

F. QUINN.
PATTERN OR MOLD FORMING MACHINE.
APPLICATION FILED JAN. 29, 1910.

972,914.

Patented Oct. 18, 1910.

6 SHEETS—SHEET 1.

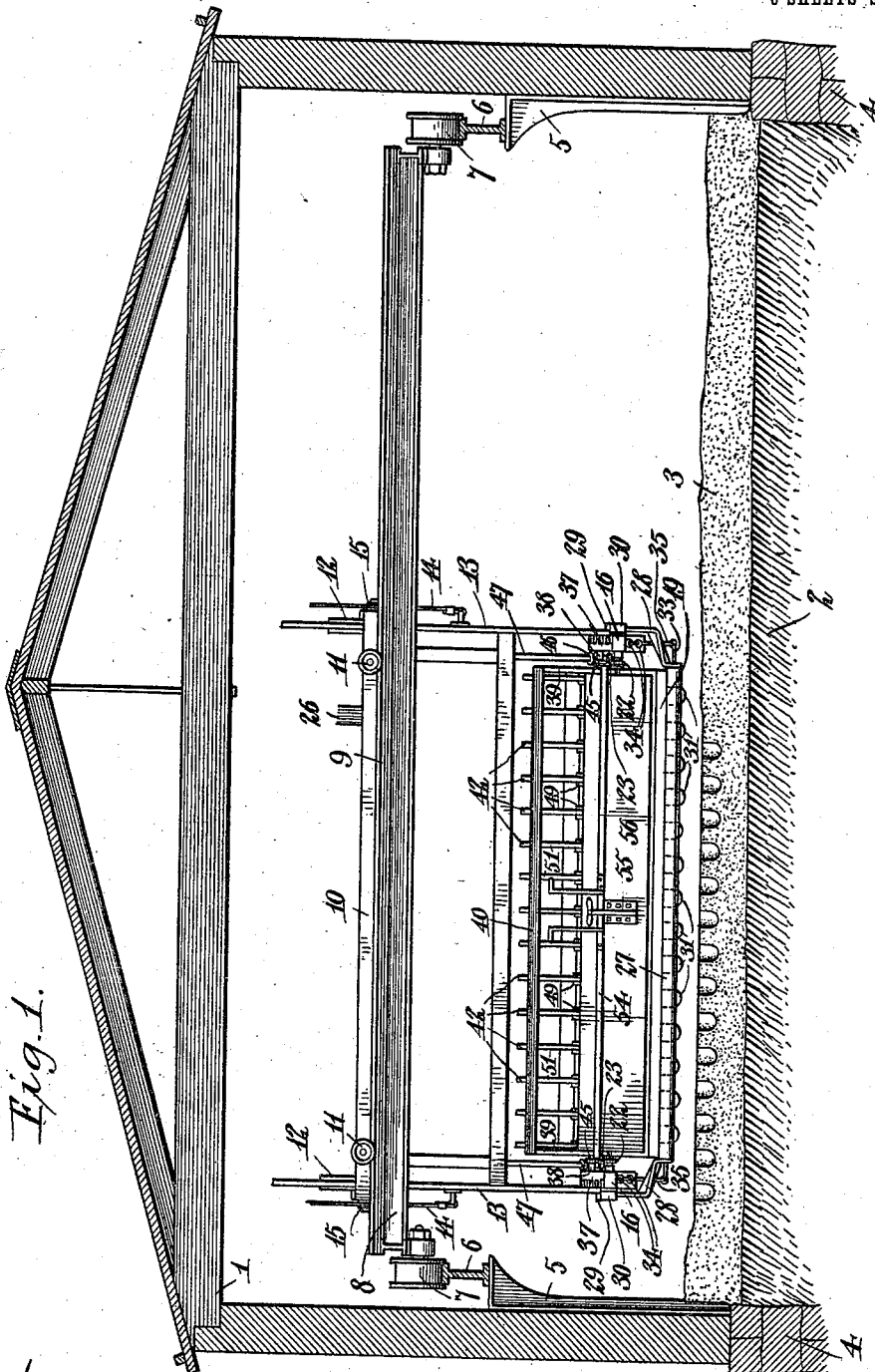


Fig. 1.

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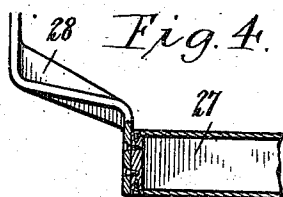
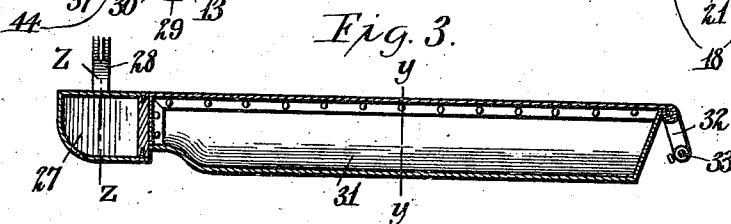
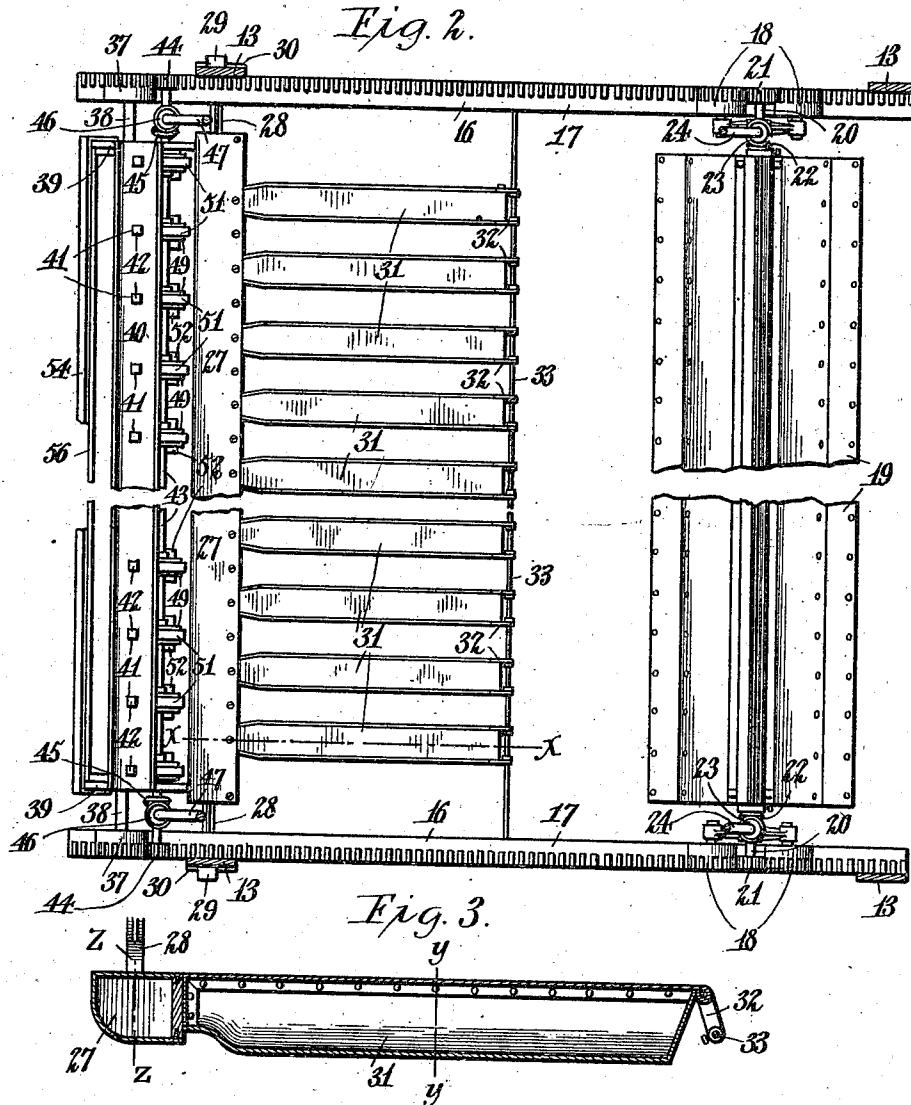


Fig. 5.



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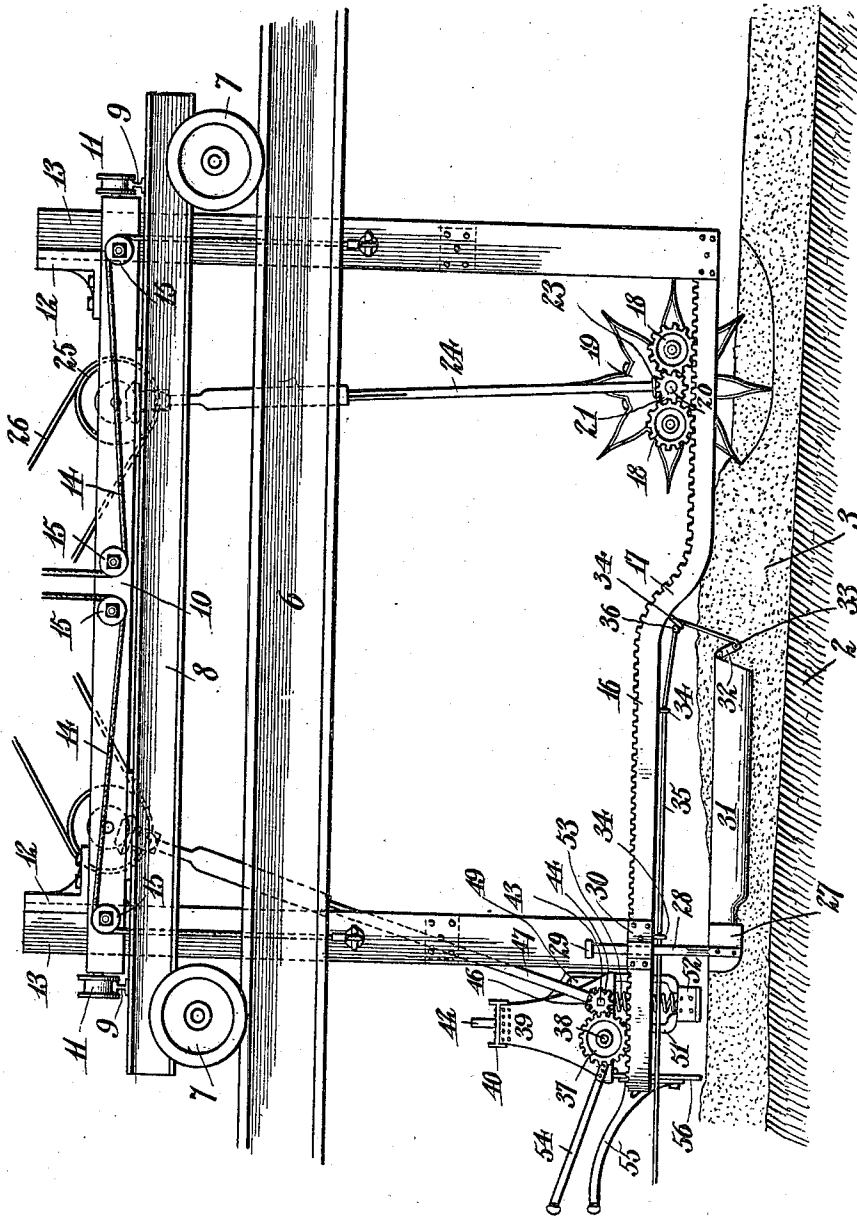
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6 SHEETS-SHEET 3.

Fig. 6.



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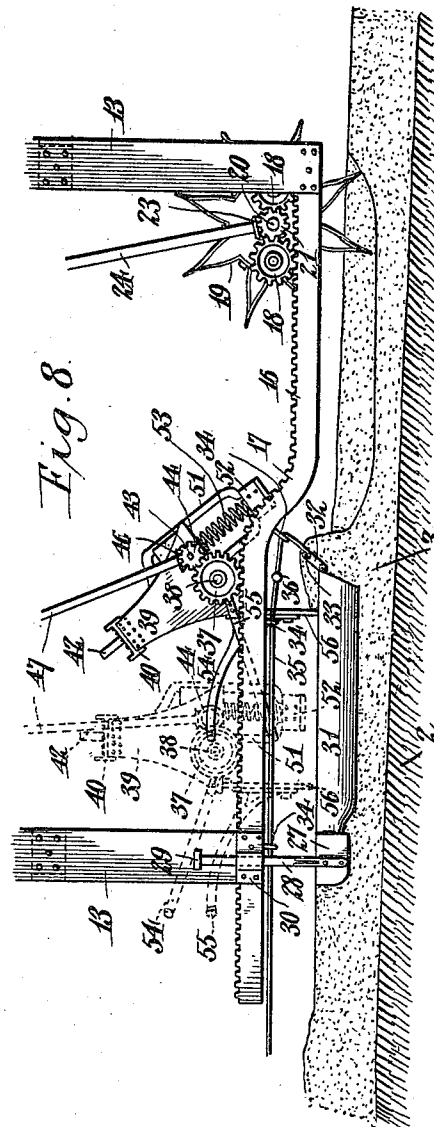
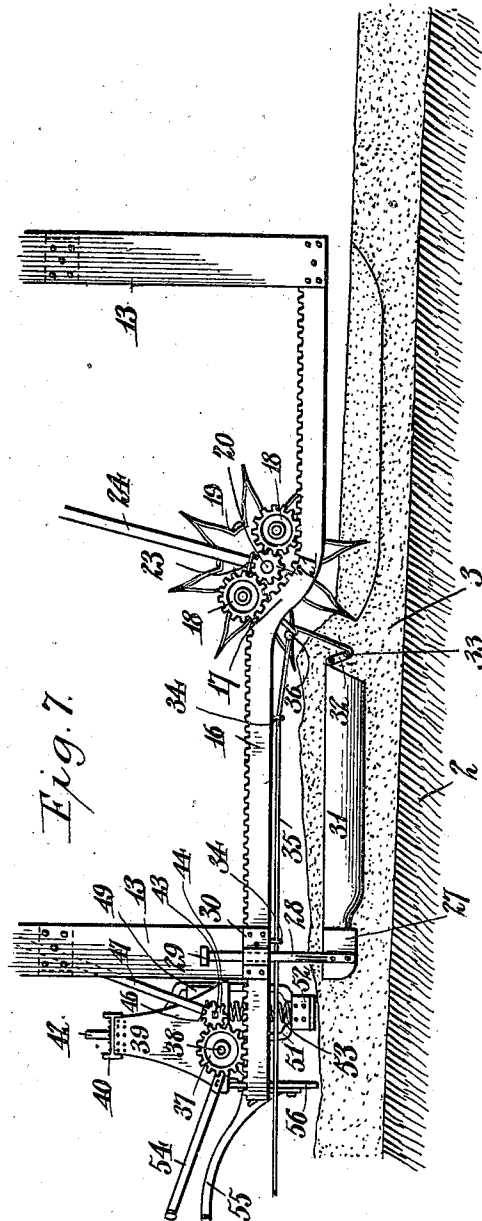
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6 SHEETS—SHEET 4.

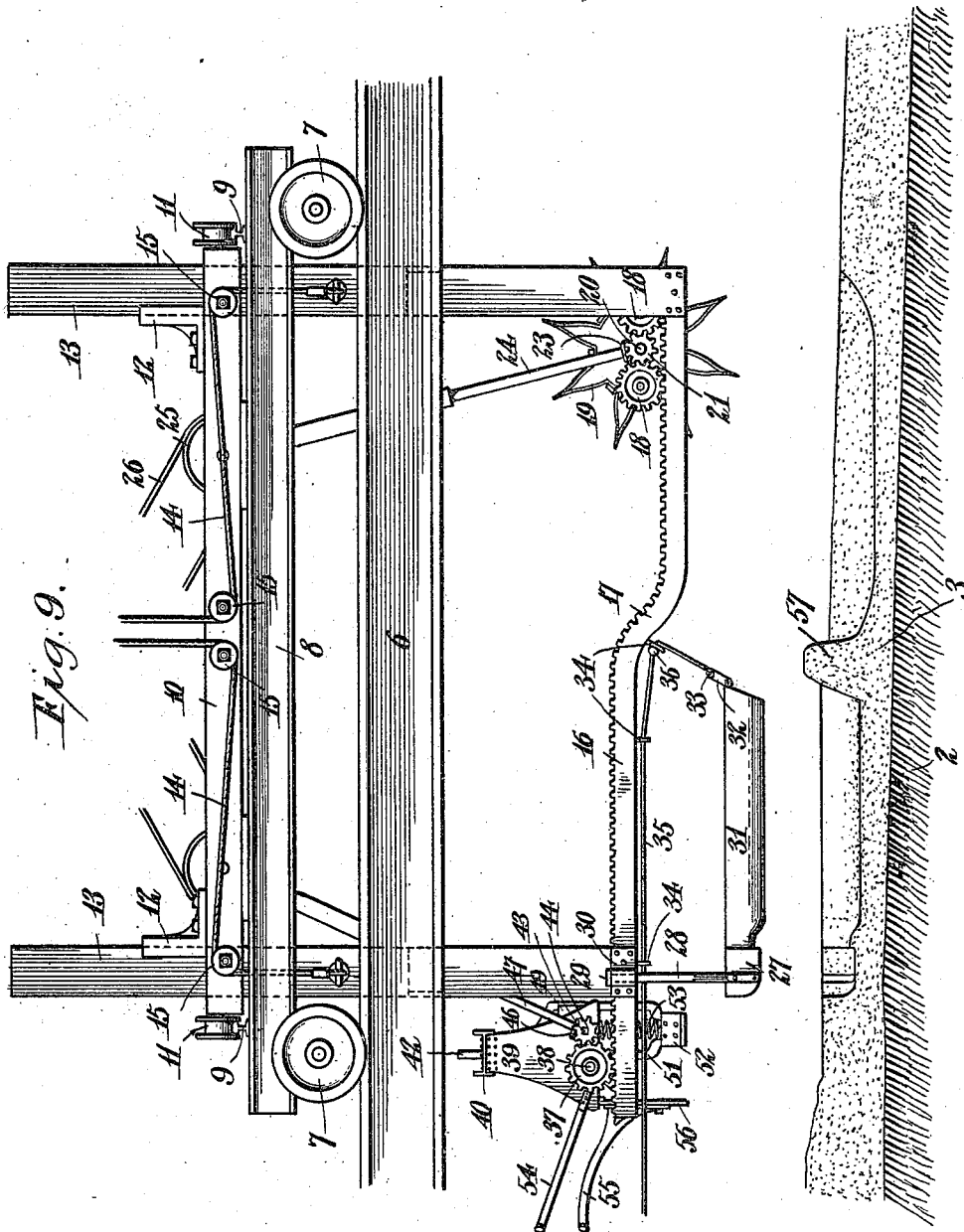


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972,914.

6 SHEETS-SHEET 5.



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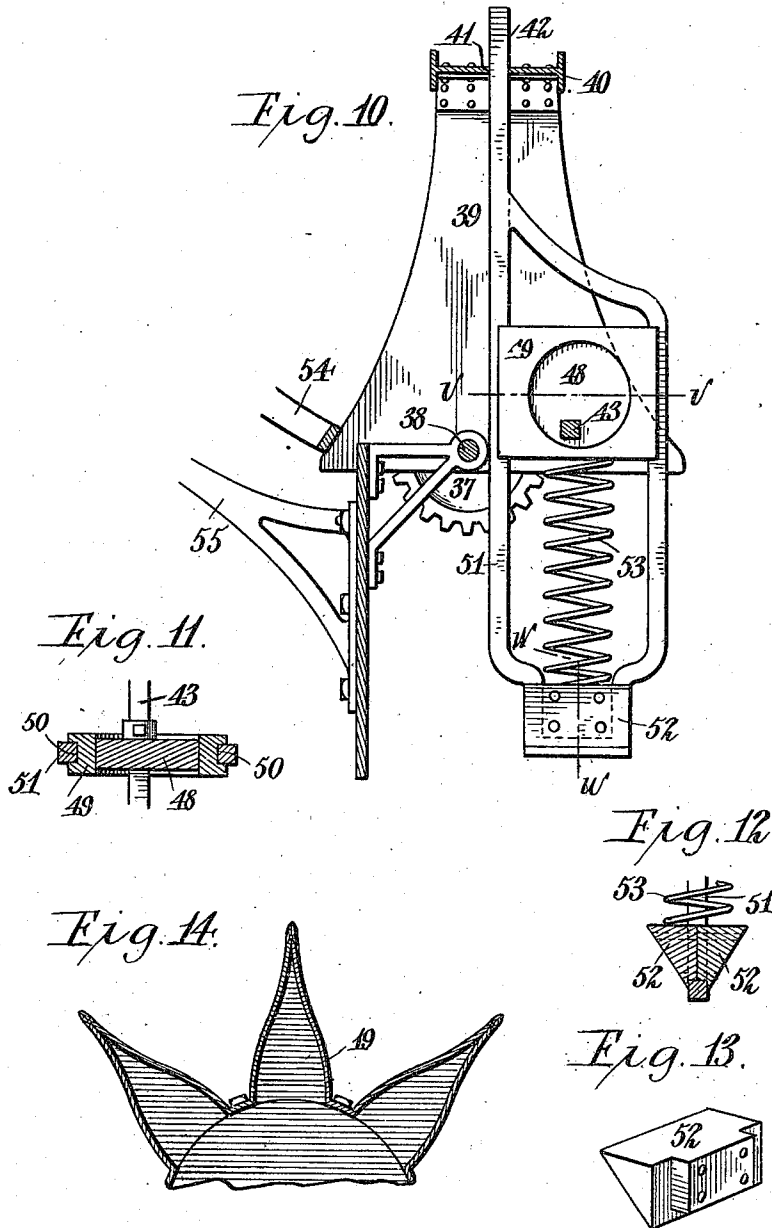
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UNITED STATES PATENT OFFICE.

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PATTERN OR MOLD FORMING MACHINE.

972,914.

Specification of Letters Patent.

Patented Oct. 18, 1910.

Application filed January 29, 1910. Serial No. 540,830.

To all whom it may concern:

Be it known that I, FELIX QUINN, a citizen of the United States, and resident of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Pattern or Mold Forming Machines, of which the following is a specification.

My invention relates to improvements in pattern or mold forming machines, and refers particularly to means for forming the molds or patterns used in casting what are known in the art as pigs.

The objects of my invention are, the provision of means of the character and for the purpose stated which can be easily operated and controlled to form the molds or patterns in a rapid and efficient manner; which will be capable of easy manipulation to produce the molds or patterns; to utilize the entire ground or sand surface of the cast house; which will first dig or form the trench and then form the patterns in series for the pigs and a communicating channel, or what is known as the sow pattern; and which will possess merit in point of efficiency, durability and ease of operation and which, all things considered, will prove a great saving of expense.

With these and other objects in view, the invention broadly stated consists in the combination with the cast house, of tracks located at the sides thereof in the customary position for carrying a crane, a crane mounted on the tracks and having auxiliary tracks formed thereon, and a combination excavating, pattern-shaping and tamping-device carried by the tracks; the arrangement of the main tracks and the auxiliary tracks on the crane permitting the machine to move up and down and across the cast house to reach all parts thereof where it is desired to form patterns or molds.

To attain the desired objects, my invention further consists in a combined excavating and mold-forming machine embodying novel features of construction and combination and arrangement of parts for service substantially as hereinafter described and as illustrated in the accompanying drawings.

Figure 1 represents a sectional view of a cast house having my invention in position therein, a portion of the pig-molds being shown in section and the device being raised

and partially moved laterally toward the space in which the next molds are to be made. Fig. 2 represents a top plan view of the device, the supporting uprights therefor being shown in section. Fig. 3 represents an enlarged detailed sectional view of the pattern-forming devices, taken on line $x-x$, of Fig. 2. Figs. 4 and 5 represent similar views taken on lines $y-y$, and $z-z$, respectively of Fig. 3. Figs. 6, 7, 8, and 9 represent detailed views illustrating the various steps in the preparation of the floor of the cast house for the casting of the pigs; in Fig. 6 the pattern being shown as just deposited in an excavation made therefor and the excavating-implement having commenced the trench to receive the next series of patterns, a portion of the sand having been thrown back onto the pattern-forming devices, while in Fig. 7 the operation of the digger has been completed, the pattern being well covered and the trench in shape to receive the next series. In Fig. 8 the action of the tamper is indicated by the dotted lines, while that of the scraper is shown in the full lines, it being here shown how the scraper serves in forming a separating partition or wall between the different series of patterns. In Fig. 9 the device is shown in the same position as in Fig. 1, it having been lifted free of the sand, the mold having been completed, and it is now in position to be placed as desired to form new molds. Fig. 10 represents an enlarged detailed view of the tamping-mechanism, the supporting beam and axle thereof being shown in section, as is also the scraping-mechanism. Fig. 11 represents a sectional view of the mechanism for operating the tampers, said section being taken on line $v-v$, of Fig. 10. Fig. 12 represents a sectional view on the line $w-w$, of Fig. 10, illustrating the structure of the contacting portion of the tampers. Fig. 13 represents a perspective view of one of the wedge-shaped blocks secured to the lower portion of the tampers, and Fig. 14 represents an enlarged fragmentary sectional view illustrating the construction of the digger or shoveling-device.

In the drawings, in which similar characters of reference are employed to denote corresponding parts in the various views, the numeral 1 designates the frame of the cast house, said cast house being provided with

a suitable floor 2 upon which is laid a thick layer or covering of sand 3, said floor and covering sloping slightly from one end to the other, the purpose of which will be hereinafter described. Secured to the sides of the cast house and preferably extending downward and resting on the foundation 4 of the cast-house in order that they may be able to withstand greater strain and support a heavy weight are the beams 5, and mounted on the top of said beams are the tracks 6, said tracks thus extending from end to end along each side of the cast house and spaced a considerable distance above the floor thereof.

Mounted upon the tracks 6 and moving thereon on the wheels 7 is the crane 8, said crane being formed of I-beams secured together in rectangular conformation, and secured on the top of the crane at each end thereof are transversely-disposed tracks 9 which extend from one side of the cast house to the other, as is clearly illustrated in Fig. 1.

My device proper has a rectangular frame-work 10 provided with wheels 11 on its ends which engage and move upon the tracks 9. Thus it will be observed that on account of the lateral positioning of the device upon the crane which moves longitudinally of the cast house it is possible to move my device into any desired part of the cast house where molds are to be formed.

Carried by each corner of the frame 10 is a guide-bracket 12, and slidably secured between the brackets and the corners of the frame are vertically movable uprights 13. A cable or other flexible connection 14 is secured to each of said uprights intermediate their ends, said connections passing over a series of sheaves 15 and being secured to a common winding drum or like device to cause the beams to be raised and lowered in unison.

Secured to the lower ends of the pair of uprights on each side of the device is a trackway 16 having a plane and a toothed portion extending coincidentally and being formed with an inclined portion 17 mid-length, said inclined portion serving to allow the device carried by the front of the machine to approach nearer the floor than that carried by rear portion thereof and also serving to limit the operation in that direction of the various devices operating upon the track. To hold the trackways 16 in spaced relation I form the teeth thereon slightly projecting above the plane portions thereof, and these teeth engage and bear against the plane portions of the gears hereinafter described and are thus held apart.

Mounted on the forward portion of each of the trackways are a pair of wheels 18 which have plane portions to engage the plane portion of the track and toothed por-

tions meshing with the toothed portion thereof, and said wheels are rotatably secured to a rotatable digger or shoveling-device 19 provided with a shaft 20 extending crosswise of the device and bearing on each end a spur gear 21 meshing with wheels 18 and serving to cause them to revolve in the same direction. A bevel-gear 22 is carried by the shaft 20 interior to each spur-gear, said gear 22 being in mesh with bevel-gears 23 carried by telescopic shafts 24 at opposite sides of the machine and serving to transmit motion to the shaft 20, the upper ends of the shafts 24 being operatively connected with a pulley 25 which is connected by the band 26 to a suitable motor carried by the frame or crane, as will be understood by reference to Figs. 6 and 9.

The digger or shoveling device 19 is shown in the form of an eight point star and is formed with a suitable frame structure and an outer casing secured thereon, said casing projecting outward in a series of folds which form the points of the star, as will be understood by reference to Fig. 14, it being understood that the digger or shoveling-device extends from one side of the machine to the other.

In the operation of my digger or shoveling device, I lower the uprights 13 which in turn cause the trackways to approach the layer of sand on the floor of the cast house, the blades of the digger or shoveling-device entering the sand and being located at the front of the machine. I now start the motor and cause the shafts 24 to revolve, which in turn revolve the shaft 20. The revolution of the shaft 20 causes the digger to revolve, throwing the sand toward the rear, while at the same time the spur-gears 21 cause the wheels 18 to turn and move toward the rear on the trackway, carrying with them the digger and causing it to dig an elongated trench. When the wheels 18 have moved to the position shown in Fig. 7, the trench is completed, and the motor is then reversed to return the digger to normal position at the front of the machine. The trench having been prepared, the crane and machine are moved forward as seen in Fig. 9, the machine being lifted to clear the sand and the pattern-forming device carried by the rear portion of the machine is brought over the trench, when the machine is lowered, the said device entering into the trench and the digger entering the sand in advance thereof. It will be understood that if desired, the first trench may be prepared by hand instead of the machine, the object of this being to utilize the space occupied by the rear of the machine when the first trench is dug thereby.

The mold-forming device, clearly shown in all details in Figs. 2 to 5 of the drawings, consists of a long, transversely-dis-

posed pattern and a series of smaller longitudinally-disposed patterns, said patterns being known for their functions as the "sow" and the "pigs" to those versed in the art.

5 To each end of the sow pattern 27 is secured an angle bar 28 having a head 29, said bars extending outward and being slidably secured by the brackets 30, the contact of the heads 29

10 with the brackets 30 serving to limit the movement of the bar and thus of the pattern 27. Said sow is formed of metal bent or formed into a long hollow member of substantially rectangular form having one

15 edge slightly rounded, and extending forward from said member are the pig patterns 31 of U-shape in cross-section having their upper sides closed, the front ends of the pig pattern being connected by means of the pivotally-secured links 32 to a cross-rod 33.

20 Secured to the ends of the rod 33 and passing upwardly through eyes 34 carried by the underside of the trackways are the flexible connections 35, the pulling of said connections serving to elevate the rod and links,

25 as will be seen by reference to Figs. 8 and 9, suitable stops 36 being secured on the connections to limit their forward movement so that the patterns will hang in substantially a horizontal position when the machine is raised, as is shown in Fig. 9. After the mold-forming device has been inserted in the trench prepared therefor, the digger 19 forms the next trench in advance, the

35 sand is thrown back upon the previous trench, covering the patterns and filling the spaces therebetween, as will be understood by reference to Fig. 7. Said spaces having been filled and the next trench prepared, I

40 then take the final steps in the preparation of the molds and tamp the sand around the patterns.

Mounted upon the rear portion of the trackway on each side is a wheel 37 similar

45 in construction to the wheels 18, and connecting the wheels 37 is a shaft 38. Mounted upon the shaft 38 are the ends or supports of a tamping frame 39, while connecting said ends and extending across from one side to the other of the device is a beam

50 40 having a series of openings 41 therein in which work the upper ends of tampers 42, there being a tamper for each space between the adjacent pigs, as will be understood from

55 Fig. 2.

Journalled in the ends of the tamping frame 39 is the squared shaft 43, said shaft bearing on each end a pinion 44 in mesh with the wheel 37 and serving to drive the

60 same, while mounted on the shaft interior to the pinion 44 is a beveled gear 45 in mesh with a gear 46 on the lower end of an extensible or telescopic shaft 47, said shaft, like the shaft 23 being operatively connected

65 with a motor for driving the same.

Mounted upon the squared shaft at the position of each of the tampers is an eccentrically mounted disk 48, adapted to revolve in a block 49 having a central socket in which the disk is received, said block having

70 grooves 50 formed in its edges in which the tamper proper is received. Said tamper is formed from a single piece of bar iron having a vertical arm 51 working in one of the openings in the beam 40, the

75 lower end of said arm being reversely bent and extending upward for a distance substantially parallel to said arm and then extending across and welded thereto, the block 49 being retained between the parallel portions of the tamper. To brace the lower or

80 contacting end of the tamper and prevent the easy damaging thereof I secure on each side of it a block 52 in the form of a triangular prism having a lug on one side adapted to extend between the sides of the tamper

85 and to be there riveted in position, the edge of the prism extending down along and nearly to the lower edge of the basal portion of the bar iron.

90

To prevent the tamper from being broken by sudden shocks, as when for instance it strikes a piece of iron embedded in the sand, I interpose between the block 49 and the

95 contacting portion of the tamper a heavy spring 53 which is of sufficient strength to withstand the ordinary blows given by the tamper without giving to any perceptible extent but serving as a buffer when the

100 tamper strikes hard substances, the blow of the tamper being occasioned by the action of the cam disk which alternately moves the tamper up and down upon the revolution of the squared shaft. The detailed construction of the tamper is shown in Fig. 10, while

105 its action is illustrated in the dotted lines in Fig. 8, and it will be understood that as the squared shaft revolves, the pinion carried thereby meshes with the wheel 37 and causes it to travel forward, bringing with it the

110 complete tamping mechanism, and in this manner the entire length of the space between the pigs is thoroughly tamped. When this result has been accomplished, the

115 tamper being at the rear of the machine, I bear down upon the handle 54 secured thereto and swing the device out of contact with the sand and bear down also on the handle

120 55 secured to a scraper 56 which is pivotally mounted upon the shaft 38. When bearing down upon the handle 55 the shaft 38 causes the wheels 37 to carry the device forward, the scraper clears all of the sand on top of the molds and levels the entire surface. As the scraper approaches the front

125 end of the molds, I draw on the connection 35, and raise the rod 33 and links 32. As the scraper continues its forward movement, it strikes the links 32 which in connection with the rod 33 serve to pile up the sand

130

and form the wall 57 between the various series of molds, as will be seen by reference to Fig. 9, after which the complete machine is raised and moved into position to form the next series of molds. When the complete series of molds have been formed I cut small passages through each of said walls 57, when the cast house is in shape for the casting. The molten metal is poured into the sow of the first series and thence spreads into all the pigs communicating therewith. As these pigs are filled the metal will pass therefrom through said passages into the sow of the next series and thence in a like manner through the complete set of molds, it being understood that the sow into which the metal is introduced is at the top of the incline in which the sand is prepared and that the inclination of the floor aids in causing the metal to flow through the entire set.

From the foregoing description taken in connection with the drawings, the construction and operation of my device will be readily understood and its advantages be fully appreciated, and it will be seen that I provide a machine which while of enormous capacity is of extremely simple construction and requires the services of but one man to operate the same. It will further be observed that I provide a machine which while simple, strong, and durable of construction combines in one device mechanism which digs the trench, which when digging the trench also serves to cover the patterns in the trench previously dug, and which then tamps and levels the surface of the molds, thus in one operation and by going over the ground but once entirely preparing the molds for the casting.

Where in the claims the terms "excavating-mechanism" or "excavator" is employed, it is intended as meaning any mechanism to dig, shovel, or otherwise prepare the sand bed to receive the patterns.

Having thus described my invention what I claim is,—

1. The combination with a cast house, of tracks secured to the sides thereof, a crane mounted thereon, and mechanism carried by the crane for excavating, forming and tamping molds for pigs in the floor of the cast house.

2. The combination with a cast house provided with tracks, of a crane adapted to travel on said tracks, a frame mounted in the crane and movable vertically with reference to the crane and movable bodily with the crane, means carried by the frame for excavating the molds, and patterns or forms carried by said frame.

3. The combination with a cast house provided with tracks, of a crane traveling on said tracks, a frame mounted and traveling on the crane, and mechanism carried by the

frame for digging a trench, forming the mold, and tamping the material.

4. The combination with a cast house, of tracks secured to the sides thereof, a crane mounted on said tracks and moving longitudinally of the cast house, a frame mounted upon and moving laterally on the crane, and excavating-mechanism carried by said frame.

5. In combination with a cast house having longitudinally extending aerial tracks therein, of a crane mounted on the tracks, supplemental tracks secured on the crane and extending laterally of the cast house, a frame mounted on the tracks, and a vertically adjustable excavating-mechanism carried by the frame.

6. The combination with a cast house having elevated tracks therein, of a crane mounted on said tracks, a frame so mounted on the crane as to have lateral movement while moving longitudinally with the crane, vertically adjustable tracks carried by the frame, and excavating mechanism mounted upon said adjustable tracks.

7. The combination with a cast-house having elevated tracks therein, of a crane mounted upon the tracks and moving longitudinally of the cast house, a frame mounted on the crane and moving laterally thereon, vertically adjustable tracks depending from the frame, an excavator mounted thereon, and a suitably driven telescopic shaft operatively connected to said excavator.

8. In combination with a movable crane, of a frame mounted on the crane and adapted to move at right angles to the line of movement thereof, a pair of vertically adjustable tracks carried by the frame, an excavator mounted on the tracks, a driven element carried by the frame, a telescopic shaft operatively connecting said element with the excavator, and mechanism operated by said shaft for moving the excavator longitudinally on the adjustable tracks.

9. In a device of the character described, the combination with a crane, of a frame mounted thereon, a pair of vertically adjustable tracks carried by the frame, excavating mechanism mounted on the forward portion of said tracks, and mold forming means suspended from the rear portion thereof.

10. In a device of the character described, the combination with a crane, of a frame mounted thereon, vertically adjustable tracks depending from the frame, excavating mechanism mounted on the forward portion of said tracks, and mold patterns adjustably secured to and depending from the tracks.

11. In a device of the character described, the combination with a crane, of a frame mounted thereon, vertically adjustable tracks depending from the frame, excavating mechanism mounted on the forward

portion of said tracks, and mold patterns adjustably secured to and depending from the tracks, said patterns comprising a long laterally disposed pattern and a series of shorter longitudinally disposed patterns extending forward therefrom.

12. In a device of the character described, the combination with a crane, of a frame mounted thereon, vertically adjustable tracks depending from the frame, excavating mechanism mounted on the forward portion of said tracks, and mold patterns adjustably secured to and depending from the tracks, said patterns comprising a long laterally disposed pattern and a series of shorter longitudinally disposed patterns extending forward therefrom, said patterns being formed of closed hollow metal members of substantially tubular conformation and said longitudinally disposed patterns being spaced a sufficient distance apart to permit of the tamping of the sand therebetween.

13. In a device of the character described, the combination with a supporting frame, of a pair of vertically adjustable tracks carried thereby, a trench-forming mechanism mounted on the forward portion of the tracks, pattern-forming means suspended from the rear portion of the tracks and adapted to be inserted in said trench, and tamping mechanism mounted on the rear portion of the tracks and adapted to be moved forward over the patterns for tamping the sand solidly in position.

14. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom, a sow and a series of pig patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, and means carried by the machine for covering said patterns and filling the spaces therebetween with sand.

15. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom, patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, means carried by the machine for covering said patterns and filling the spaces therebetween with sand, and means mounted on the tracks for tamping the sand between the patterns.

16. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom, patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, means carried by the machine for covering said patterns, and filling the spaces therebetween with sand, means mounted on the tracks for tamping

the sand between said patterns, and means carried by the device for leveling off the superfluous sand on the patterns.

17. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom, patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, means carried by the machine for covering said patterns and filling the spaces therebetween with sand, means mounted on the tracks for tamping the sand between said patterns, and means secured to the tamping mechanism and adapted to be swung into operative position after the tamping operation has been completed to level off the superfluous sand on the patterns.

18. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom, a series of patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, means carried by the machine for covering said patterns and filling the spaces therebetween with sand, means mounted upon the tracks for tamping the sand between said patterns, a shaft bearing eccentrics for operating the tamping devices, a driven element on the frame, and a telescopic shaft operatively connecting the driven element with the eccentric-bearing shaft for driving the latter.

19. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom and having toothed portions, a sow and a series of pig patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, means carried by the machine for covering said patterns and filling the spaces therebetween with sand, means mounted upon the tracks for tamping the sand between said pig-patterns, a shaft bearing eccentrics for operating said tamping means, a driven element on the frame, a telescopic shaft operatively connecting the driven element with the eccentric bearing shaft for driving the latter, wheels on said tamping means having toothed portions in mesh with the toothed portions of the tracks, and pinions on said eccentric bearing shaft in mesh with the toothed portions of said wheels.

20. In a device of the character described, the combination with suitable supports, of a pair of vertically adjustable tracks suspended therefrom, a sow and a series of pig patterns depending from the tracks and adapted to be inserted in a trench in the sand to form molds in which the metal can be cast, means carried by the machine for

covering said patterns and filling the spaces
between the pigs with sand, said covering
means forming also a trench in the sand in
advance of the patterns, means mounted on
5 the tracks for tamping the sand between the
pigs, said tamping means being adapted to
move back and forth on the tracks, a level-
ing device secured to the tamping means
and adapted to remove the superfluous sand
10 from the patterns, and means secured to the
forward ends of the pigs and adapted to be
swung up to engage the leveler to limit the

forward movement thereof and cause the
superfluous sand to be piled up to form a
division wall between the molds just formed 15
and the trench for the next series.

In testimony whereof, I have affixed my
signature in the presence of two subscrib-
ing witnesses.

FELIX QUINN.

Witnesses:

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CHRIST FEINLE, Jr.