H. & J. H. BESSER.

POWER TILE MACHINE.

APPLICATION FILED FEB. 27, 1909.

981,051.

Patented Jan. 10, 1911.

4 SHEETS—SHEET 1.

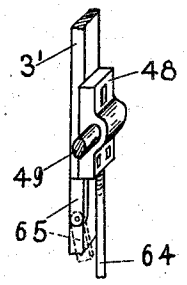

Fig. 10

Fig. 1

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4 SHEETS—SHEET 2.

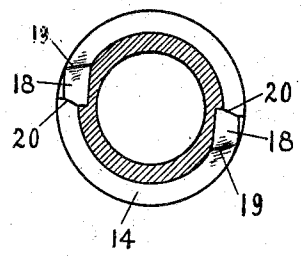

Fig. 8

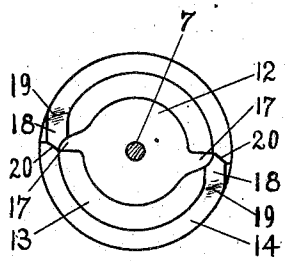

Fig. 9

Fig. 2

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4 SHEETS—SHEET 3.

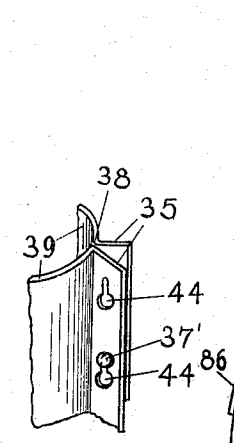

Fig. 7

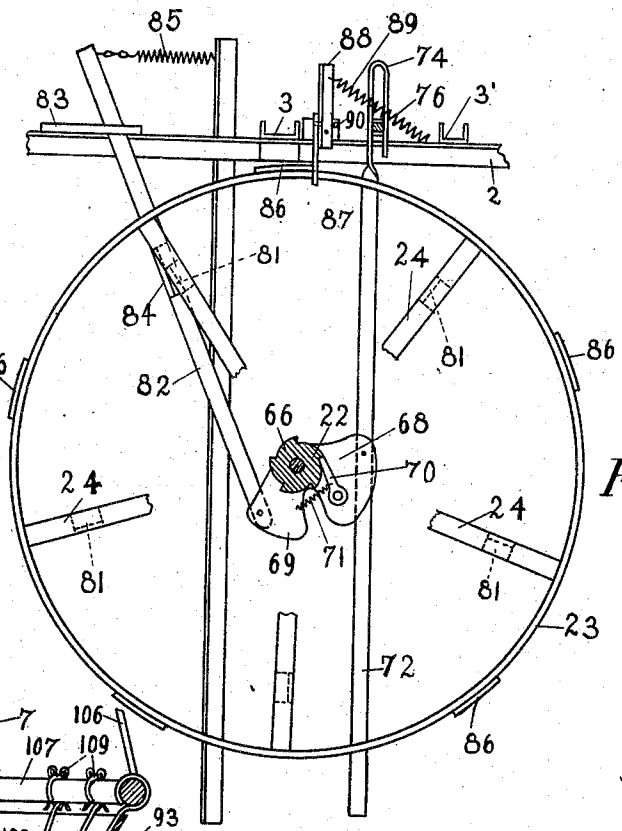

Fig. 3

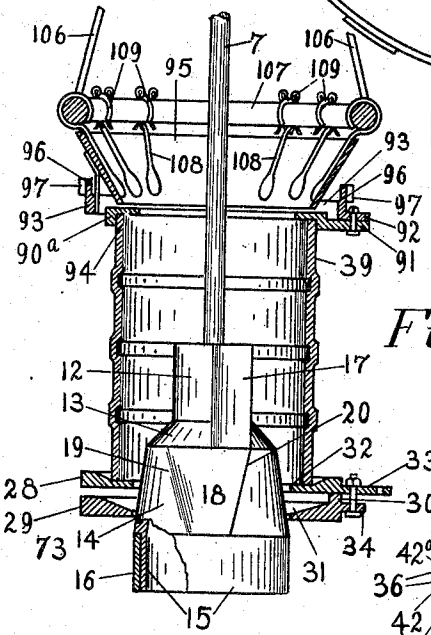

Fig. 4

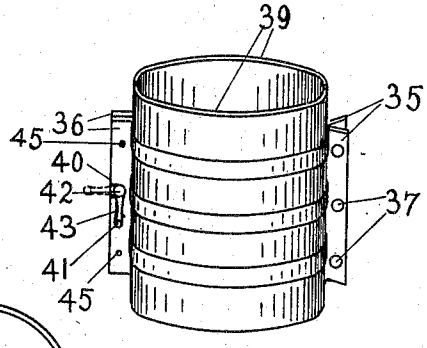

Fig. 5

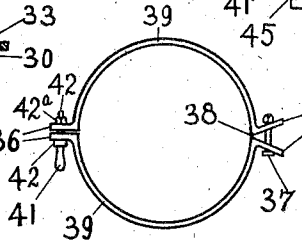

Fig. 6

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4 SHEETS—SHEET 4.

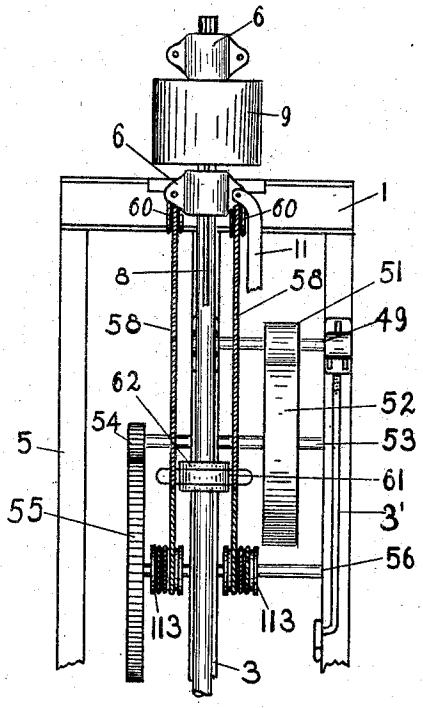

Fig. 12

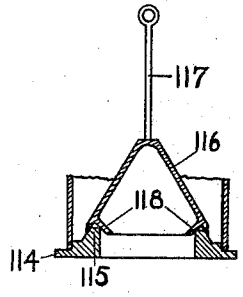

Fig. 13

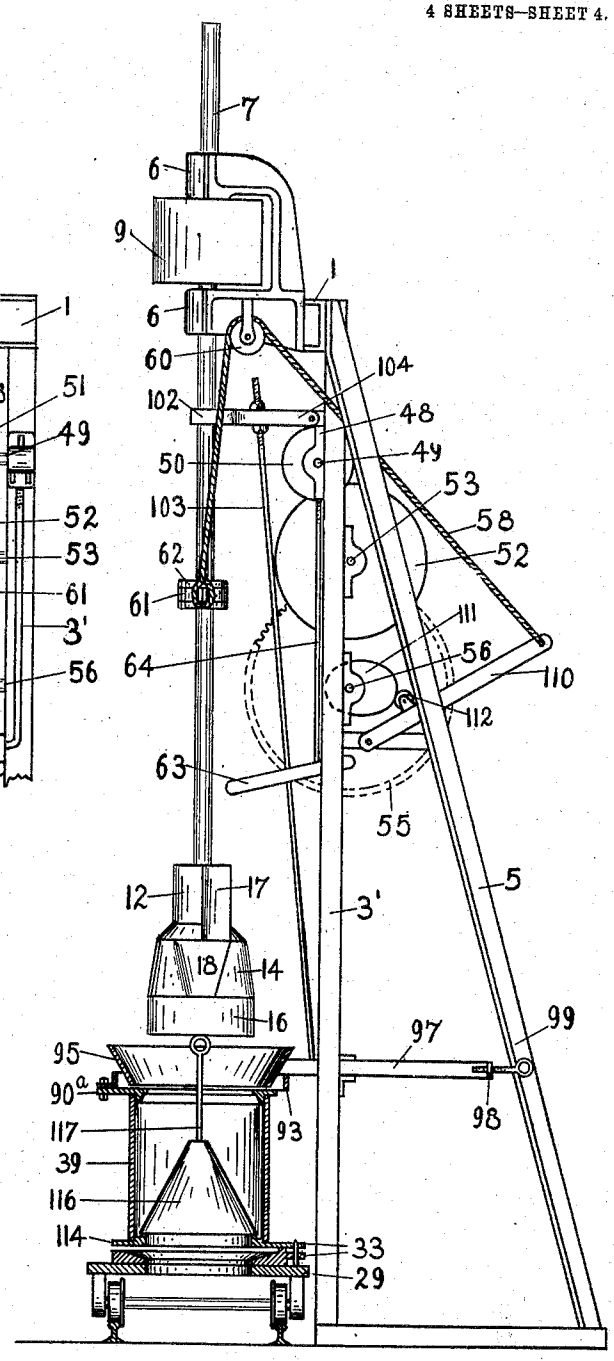

Fig. 11

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UNITED STATES PATENT OFFICE.

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POWER TILE-MACHINE.

981,051. Specification of Letters Patent. **Patented Jan. 10, 1911.**

Application filed February 27, 1909. Serial No. 480,365.

To all whom it may concern:

Be it known that we, HERMAN BESSER and JESSE H. BESSER, citizens of the United States, residing at Alpena, in the county of Alpena and State of Michigan, have invented certain new and useful Improvements in Power Tile-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to power tile machines, such machines comprising, broadly, mechanism actuated by mechanically applied power to form drain, sewer and other tile.

Sewer tile should possess a non-porous inner or outer surface, while drain tile should be porous.

One object of our invention is to provide a machine capable of making both porous and non-porous tile at will.

Another object is the provision of a non-positive drive for actuating the plunger and the packer head carried thereby. Heretofore, packer heads have been positively driven as by means of cams, which forcibly depress the plunger. This construction is faulty because it may happen that the rotation of the table carrying the molds or casings may be impeded and will not move to the proper position, in which event the forcible depression of the packer head will seriously injure the mechanism and render the machine inoperative. In our invention, the packer head may engage the rotary table without injury to any of the parts.

A further object of our invention is the provision of a friction drive which obviates the expense of clutches and permits slippage in the event that the mechanism becomes clogged.

Still another object is the provision of independent means for actuating the rotary table, and raising and lowering the plunger, and for rotating the plunger.

A still further object is the provision of a machine which will form a tile as hard, strong and compact at one end as at the other.

Another object is the provision of a novel casing or mold which can be more easily locked, released and handled than any other of which we are aware, as well as being less expensive to manufacture.

Still another object of our invention is the provision of a novel packer head which will first pack the material in place loosely, then more compactly, smooth the inner face of the tile and cut off the supply of material to the tile automatically in freeing itself from the casing.

A further object is the provision of means for relieving the pressure at the bottom of the socket, which coöperates with the tapered packer head and permits the formation of a comparatively large opening to receive a larger supply of material than heretofore.

A still further object is the provision of a removable wearing face on the packer head, which obviates the necessity of discarding the head when it becomes worn.

Still another object is the provision of novel means for raising and lowering the plunger.

Another object is the provision of a novel means for cushioning and stopping the step-by-step rotation of the table carrying the mold casings.

A further object is the provision of novel driving means for the table and the provision of novel controlling means for such driving means.

Another object is the provision of novel clamping means for the upper ends of the mold casings.

A still further object is the provision of means for automatically cleaning the hopper.

To these and other ends, therefore, our invention consists in certain novel features and combinations such as will be more fully described hereinafter and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of our invention, parts being omitted to better disclose the construction, Fig. 2 is a side view partly in section, Fig. 3 is a detail view of the cushioning and stopping means, Fig. 4 is a detail view through a casing showing the plunger, the

socket and the cleaning member, Figs. 5 and 6 are detail views of the casing or mold, Fig. 7 is a view showing a slight modification thereof, Figs. 8 and 9 are detail views of the packer head, Fig. 10 is a detail view of the catch for maintaining the frictions out of engagement, Fig. 11 is a detail view of the mechanism employed for medium heavy work, Fig. 12 is a similar view showing the mechanism employed for the heaviest work, and Fig. 13 is a detail view of the deflector.

It should be borne in mind that the machine herein shown and described is merely one embodiment which our invention may assume. Tiles of varying sizes can be made on this machine by simply changing the sockets, clamping spider, the packer head, the molds, and if necessary, adjusting the height of the clamping spider and cleaning member.

This machine is of that class wherein is provided a constantly whirling vertically movable plunger carrying a tapered packing head, which latter is designed to substantially close the bottom of the mold or casing. The casings are preferably mounted upon a mechanically-rotated table automatically movable step-by-step to a point in alinement with the packer head, the machine being so synchronized that when the plunger is raised, the table is rotated to bring an empty casing beneath the plunger, whereupon the casing is automatically clamped in position and the plunger lowered until the packer head is brought to the proper position. The material, as cement and sand, is then deposited in the casing. The plunger is automatically raised, the tapered head forcing the tile material laterally and gradually subjecting it to a heavy pressure, the whirling motion of the head serving to smooth the interior periphery of the tile. As the head nears the limit of its upward movement, it operates to release the means which clamps the casing in place and immediately subsequent thereto, the table is automatically actuated another step to bring the succeeding empty casing beneath the packer head. The filled casings are removed and empty ones substituted therefor so that the operation of the machine is constant.

As illustrated, the invention consists of a frame comprising a D-shaped body formed of the upper cross bar 1, the foot bar 2 and the vertical bars 3, 3′ connecting the two, such body being suitably braced as shown at 4, and provided with the rearwardly inclined struts 5, 5. Boxes 6, 6 carried by the upper bar 1 receive a vertical plunger shaft 7 having a way 8. In order to rotate the shaft, a pulley 9 is feathered on the head of the shaft, the pulley being driven directly from any suitable source of power. A guide bearing 10 is supported below the bearings 6, 6 by means of a depending arm 11.

The lower end of the plunger shaft has removably secured thereto, a packer head. This head is of a peculiar construction. As illustrated in Figs. 4 and 9, the head comprises a cylindrical neck 12 at the lower end of which is formed a downwardly inclined shoulder 13 which in turn merges into a face 14 inclined at a greater angle to the horizontal than the shoulder, and merging into a cylindrical base 15. This base is in practice turned down to receive a steel ring 16 shrunk onto the base and operating to resist wear.

The cylindrical base is subject to considerable wear and heretofore it has been customary when the base had worn, to scrap the entire head. In our invention, however, the steel ring resists wear longer than the prior cast metal heads and when the ring is worn, it may be removed and a new one substituted at a minimum of expense and without scrapping the head.

The neck 12 is provided with two opposed wings 17 extending preferably throughout the length of the neck and the shoulder 13. The upper ends of the wings may slightly overhang the lower ends. The outer faces of the wings are curved.

The inclined face 14 is provided with one or more recesses 18 inclined laterally from the point 19 to the cut-off wall 20, at which point the recess is deepest. These recesses are of a truncated V-shape in contour and extend the full height of the face 14. The wall 20 cuts off the supply of material in a manner hereinafter set forth. The nearer vertical such wall is, the harder and more compact will be the tile produced. Vice versa, the greater the angle of the wall 20 is to the vertical, the less solid and more porous will be the tile.

Any number of cut-off recesses 18 may be employed, and in general, the greater the number of recesses, the more compact and solid will be the tile produced, on account of the larger amount of material used in its construction.

The wings and recesses may be conveniently located relative to each other on the head, but we prefer that the lower outer corner of the wing should meet the upper corner of the cut-off wall 20.

One means for automatically and successively moving the empty molds or casings into alinement with the packer head and for removing the filled molds or casings may be constructed as follows: In front of the frame is located a carrier comprising a horizontal rotatable table consisting of a hub 21 journaled on a vertical stub shaft 22, a rim 23 and radiating spokes 24 connecting the hub and rim. The rim is sustained upon suitably supported rolls 25. The spokes are suitably braced by the angular braces 26 carrying pins 27, the hub also pro-

vided with a series of pins 27′. Socket members are removably received on these pins, the sockets constituting seats for the cylindrical mold casings.

The socket members constitute an important feature of our invention.

In prior machines of this same general class, it has been customary to provide a solidly formed ring, owing to which, it was impossible to sink the packer head sufficiently far to permit the admission of sufficient material to the lower end of the casing. Had the head been sunk the proper distance, the material would form a wedge between the tapered portion of the head and the solid inner periphery of the ring, which would prevent the head from being raised. As a result, the head could not be depressed far enough to admit sufficient material to the lower end of the casing to form a tile as solid and compact at the lower end as at the upper end. This resulted in the production of inferior tile.

We have discovered that by providing a relief space in the socket, the packer head can descend so that its tapered face is at least partially below the socket to admit sufficient material to the bottom of the casing and as one means for accomplishing this end, we provide a socket consisting of two rings 28 and 29 spaced apart from each other as by the bearing lugs 30. The lower ring is beveled on its upper face as at 31, the bevel reducing the thickness of the inner periphery of the lower ring. The upper ring has a seat 32 formed on its upper face to receive the lower edge of the mold casing. As a means for removably supporting the socket so formed on the table, we provide one of said rings (as the upper one) with radiating arms 33 apertured to receive the pins 27, 27′, the remaining ring having shorter radiating arms 34 bolted to the longer arms of the first named ring. Obviously any other manner of constructing the socket might be resorted to, our invention lying in the provision of a socket having a relief space for the material.

It is plain that sockets and mold casings of different diameters may be substituted for those shown, to produce tile of different sizes.

The cylindrical mold casings receivable in the sockets are preferably constructed as shown in Figs 5 and 6. Such mold casings comprise two preferably semi-cylindrical sections 39, the opposite longitudinal edges of which are provided with flanges 35 and 36 respectively, integral with or formed independently of the sections. Such flanges do not extend the full length of the sections but stop short of each end in order to allow the lower cylindrical ends of the casings to fit in the seats 32 of the rings 28, the upper ends of the casings receiving the clamping spider hereinafter described.

The casings when filled and the tile completed are removed from the table, opened to release the tile, closed, locked in close position and replaced on the table and in order to provide a simple casing which can be easily and quickly opened and closed, we bend the rear flanges 35 at an acute angle to the periphery of the casing so that the opposed flanges 35 on the two sections diverge as shown, when the casing is in closed position. One of said flanges carries a connecting means as the studs or rivets 37. These rivets, which are preferably straight, pass loosely through the opposite flange and are headed to prevent the disengagement of the two sections. This construction forms a hinge-connection and, owing to the arrangement and the resiliency of the material forming the casings, the closing of the sections must be effected against a slight tension caused by the meeting of the bends 38 at the juncture of the flanges 35 and the body portions of the sections 39 prior to the engagement of the parallel front flanges 36, which tension operates to maintain the locking means against accidental release. The binding of the fastening means in the flanges 35 also tends to increase the tendency of the sections to spring apart from each other. By offsetting the hinge-connection in the manner shown, the body portions of the sections move apart from each other to release the completed tile without injury thereto.

As a simple fastening means for locking the casing in closed position, we preferably slot one of the parallel flanges 36 as shown at 40. The opposite flange is apertured to receive a crank-shaped latch 41, one end 42 of which is journaled in the flange and provided with an adjustable nut 42ª to take up wear. In order to lock the casing, the flanges 36 are brought together against the tension, as heretofore described, the slot 40 lying opposite the cranked latch. The cranked end 42 of the latch is then fitted into the slot and the latch swung downward so that its intermediate portion 43 lies parallel with the flange.

To open the casing and release the contained tile, the casing is lifted off from the socket on the rotary table, the workman grasping the flanges 35, 36 and carrying the casing to a suitable table whereupon, with one hand he swings the latch up until it registers with the slot, after which he pinches the diverging flanges 35 together. This operates to swing the two sections open and the tile is released with a minimum number of operations.

In making long tile, it may be impractical to swing the sections of the casing horizontally relative to each other and, therefore, we have provided a slight modification shown in Fig. 7, wherein one of the opposed flanges 35 is provided with inverted key-

hole slots 44 to receive headed rivets 37′ carried by the remaining flange 35. In order to open a casing constructed in this manner, the latches 41 are unlocked and one section raised bodily and then moved laterally to release it from the headed rivets 37′.

Guide pins 45 carried by one flange 36 may be received in apertures in the remaining flange. One or more latches 41 may be employed and the sections 39 may or may not be corrugated.

In order to prevent rotation of the casings relative to the sockets of the rotary table, we provide the stops 46 adjustably carried by the spokes 24, such stops projecting upward and contacting with either the flanges 35 or 36. By pivotally mounting these stops as at 47, they can be adjusted to engage the flanges of casings of different sizes.

As one means for rotating the table step-by-step, for raising and lowering the plunger, and for releasably clamping the casings in position while a tile is being formed, we may employ the following construction as one of many suitable for the purpose.

Bearings 48 are slidably mounted on the respective vertically extending bars 3, 3′, such bearings adapted to receive a power shaft 49, carrying a pulley 50, communicating with any suitable source of power. This shaft also carries a friction pinion 51 adapted to engage a friction wheel 52 on a countershaft 53 journaled in the frame. The countershaft also carries a spur gear 54 meshing with a large gear 55 on a jack-shaft 56 journaled in the frame. The gear 55 carries a pin 57 near its periphery to which pin one end of a cable 58 is secured, the cable passing over an idler 59 loose on the countershaft, thence over a sheave 60 on the frame, the opposite end of the cable being attached to a clamp 61 on a shouldered collar 62 fast on the plunger 7. The clamp permits the rotation of the collar.

The rotation of the large gear 55 will raise the plunger and its packer head a distance nearly equal to the diameter of the gear. It will be observed that we do not employ a positive means for causing the descent of the packer head and hence, if the rotation of the table is impeded, the descent of the plunger will do no damage, whereas, if the plunger was caused to descend positively by means of a cam for instance, the engagement of the head and table would injure the machine.

The power is transmitted through the friction pinion 51 and wheel 52, thereby allowing slippage in case the mechanism becomes clogged. The friction pinion normally tends to engage the friction wheel and when it is desired to stop the machine, the bearings are raised by means of a lever 63 pivoted to the frame and connected by a rod 64 to one of the bearings 48. A catch 65 pivoted to the frame may be thrown into the path of the bearing when raised to retain the machine inoperative.

In order to effect the step-by-step movement of the table relative to the frame, we may employ the following construction: A ratchet wheel 66 is fixed to the under face of the hub 21, such ratchet having as many teeth preferably, as there are casings on the table, and resting upon a pawl plate pivoted on the stub-shaft 22, the lower end of such shaft being received in a step bearing 67. The pawl plate has two lobes 68 and 69 extending at an angle to each other. One of said lobes carries a pawl 70 pivotally secured thereto, the free end of the pawl normally caused to engage the ratchet by means of a spring 71. A horizontally extending bar 72 is pivotally connected to the lobe 68 of the pawl plate. The rear end of this bar is looped as shown at 74, the loop being provided with a plurality of registering apertures 75 to permit adjustment of the bar. A vertically extending rod 76 is pivotally supported by links 77 pivotally connected to the frame, the lower end of the rod being adjustably received in the loop 74, and in order to reciprocate the vertical rod, we provide the latter with a laterally extending roll 78 received in a cam groove 79 on the outer face of a cam 80 carried by the jack-shaft 56. The rotation of the cam operates to move the vertical rod 76 bodily back and forth, the lower end of the rod operating to reciprocate the horizontal bar back and forth to oscillate the pawl plate and intermittently actuate the table in one direction.

It is obvious that the table carrying the mold casings must be actuated a certain predetermined distance in order to move the filled mold casing from the path of movement of the plunger and bring an empty mold casing into such path of movement, such actuation of the table taking place only during the time when the plunger is in raised position. Also, the annular space between the lower ring 28 and the packer head will not admit of any great variation in the length of each step. Consequently, some means must be provided for bringing the table into proper position relative to the packer head without jar or vibration (in order not to injure the previously completed tile). Many devices might be used to attain this end, among them being those which merely actuate the table the required distance and then stop with a jar, but we have devised the following construction as being one well suited to the purpose: The spokes 24 of the table each carry a depending abutment 81. A horizontal lever 82 lying at an angle to the connecting bar 72 and on the opposite side of the stub-shaft 22 is received

in a guide 83 on the base, the forward end of the lever being pivotally connected to the remaining lobe 69 of the pawl plate. This lever carries intermediate its ends a block 84 which is moved into and out of the path of movement of the depending abutments 81, by reason of the oscillation of the pawl plate imparted from the cam. The rear end of the lever 82 which extends back beneath the frame is connected by a spring 85 to any stationary part of the frame or base, the lever 82 being permitted a lateral as well as a longitudinal reciprocatory movement. The throw of the pawl plate and pawl is sufficient to rotate the table a greater distance than is necessary to move one casing out of register with and the succeeding casing into register with the plunger, such movement of the pawl plate tending to draw the lever forward longitudinally beneath the table to bring the block carried thereby into the path of movement of the depending abutment carried by the spoke directly behind the filled casing. The throw of the table is so great as to cause the impingement of the abutment 81 with the block 84 to force the lever laterally against the tension of its spring 85 and when the force has spent, the spring returns the lever to normal position, reversing the movement of the table.

In order to stop the table at the proper point without jar or vibration, we provide the rim 23 with a plurality of inclined stops 86 which, during the primary movement of the table, ride beneath a finger 87 pivoted for vertical movement to a support 88, which in turn is pivoted for horizontal movement, to the frame. A spring 89 normally retains the support against a stop pin 90 on the frame. On the reverse movement of the table, the stop 86 engages the finger 87 and, if the reverse movement is of sufficient force, swings the finger and its support horizontally against the tension of the cushioning spring 89 which returns the table gently to its proper position with the empty casing beneath the plunger. The stops 86 are located with reference to the casings, so that when the respective stops are in position against the finger when at rest, the casing is in alinement with the plunger. It is also necessary to provide a means for holding the casing stationary against vibration when brought into alinement with the plunger, to effect which, we provide a spider 90ª having radial arms 91 removably secured to lips 92 carried by an annulus 93. This spider is provided with an inverted seat 94 fitting around the upper end of each casing as it is successively presented. The annulus carries a funnel or hopper 95 into which a suitably supported chute (not shown) is designed to discharge material.

The annulus is provided with a pair of oppositely disposed lugs 96 to which the outer ends of arms 97 are secured in any suitable manner as by pivots. These arms extend rearwardly and at their rear ends are provided with outturned apertured ears 98 designed to receive the threaded ends of eyebolts 99, pivoted to the rearwardly inclined struts 5, 5 respectively. The central bar 3 carries a transversely extending adjustable rest 100 on which the arms are supported when in their lowered position, guides 101 being carried by the rest and cooperating with the arms.

In order that the annulus and its thereto attached spider may be automatically raised just prior to the actuation of the table and lowered as soon as an empty casing is brought beneath it, we provide the following mechanism: The stem of a fork 102 is pivoted to the center bar 3, the fork embracing the plunger 7. Depending rods 103 are adjustably connected at their upper ends to the stem 104 of the fork, the lower ends of the rods being secured to a brace 105 connecting the arms 97. As the collar 62 nears the upper limit of its movement, it engages the fork 102, raising the latter and by reason of the connecting rods 103, the annulus, funnel and spider are raised off from the filled casing to release the latter. The annulus and connected parts are held in raised position until the table has been rotated to bring the succeeding empty mold to position, whereupon the annulus is lowered to seat its spider on the upper end of the empty casing. It will be observed that the spider is not raised until the plunger has been completely withdrawn from the mold and that the spider is seated prior to the descent of the plunger to the bottom of the mold. Hence, the spider does not move throughout a full up and down movement of the plunger.

It has been found that the surplus material, if any, of each charge will accumulate in the funnel and cake, thereby reducing the opening through which material is admitted to the casing, to prevent which we preferably employ a cleaning mechanism which may be constructed as follows: A pair of hangers 106 depend from opposite sides of the clamp 61, the lower ends of such hangers having secured thereto a ring 107 formed of round iron or equivalent material. A number of fingers 108 having eyes 109 are loosely strung on the ring, the lower free ends of the fingers preferably being slightly flattened. These fingers may be spaced apart from each other in any suitable manner and the cleaning mechanism resembles a circular bottomless basket, the diameter of which is nearly equal to the diameter of the upper end of the funnel in which it is received. Its function is as follows: When

the plunger is in lowered position, the fingers lie in and conform to the slant of the funnel. As the plunger is raised the basket rises, the fingers spreading or swinging outward by gravity until they hang vertically from the supporting ring 107. This action serves to loosen any material which has accumulated on the hopper, owing to the discharge of material thereinto. As the plunger rises, the surplus material from the charge is thrown outward against the hopper and compressed. On the succeeding downward stroke, the plunger enters the casing first, and when it is nearly at the bottom thereof, the fingers 108 engage the hopper near its upper edge and follow the sides of the hopper. In so doing, they scrape off the previously compacted material which drops into the casing and forms a part of the next tile.

Owing to the manner in which the fingers are hung on the ring, they can swing laterally as well as following the contour of the hopper.

The operation of our invention can be briefly set forth as follows: Assuming the plunger to be raised, the frictions disengaged, and an empty casing in place beneath the plunger, the operator will first release the latch 65 and lower lever 63 to engage the friction pinion 51 with the large friction wheel 52. This transmits power to the spur gear 54 to rotate the large gear 55 and lower the plunger. It also actuates the cam 80, but owing to the shape of the cam groove 79, no motion is imparted to the vertical rod 76. Simultaneously with the first movement downward of the plunger, the collar 62 permits the fork 102 to descend, allowing the spider 90^a to seat itself on the upper end of the empty casing, and as the plunger nears the lower limit of its movement, the cleaning mechanism is seated in the funnel, as described. The plunger descends until the inclined face 14 of the head lies opposite the reduced inner edge of the lower ring 29, the cylindrical stroking portion 16 of the head lying below the lower ring, and the neck 12 carrying the wings 17 lying at the lower end of the casing. Sufficient material is then discharged into the funnel, the material falling to the bottom of the casing and part descending as far as the lower ring 29. The rapidly whirling head throws the material centrifugally against the inner periphery of the casing, the wings operating to pack the material loosely in place. By this time, the large gear 55 has rotated sufficiently far to commence raising the plunger. As the head ascends, the tapered or inclined face 14 thereof engages the loosely compacted material and packs it with gradually increasing force (owing to the increasing taper) against the inner periphery of the casing, the recesses 18 permitting the loose material from above to feed down onto the inclined face and form a tile of the required thickness. Owing to the fact that the head has descended so far that a portion at least of the tapered face 14 is beneath the lower ring 29, the material forms an annular wedge between such tapered face and the inner peripheries of the socket rings 28 and 29. If such socket were solid, this wedge would prevent the ascent of the plunger and disarrange the parts. Therefore, we form a relief space 73 between the two rings which allows the material forming the wedge to move laterally. By causing the head to descend as far as described, a greater amount of material is admitted to the lower end of the casing 4, the machine will form compact tiles of equal density or hardness at both ends. This would not be possible if the head descended only to the bottom of the casing as in former machines. But little material falls through the annular space between the head and socket, owing to the high speed of rotation of the head and the small opening and we can employ what is known as a "wet mix" in the formation of the tiles. The cylindrical base 15 following the tapered face 14 smooths the interior of the tile while maintaining the maximum pressure. All surplus material is pushed ahead of the packer as it ascends and is discharged into the funnel, the inclined wall 20 of the recess cutting off the supply of material to the casing as the recess ascends above the spider 90^a and freeing the packer head from the tile as it ascends through the spider carried by the pivotally supported ring 93. Were it not for this, the surplus material impinging against the seat 94 of the spider would raise the clamping member before the packer head had ascended therebeyond. As the plunger nears the upper end of its movement, the collar 62 engages the fork 102 to lift the clamping member and immediately subsequent thereto the cam 80 actuates the vertical rod 76 and bar 72 to oscillate the pawl plate in one direction to enable the pawl to engage the next tooth of the ratchet. This movement of the pawl plate operates to throw the lever 82 rearwardly to move the block 84 carried thereby out of the path of movement of the abutment 81 carried by the table. The cam immediately actuates the pawl plate (through the described mechanism) in the opposite direction to rotate the table one step, the primary movement of the table operating to cause the first abutment 81 to ride past the block 84, but the continued movement of the pawl plate brings the lever and its block into the path of movement of the next abutment for engagement thereby. The movement of the table is reversed, cushioned and stopped as

heretofore described, and the foregoing operation repeated.

In making drain tile, porosity is desired, but in making sewer tile, impermeability is necessary.

Heretofore, so far as we are aware, it has been impossible to retain an intermittently movable table stationary while the plunger is caused to ascend and descend into the same mold casing two or more times in succession. With our construction, however, this can be accomplished and as a result, we are able to make porous and non-porous tile on the same machine.

In order to manufacture non-porous tile, all that is necessary is for the operator to work the lever 63 to throw the friction pinion 51 alternately into and out of engagement with the friction wheel 52. Thus, as the plunger nears the upper limit of its movement and before the cam 80 has been rotated sufficiently far to actuate the ratchet and pawl mechanism, the lever is raised to disengage the frictions. This raising of the lever takes place before the pin 57 to which the cable 58 is attached, has passed its lower dead center. The weight of the packer head, plunger and connected parts causes the descent of the plunger which reënters the casing, whereupon a supply of neat cement or rich mixture is thrown into the funnel. The descent by gravity of the plunger has reversed the rotation of the gear 55, bringing the pin 57 to its upper limit of movement, and the cam 80 is returned to its former position. The lever is then lowered, throwing the frictions into engagement, whereupon the plunger is raised, spreading the rich mixture on the interior periphery of the tile and forming an impermeable surface and a glossy finish. This operation may be repeated as often as desired, and may be utilized to form a more compact tile as well.

In the manufacture of large, long and compact sewer tile it is necessary to use a packer head of greater weight than when making drain tile. Also the table is preferably, though not necessarily, moved by hand or a car (not shown) may be substituted in place of the table.

In Fig. 11 is illustrated one means which we may employ to raise and lower the packer head, such means consisting of a pair of levers 110 pivotally secured to any convenient portion of the frame at their lower ends and having the ends of a pair of cables 58 secured to their free ends, such cables passing over sheaves 60, 60 and thence to diametrically opposite sides of the clamp 61. The weight of the packer head will normally swing the levers forwardly and in order to reciprocate the packer head, we provide shaft 56 with a pair of cams 111 which engage anti-friction rolls 112 on the levers. Rotation of the cams will swing the levers back and forth to raise and lower the packer head.

For the heaviest work, instead of the cams and levers or the gear 55 and pin 57, we may employ two drums 113 on shaft 56 (shown in Fig. 12) to which a pair of cables 58 are connected. When using this construction, the method of raising the packer head and then disengaging the frictions 51 and 52, is utilized in making the tile. Thus, the cables are alternately wound upon the drums by the application of power to the shaft 56, and unwound from the drums by the force of gravity acting upon the heavy packer head.

In making sewer tile, it is desirable that the opposite ends of the tile be male and female respectively. Such male and female ends may be made of any convenient configuration and for illustration, we have shown a socket ended tile. The spider 90^a is provided with a proper seat to form the male end. The female end of the tile is formed by substituting a ring 114 which may have the configuration shown in Fig. 11 for the upper ring 28 of the socket used for drain tile. This ring 114 is spaced apart from the lower ring 29 and both are provided with perforated arms 33, 33, received upon pins 27, 27, carried by any suitable traveling support. The upper and lower rings 114 and 29 are not bolted together.

It is obvious that, because of the central raised shoulder 115 of the ring 114, the packer head will not be able to pack the material in the annular space surrounding the shoulder and to attain this end, we provide a conical deflector 116 carried at one end of a rod 117. This deflector is equipped with an inwardly projecting annular rest 118. This deflector is inserted into the casing while the packer head is raised, the lower edge of the deflector inclosing the upper end of the shoulder 115 and held in place by the engagement of the rest 118 with the shoulder. Sufficient material is then thrown into the casing and is deflected into the annular space surrounding the shoulder and tamped down. As soon as this space is filled, the deflector is withdrawn and the tile completed in the manner heretofore set forth.

As soon as completed and the spider released, the casing is moved from beneath the packer head and is carried, together with the ring 114 which serves as a pallet board, to any suitable place where the casing is removed and the tile left to season.

It is evident that tiles of varying lengths and sizes can be manufactured on this machine by simply changing the adjustment of the parts and substituting larger or smaller casings, sockets, and clamping members.

We have provided a strong and compact power tile machine which cannot easily get out of order and which will continuously operate to automatically manufacture a maximum number of perfect tiles in the shortest possible time.

Changes might be made in the form and arrangement of the several parts described without departing from the spirit and scope of our invention.

Having thus fully disclosed our invention, what we claim as new, is:—

1. A tile machine comprising a feed table, a series of mold casings carried thereby, a tile forming member to which the mold casings are successively presented, means for imparting an intermittent movement to the table sufficient to move the mold casing past its proper position relative to the tile forming member, automatic means for reversing the movement of the table, and cushioning means for stopping the table at the proper point to bring the mold casing into alinement with the tile forming member.

2. A tile machine comprising a suitably supported mold casing, a power driven friction pinion, a friction wheel, means controlling the engagement of the pinion and wheel, a gear driven from the wheel, a rotary tile forming member, and a flexible connection, one end of which is connected to the gear and its opposite end connected to the tile forming member to effect the reciprocation thereof.

3. A tile forming machine comprising a suitably supported mold casing, a tile former, a rotary member, a connection between the tile former and the member to effect the reciprocation of the tile former, frictions for imparting movement to the rotary member, a power shaft on which one of the frictions is mounted, slidable bearings in which the power shaft is journaled, and means connected to at least one of the bearings for controlling the engagement of the frictions.

4. A tile machine comprising a suitably supported mold casing, a tile forming member, gearing for raising the tile forming member and for permitting its unaided descent, means adapted to be thrown into and out of engagement with the gearing for imparting motion thereto in one direction, the weight of the tile forming member being sufficient to reverse the motion of the gearing when the first named means is thrown out of engagement with the gearing.

5. In a tile machine, the combination with a tile forming member and a table supporting a plurality of mold casings, of a ratchet and pawl mechanism for intermittently actuating the table, an oscillatory rod, means for oscillating the rod, a bar pivotally connected to the ratchet and pawl mechanism, the rear end of the bar being looped and having registering apertures, one end of the rod received in the loop, and means removably receivable in the apertures on opposite sides of the rod to cause the rod to transmit motion to the bar.

6. A tile machine comprising a mold casing, a shaft, a tile forming member on the shaft, means for raising and lowering the shaft, a pivotally supported clamping means for retaining the mold casing in position, a lever independent of the means for raising and lowering the shaft, rods adjustably connecting the clamping means and lever, and means carried by the shaft adapted to engage the lever to release the mold casing from the clamping means.

7. A tile machine comprising a mold casing, a swinging clamping member, a reciprocatory plunger, a collar fixed on the plunger, a packer head carried by the plunger and movable into and out of the casing, a pivotally supported lever, the free end of which projects into the path of movement of the collar, and rods adjustably connecting the lever and the clamping member.

8. In a tile machine, a rotary packer head comprising a cylindrical base, a true frusto-conical face, a tapered shoulder, and a cylindrical neck, substantially vertical wings projecting from the neck, the frusto-conical face having at least one substantially V-shaped recess shallow at one side and gradually becoming deeper until it terminates in an abrupt inclined cut-off wall at the opposite side.

9. In a tile machine, a packer head having a base, a frusto-conical face surmounting the base, a neck disposed above the face, and wings projecting laterally from the neck.

10. A tile machine comprising a tile forming member, a mold casing, and a socket therefor, the socket consisting of a plurality of superposed members having annular alined apertures therethrough, the members being spaced apart from each other to afford a relief space for the reception of surplus material, and a support on which the socket is removably mounted.

11. A tile machine comprising a tile forming member, a mold casing, and a socket therefor, the socket consisting of a plurality of superposed annular members spaced apart from each other, one of said members having a seat formed on its upper face for the reception of the mold casing, the remaining annular member having its inner periphery reduced in thickness.

12. A tile machine comprising a tile forming member, a mold casing, and a socket therefor, the socket consisting of a pair of superposed rings, the upper ring having a

seat formed therein for the reception of the lower end of the mold casing, the lower ring having a beveled face, lugs for spacing the rings apart from each other, and means for connecting the rings.

13. In a tile machine, a table, a plurality of mold casings thereon, means for imparting a step-by-step movement to the table, a braking means adapted to be engaged by the table to limit the length and duration of each step movement, and means connected to the braking means for imparting a reverse rotation to the table.

14. In a tile machine, a table, a plurality of mold casings thereon, means for imparting a step-by-step movement to the table, abutments on the table, a braking means connected to the table-actuating means and operated thereby to move into and out of the path of movement of the abutments to limit the length of each step movement, separate means for releasably locking the table in position, and means connected with the braking means for causing the latter to impart a reverse rotation to the table.

15. In a tile machine, a table, a plurality of mold casings thereon, means for imparting a step-by-step movement to the table, and yielding braking means adapted to be engaged by the table to effect a cessation of movement thereof in one direction and to impart a reverse movement thereto.

16. In a tile machine, a table, a plurality of mold casings carried thereon, a pivotally mounted plate, a pawl on the plate, a ratchet carried by the table and engaged by the pawl, a sliding bar connected to the plate, the rear end of the bar being looped and perforated, a pivotally supported cam-actuated rod, one end of which is movably and adjustably received in the loop, and means for releasably maintaining the connection between the rod and bar.

17. In a tile machine, a table, a plurality of casings mounted thereon, abutments carried by the table, a block movable automatically into and out of the path of movement of the abutments, the block capable of being displaced by the contact of an abutment therewith, and means for returning the block and table to their proper positions.

18. A tile machine comprising a table, a plurality of casings mounted thereon, a tile forming member to which the casings are successively presented, means for imparting a step-by-step movement to the table, such movement operating to throw the table beyond its proper position, means engaged by the table for first arresting and then automatically reversing its forward movement, and a cushioning member for bringing the table to rest to present a casing to the tile forming member.

19. In a tile machine, a table, a plurality of mold casings carried thereby, means for imparting a step-by-step movement to the table, a spring-retracted braking lever, one end of which is pivotally connected to the table-actuating means, abutments on the table, the lever normally lying out of the path of movement of the abutments when the table is stationary, the operation of the table-actuating means adapted to draw a portion of the lever into the path of movement of the abutments to serve to gradually arrest the movement of the table, and separate means for releasably locking the table stationary in proper position.

20. A tile machine comprising a table, a plurality of mold casings mounted thereon, means for imparting a step-by-step movement to the table, and a cushioning stop for bringing the table to a state of rest, the stop adapted to yield more or less under the impact of the table thereagainst, to avoid jarring the contents of the table, the stop normally lying in the path of movement of the table.

21. A tile machine comprising a table, a plurality of mold casings mounted thereon, means for imparting a step-by-step movement to the table, a cushioning stop for bringing the table to a state of rest, the stop comprising an arm pivotally supported for movement in one direction, a pin, means for yieldingly maintaining the arm against the pin, a projecting finger pivoted to the arm and adapted to move in a direction transverse to the direction of movement permitted the arm, and means on the table adapted to engage the finger.

22. A tile machine comprising a rotary table, means for imparting a step-by-step movement thereto, abutments carried by the table, a retarding member operated by the table actuating means and movable into and out of the path of the abutments, a spring connected with the member and placed under tension by the engagement of an abutment therewith, a movable cushioning finger, inclined stops carried by the table and adapted to engage the finger when the table is reversed by the action of the spring, and means for returning the table to and arresting it in its position of rest.

23. A tile machine comprising a table, a plurality of mold casings carried thereby, means for imparting a step-by-step movement to the table, inclined stops carried by the table, a pivoted finger projecting into the path of movement of the stops, and means for yieldingly retaining the finger in normal position.

24. A tile machine comprising a mold casing, a hopper for discharging material thereinto, and a series of loosely mounted scraping fingers arranged to conform to the shape of the upper end of the hopper,

the fingers adapted to be moved into and out of the hopper, the fingers adapted to swing relative to their support to the conformation of the hopper.

25. A tile making machine comprising a mold casing, a combined ring and pallet board on which the casing is seated, a raised shoulder on the ring inclosed by the casing, and a deflecting means receivable on the shoulder to deflect material into the space between the shoulder and the casing.

26. A tile making machine comprising a mold casing, a combined ring and pallet board on which the casing is seated, a raised shoulder on the ring inclosed by the casing, and a conical deflector having an inwardly projecting rest adapted to engage the shoulder to deflect material into the space between the shoulder and the casing.

In testimony whereof, we affix our signatures in presence of two witnesses.

HERMAN BESSER.
JESSE H. BESSER.

Witnesses:
FRED R. TRELFA,
J. R. MCHARG.