

8. Gravity molding apparatus comprising, in combination with means for intermittently discharging into a flask from a suitable elevation compact wads of sand, a pendent reversible and vertically-movable flask-support partially located in and movable back and forth across the line of fall of such wads.

9. Gravity molding apparatus comprising, in combination with means for intermittently discharging into a flask from a suitable elevation compact wads of sand, a swinging vertically-movable frame, a flask-support bed pivotally mounted in said frame, and means for locking said bed in adjusted positions, said bed being movable back and forth across the line of fall of the wads.

10. Gravity molding apparatus comprising, in combination with sand elevating and discharging mechanism, a cradle having at its lower end a bed partially located in the line of discharge of the sand, a shaft mounted above said bed and having sprocket-wheels and a brake-wheel fast thereon, chains connected to the upper end of said cradle and passing over said sprocket-wheels and having weights applied to their free ends, and brake mechanism cooperating with said brake-wheel, the combination operating as described.

11. Gravity molding apparatus comprising an endless bucket elevator having one end supported at a suitable elevation, as described, the buckets being adapted to discharge at the upper end of the elevator over a flask, and the sand so discharged to fall into the flask, a sand-supply for said elevator, and means cooperating with said elevator for compressing the sand in the buckets thereof.

12. Gravity molding apparatus comprising an endless bucket elevator having one end supported at a suitable elevation, as described, the buckets being adapted to discharge at the upper end of the elevator over a flask, and the sand so discharged to fall into the flask, a sand-supply for said elevator, and a pivoted packing-plate adapted to be engaged successively by the buckets in their upward movement.

13. In gravity molding apparatus, in combination with means for elevating and intermittently discharging sand above a flask to fall by gravity thereinto, means for compressing the sand, before its discharge, into unitary blocks or wads.

14. In gravity molding apparatus, means for elevating the sand, means for compressing the same into separate wads, or blocks,

and means for intermittently discharging said wads or blocks above a flask to cause the sand to fall into and pack in said flask.

15. In gravity molding apparatus, means for continuously elevating and discharging separate, unitary bodies of sand above a flask to cause the sand to fall into and pack in said flask, and means for compressing each body of sand before its discharge.

16. In gravity molding apparatus, means for continuously elevating and discharging separate, unitary bodies of sand above a flask to cause the sand to fall into and pack in said flask, and automatic means for compressing each body of sand before its discharge.

17. In gravity molding apparatus, in combination with a swinging cradle, a scraper pivotally mounted adjacent thereto and adapted to be turned into and out of cooperative relation therewith.

18. In gravity molding apparatus, in combination with a swinging cradle, a scraper cooperating therewith, said scraper comprising a frame, a blade projecting therefrom, and curved guards located at the outer edge of the blade at each end thereof and extending to the frame at points removed from either side thereof.

19. Gravity molding apparatus comprising an endless sand-elevator having one end supported at a considerable height, as described, and being adapted to discharge the sand intermittently at its upper end over a flask, to cause the sand to fall by gravity directly thereinto, a sand-supply for said elevator, said elevator being guided to travel in planes inclined to the vertical, and a flask-support movable back and forth across the line of fall of the sand.

20. Gravity molding apparatus comprising an endless sand-elevator having one end supported at a considerable height, as described, and being adapted to discharge the sand intermittently at its upper end over a flask, to cause the sand to fall by gravity directly thereinto, a sand-supply for said elevator, said elevator being guided intermediate its ends to cause the upper and lower portions thereof, respectively, to travel in planes inclined in opposite directions to the vertical, and a flask-support movable back and forth across the line of fall of the sand.

21. Gravity molding apparatus comprising an endless sand-elevator having one end supported at a considerable height, as described, and being adapted to discharge the sand intermittently into space at its upper end over a flask, to cause the sand to fall by gravity directly thereinto, a sand-supply for said elevator, said elevator being guided intermediate its ends to cause the upper and lower portions thereof, respectively, to travel in planes inclined in opposite directions to



the vertical, and a swinging cradle adapted to support the flask to receive the wads of sand discharged from the elevator, said cradle being movable toward and from the elevator in the space afforded by inclining the opposite end portions thereof as described.

In testimony whereof we have hereunto

set our hands in presence of two subscribing witnesses.

JOHN E. MITCHELL.  
DENNIS PARKS.

Witnesses:

CLELL MELTON,  
HENRY N. LENGFELDER.