(No Model.) 3 Sheets—Sheet 1.

J. H. WALSH.

MACHINE FOR MAKING MULTITUBULAR PIPES.

No. 395,095. Patented Dec. 25, 1888.

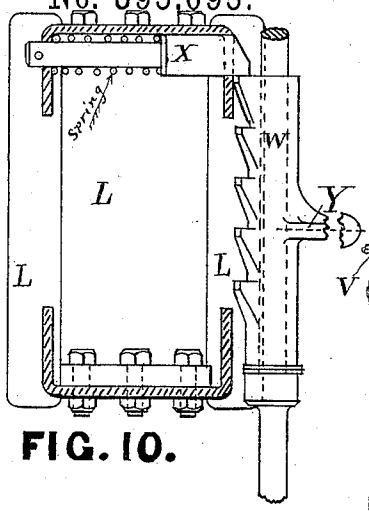


FIG. 10.

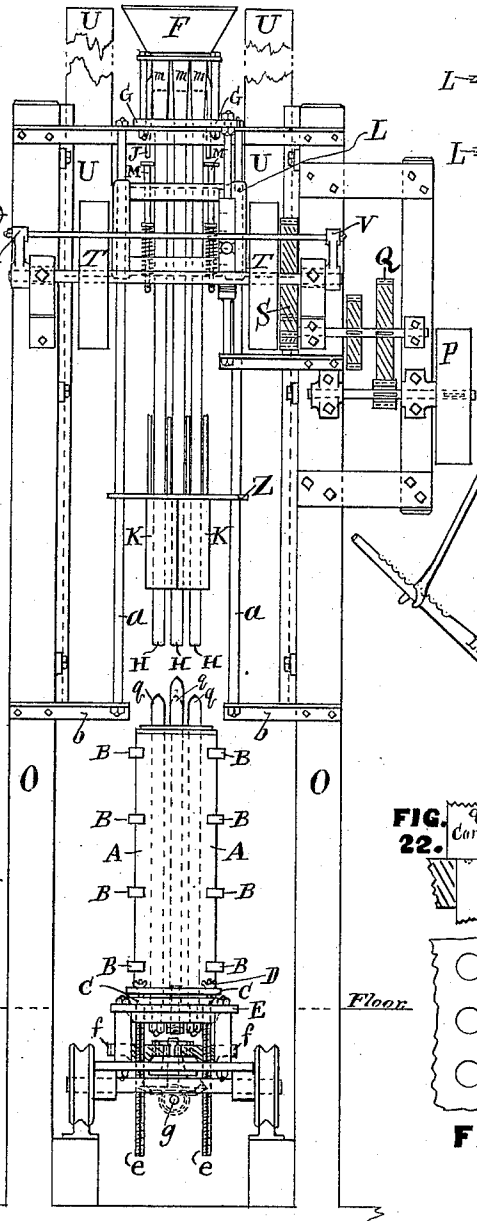


FIG. 1.

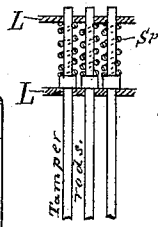


FIG. 26.

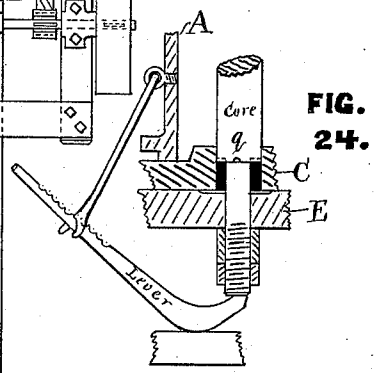


FIG. 24.

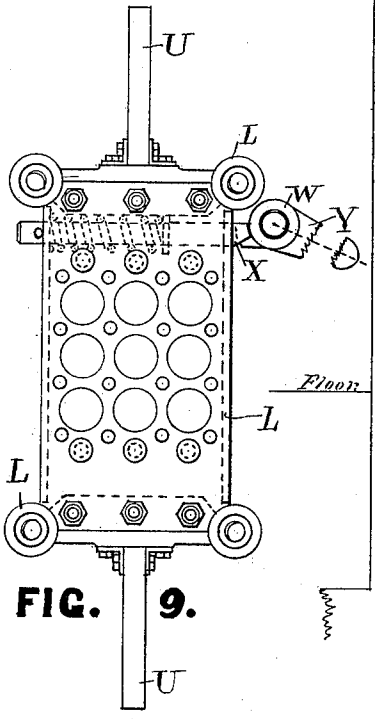


FIG. 9.

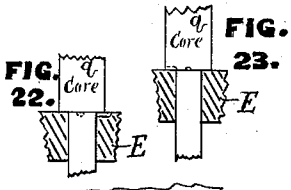


FIG. 23.

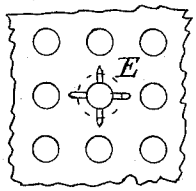


FIG. 21.

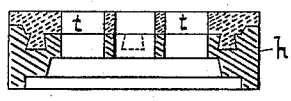


FIG. 27.

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By Charles Carr-Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

J. H. WALSH.

MACHINE FOR MAKING MULTITUBULAR PIPES.

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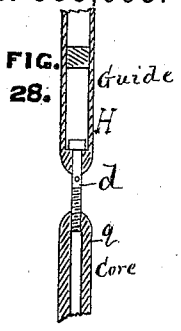
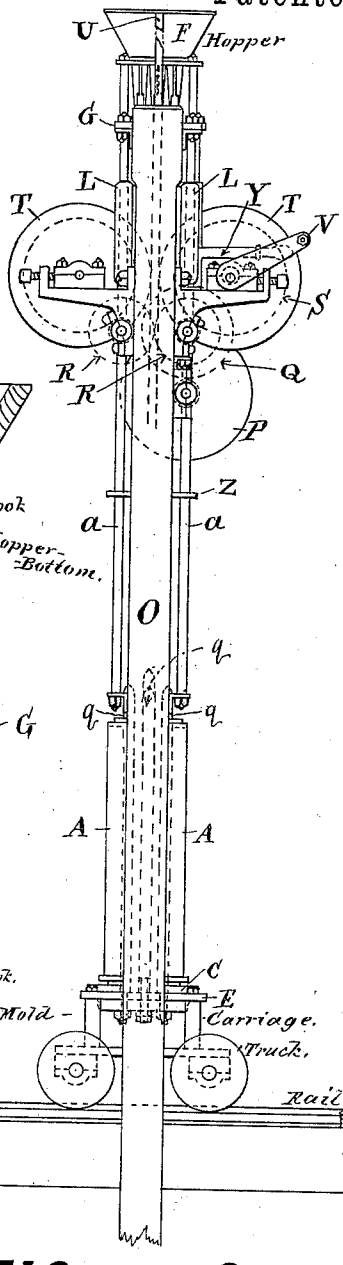


FIG. 28.



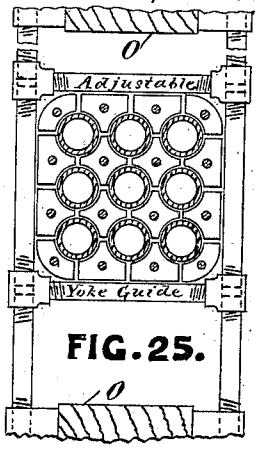


FIG. 25.

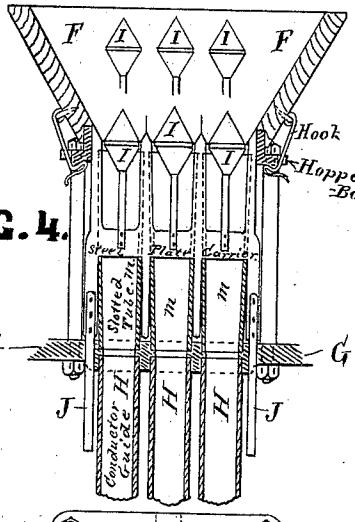


FIG. 4.

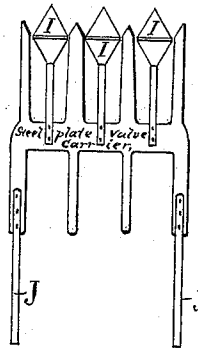


FIG. 5.

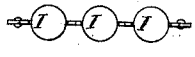


FIG. 6.

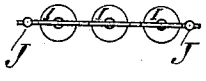


FIG. 7.

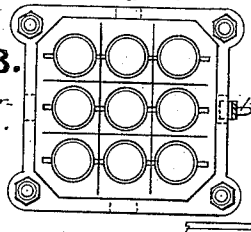


FIG. 8.

FIG. 2.

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MACHINE FOR MAKING MULTITUBULAR PIPES.

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FIG. 14.

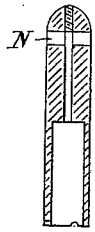


FIG. 13.

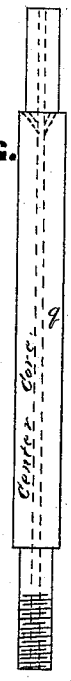


FIG. 15.



FIG. 16.



FIG. 17.



FIG. 18.



FIG. 11.

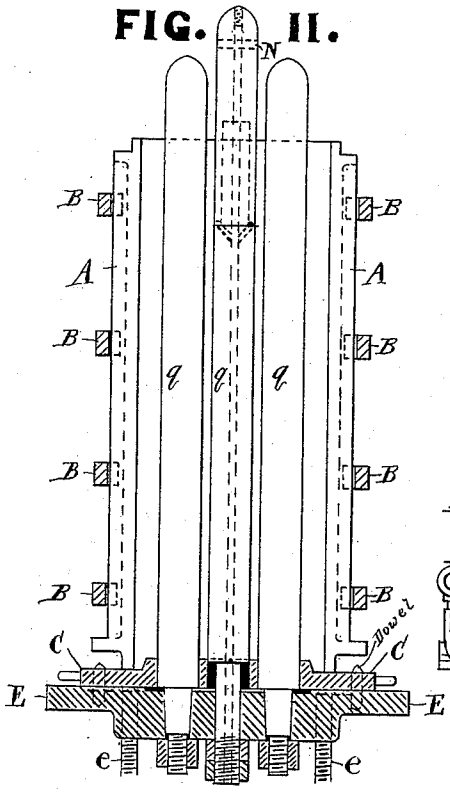
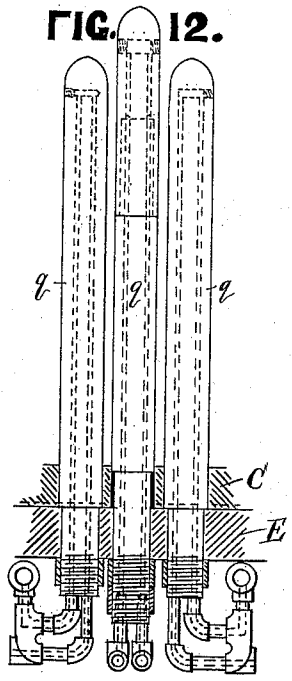


FIG. 12.



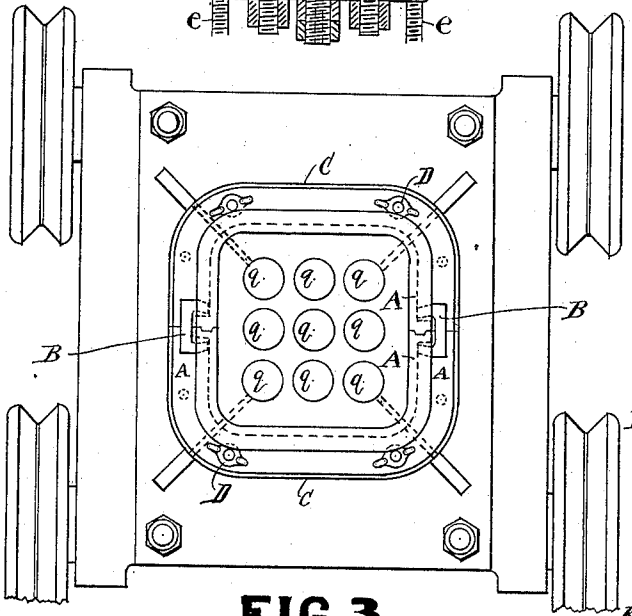
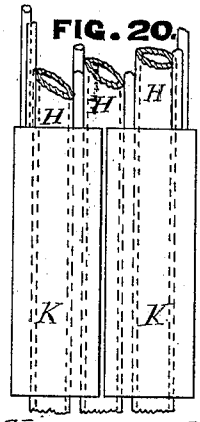


FIG. 3.

FIG. 20.



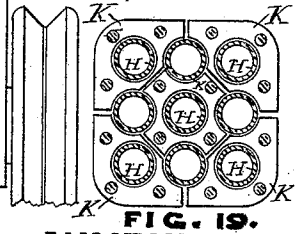


FIG. 19.

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UNITED STATES PATENT OFFICE.

JOHN H. WALSH, OF BOSTON, MASSACHUSETTS.

MACHINE FOR MAKING MULTITUBULAR PIPE.

SPECIFICATION forming part of Letters Patent No. 395,095, dated December 25, 1888.

Application filed April 18, 1887. Serial No. 235,254. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. WALSH, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines and Process for Making Multitubular Pipe; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention relates to the construction of various parts of the machine, the combination of parts, and to the process used in removing the pipe from the cores, all substantially as hereinafter more fully set forth and described.

The pipes for making which the machine is adapted are generally made of cement and other various materials, which, after suitable pulverization and preparation, are compacted within a suitable mold or case and around suitable caliber-forming cores or arbors by means of a suitably-graduated tamping applied during the gradual filling of the mold.

Referring to the drawings, Figure 1 is a front elevation with parts in section. Fig. 2 is a side elevation. (It is not attempted to show everything in these views, but only so much of a machine to which my improvements are applied as will enable me to make clear the construction and operation of the improvements.) Fig. 3 is a plan of the mold-case standing upon the lower head of the mold, and which rests upon the upper plate of the mold-carriage, which is also a socket-plate for cores *q*. Fig. 4 is a sectional elevation showing the feed-hopper, its valves, the tubular guiding and feeding conductors, H, &c. Fig. 5 is an elevation of the same valves and attached parts. Fig. 6 is a plan of the same. Fig. 7 is an under view of the same. Fig. 8 is a plan of the hopper-bottom, and shows also at the right a sectional view of one of the hooks which hold the rim of the hopper to its bottom, &c. Fig. 9 is a plan of "cage" L, or sliding frame which carries the tampers. (The lock-bolt X and ratchet W are also shown, which catch and hold the cage in elevated position, the lifting boards U, &c.) Fig. 10 is a sectional elevation of the same, lifting-boards, &c., omitted. Fig. 11 is a view in sectional elevation of the upper plate of the mold-carriage, the lower head of the mold, one-half of the mold-case, and the caliber-forming cores, dowels for lower head and plate, &c. Fig. 12 is a similar sectional elevation illustrating the application of steam for heating the cores. Fig. 13 is an elevation of the main part of the central core in a cluster. Fig. 14 is a central vertical section of the top part of the same core. Fig. 15 is an under view of the same top part. Fig. 16 is a plan of the same. Fig. 17 is a plan of the main part shown in Fig. 13. Fig. 18 is an under view of the same. Fig. 19 is a sectional plan showing the tampers, their rods, and the tubular tamper guiding and feeding conductors H. Fig. 20 is a sectional elevation of the same. Fig. 21 is a plan of a part of the top plate of the mold-carriage and shows air-grooves around the center core-socket. Fig. 22 is a sectional elevation of the same, a core, and the air-grooves. Fig. 23 is a similar view showing the air-grooves in the shoulder of the core instead of in the plate. Fig. 24 is a sectional elevation illustrating the lifting of the center core by means of a lever and means for holding the same up. Fig. 25 is a sectional plan showing the tamper-heads for tamping a nine-caliber or nine-flue pipe, the area being divided into sixteen separate tamping-heads, each having its rod or shank, and showing also the adjustable-screw yoke-guide to assist in guiding the heads. Fig. 26 is a sectional elevation showing the tamper-rods connected with springs to the upper and lower plates of the cage L. Fig. 27 is a central sectional view of the top head of the mold or follower, which forms the top end of the pipe and is perforated to allow the cores to pass through it. Fig. 28 is a central vertical sectional view illustrating the screw holder and lifter and its relations to the guide and core.

Like letters refer to the same or to corresponding parts in all the figures.

Referring first to Figs. 1, 2, and 3, the pipe-mold A is in two parts, united by means of the clamps B, and is seated upon the lower head, C, and may be secured to head C by the screws D, four of which are shown fastened in the head passing through the lower flange of the mold-case and provided with a thumb-nut above. The lower head, C, receives dowels fixed in the top plate, E, of the

mold-carriage, which keep the case in place. In the top plate of the carriage are arranged in suitable sockets the cores or arbors *q*, which form the calibers or flues of the pipe. These are secured by means of a suitable tenon terminating in a screw provided with a nut. There are nine of these cores shown. The cores are constructed with a slight taper, being smallest at the top and larger next to the lower head of the mold.

Great difficulty has heretofore been experienced in removing these cores from the freshly-formed pipe, the material adhering and breaking up when the cores are withdrawn. One feature of my invention has reference to the prevention of this evil, and consists in the process of first partially removing the center core and thereby giving free admission of air to fill the slightest vacancies caused by the pipe beginning to move off from the cores and carriage; also, in making the center core in parts, as illustrated in Figs. 14 to 18, inclusive.

The process of removal above alluded to consists of entering a transverse lever into and through the hole N, (shown in Figs. 14 and 11,) and giving a reciprocating rotary movement to that part of the center core, which loosens it from the pipe material. Then this top part of the core is also made smallest at the joint and larger at the upper end. It is therefore easily lifted up, admitting air in its joint through the air grooves and holes shown. Then, the pipe having been tamped with the center core lifted up, as shown in Figs. 11 and 24, the top piece of Fig. 14 is replaced, as in Fig. 11, and the entire core is driven down till its shoulder rests on plate E. By this time and by these means and the process described the center core has been so freed from the pipe material that the lower head of the mold, on which the pipe rests and through which the cores are freely fitted, may be lifted, so lifting the newly-formed freshly-made pipe safely and without injury or crumbling from the cores. As a matter of course the same process of freeing and giving air may be applied to the other cores; but in my practice thus far this has been sufficient to prevent all breaking up. By reference to Figs. 3, 11, 12, 13, 14, 15, 17, and 18 the air holes and grooves may be seen. In Fig. 3 they are shown dotted and running from the corners of plate C to the corner cores, and formed in plate E (see the same in Fig. 11) partly in dotted lines; also, dotted in Fig. 12; also, in center core, Figs. 13 and 17, extending longitudinally through the center with three branches at the shoulder opening in the joint between the top part and the main part of the core, which are shown, respectively, in Figs. 14 and 13; also, in the lower end in Fig. 14, at three points in Fig. 15, partly full and partly dotted in Fig. 17, and central in Fig. 18. When the nature of the material and the components of the composition require heat in the manipulation, steam may be admitted into the cores for the purpose, as illustrated in Fig. 12, the cores having been provided with steam-passages and supply and exit pipes, as in this figure illustrated. The steam enters from one pipe, passes longitudinally, and returns in a parallel flue and passes out into the exit-pipe. The steam and exit pipes are made conveniently attachable and detachable to and from the center pipe particularly.

Another feature of my improvement consists of the automatic feeding devices. I provide a hopper, F, to receive the material. This hopper has a bottom in which are perforations corresponding in number and arrangement to the cores for forming the flues or calibers of the pipe, and the hopper is suitably formed within, so that all its surfaces shall slope down to the orifices with sufficient steepness to readily deliver thereto all material placed within it.

In the orifices in the bottom of the hopper are arranged conical valves I. (See Fig. 4.) The hopper is secured over the plate G, in which are secured conductors H or tubes, the inside of which conducts the material to the mold below when delivered by the valves from the hopper, and the outside of which forms guides for the tamping-heads. These conducting-guides are marked H. The valves are marked I, and in Fig. 4 are shown in the closed position; also, above, detached, and in the open position. Between the valve-orifices and the plate carrying the conducting-guides are arranged connecting short tubes *m*, through slots in which (shown in Fig. 4) slides a thin steel carrier, (shown in Fig. 5,) to which the valve-stems are attached, and also the rods J, by which it and the valves are lifted. The comb-tooth-like prongs projecting up and down between the valves and rods J serve to keep the slots closed, in which the thin steel valve-carrier slides up and down in the tubes.

The tampers are marked K, and are suspended in the cage L with spring-connections, so that each shall strike a blow in some sense independent of the other when with the cage they fall together upon the material in the mold. When the cage rises, the spring-tappets M lift the rods J, and with them the valves I, and so cause the material to be discharged through the conductors H into the mold, after which the tampers are allowed to fall, so as to compact each feeding of material.

The main frame of the machine may be constructed in any convenient form. As shown, O O are upright timbers connected by the plate which supports the conductor-guides H, and to these two timbers are attached the gearing, guides, &c. Any suitable gearing may be used to operate the tampers and feed device. As shown, P is a driving-pulley. On its shaft is a pinion driving the gear-wheel Q, on whose shaft is a gear, R, playing into a similar gear on a shaft. These two shafts carry each a pinion playing into a larger gear, each marked S, on a shaft carrying one

of the friction-pulleys T, which embrace the litting-boards U, attached to the cage. The shafts carrying the friction-pulleys are one of them in stationary bearings, the other in movable bearings.

The one that is movable has eccentrics in which the journals have their bearing, so that by moving levers attached to the eccentric-bearings the journal is forced toward or from the shaft having stationary bearings. These levers are marked **V**, and the eccentric may be seen in dotted line in Fig. 2. Thus the gearing in motion from a belt applied to pulley P, the pulleys T will revolve together in opposite directions, when, if the levers V are moved in one direction, pulleys T will embrace and lift by their frictional contact the lifting-boards U and with them the cage and tampers. The opposite movement of the levers V releases the board, while the ratchet W and spring-bolt X catch and hold the cage and tampers in the elevated position.

The ratchet W has a lever, Y, by which it may receive a partially rotatory movement, so releasing the bolt X and allowing the cage and tampers to fall at the will of the operator. Thus in the operation the cage with its tampers are lifted, the tappets M in the cage strike the rods J, open the valves I, the material in the hopper drops through the valve-openings and the conducting-guides H into the mold, and is equally distributed among and around the cores. Then the operator allows the cage and tampers to fall. Meanwhile another feed is supplied to the hopper, and he presses levers V, when the cage rises, &c., the operation being repeated until the mold is full, when a top former, *h*, is placed on top the mold, and another blow or two completes the molding of the pipe. This is all done while the center-pipe core is in the raised position shown in Figs. 11 and 24, after which the core is loosened and the air let in, as previously described; then the lower head, case, and pipe are lifted off the cores together, the mold-carriage having been rolled aside for the purpose. The case is then removed from the pipe and, with the lower head, replaced for making the next pipe; or a duplicate case and head may be at hand to use while the first is being removed from the pipe. The tampers are guided in their upward movement and fall by means of, first, the conductor-guides H; second, the plate-guide Z; and, third, by the adjustable yoke-guide. (Shown in Fig. 25.) The first conductor-guides are stationary. The second, the plate-guide Z, is perforated for and fits freely the conductor-guides and the tamper-rods, resting on the tamper-heads, and moving with them to the supports and stops *b* at the bottom of the guide-rods *a*, and also fitting freely the guide-rods *a*.

The adjustable-screw yoke-guide of Fig. 25 is to be located near the top of the mold and will insure the tampers entering the mold truly and leaving it quietly.

As to the construction of the tamper-heads, I prefer that shown in Figs. 19 and 20. In these figures the tamper-head is in five parts, or, in other words, there are five tamper-heads. It will be noticed that this construction makes five tubular tamper-heads, each tubular head freely fitting a fixed central guide. This makes a very perfect working arrangement, each of the five being connected to the cage by its rods with a spring-connection.

In Fig. 25 is shown a tamper-head divided into sixteen separate parts or tamper-heads, each to be connected by a rod to the tamper-carrying cage L. It will be observed that four of these heads or parts coming between the stationary guides are well guided, but the other twelve particularly need the auxiliary guides Z and the adjustable yoke-guide of Fig. 25. I also provide for the center core a screw-holder and lifter, as illustrated in Fig. 28. The screw is socketed in guide H in those cases in which the feed-hopper and valve device are not used, which is the case in some of my simpler machines. In such cases the screw *d* serves to lift the center core and to hold it up and to steady it if its socket gets loose. When this screw is not in use, it can be pushed up into the guide and be held there by screwing in a stopper.

The springs on the tappets M relieve the blow when they strike the rods J and give an easy action to the opening of the valves.

So, with the springs on the tamping-rods in the cage, the cage and the tampers fall together; but when the tampers come to strike upon the material, if rigidly fastened to the cage they would act like one solid tamper; but this is not the case. Each spring yields upon its tamper, and the weight of the cage comes upon all the springs together, so that the blow of all the separate tampers is equalized and graduated to the resistance of the material, so giving an equal hardness at all points of the area and height of the pipe. There are four screws, *e*, two of which are seen in Fig. 1, the other two being covered by them, being directly beyond. These screws have their nuts in the core-socket plate or upper plate, E, of the mold-carriage, and are used either by hand or power to lift the lower head or follower, C, of the mold-case and the new-formed pipe. After they are thus lifted free from the cores any crane or lifting and traveling device may be used to take away the pipe. A system of gearing is indicated in Fig. 1 for operating the screws.

The top former or follower, *h*, Fig. 27, which gives form to the top end of the pipe, is constructed with a soft-metal or lead facing for the tampers to strike on. This facing is marked *t* and is section-lined in dotted lines in Fig. 27. It may be cast into dovetail sockets in the cast-iron with or without tinning the surface, and within a raised rim around the outer edge, all of which is indicated in the drawings. This soft facing is a protection to the tampers and the follower and modifies the blow upon the pipe material.

I do not claim the combination, with the mold-box having a series of mandrels or formers, *q*, of a series of tamps, *k*, a series of rods for operating said tamps, and a plate, *z*, having a series of holes for guiding the tamp-rods, and a series of larger holes to receive the upper ends of the mandrels and bring them into and hold them in proper or true positions.

I do not claim the combination, with a mold-box having a series of mandrels or formers, *q*, of a series of reciprocating tamps and tamp-rods, and a reciprocating plate, *z*, having a series of holes to receive the mandrels and a series of holes to permit of the passage of the tamp-rods, but not of the tamps, so that the latter will lift the said plate and cause it in its descent to strike or jar the mandrels and center the same. I do not claim the combination, with a vertical mold-box, of a series of stationary formers or mandrels within said box, and a vertically-reciprocating tamping device consisting of a series of independent and simultaneously operating tamps shaped to fit around the said mandrels, but not singly encircling them; nor the combination, with a base-plate, of a series of upright formers or mandrels attached thereto, a mold-box inclosing said mandrels and vertically movable in relation thereto and to said base-plate, and a vertically-reciprocating tamping device consisting of a series of independent tamps shaped to fit around the mandrels, but not singly encircling them; nor the combination, with an upright and vertically-movable mold-box, and a series of stationary formers or mandrels within said box, and a vertically-reciprocating tamping device consisting of a series of independent and simultaneously-operating tamps shaped to fit around the said mandrels, but not singly encircling them; nor the combination of a base-plate carrying a number of stationary vertical formers or mandrels, a mold-box inclosing the mandrels or formers, a series of tamps, K, suspended from a drop-carriage or head by means of the rods, said rods having a limited independent movement in relation to each other in the head or carriage, and devices for lifting the carriage and permitting it to drop; nor the combination of a series of tamps, a head or carriage for supporting the same, devices for lifting the head vertically and for releasing it to permit it to drop, a yielding connection between each of the tamps and the head, and guides for directing the vertical movement of the tamps; nor the combination of a number of stationary vertical mandrels, a mold-box inclosing the same, the drop sectional tamps K, and the removable block *h*, having an under surface adapted to finish one end of a conduit, and a flat upper surface against which tamps are brought in contact; nor the combination of a truck mounted upon horizontal tracks, a bed or plate carried by said truck and supporting a number of vertical mandrels, a mold-box inclosing said mandrels and carried by said truck, and a mold-box-lifting device, also supported by said truck, for lifting the mold-box and conduit-section therein contained longitudinally in relation to the formers; nor the combination of a frame having vertical ways for the vertical travel of a carriage or head, said carriage or head, and a series of tamps carried by said carriage or head, a lifting mechanism for lifting the carriage or head and tamps attached thereto vertically, a releasing device for releasing the carriage or head from the operation of the lifting mechanism to permit it to drop, horizontal tracks below said carriage or head, and extending horizontally from said frame a truck horizontally movable upon said track, a mold-box, formers, and a lifting device for lifting the mold-box relatively to the formers carried by said truck; nor the combination, with the movable carriage or head L, provided with the spring latch X, of a rod and sleeve, W, pivoted on the said rod and provided with teeth and the operating-handle *y*.

I claim—

1. The core as constructed in two parts—upper and lower—united by the long tenon and socket and perforated for air longitudinally, and having the branch air-holes at the joint, substantially as described.

2. The core constructed with the long tenon at the bottom, in combination with the socket-plate having the air-channels, substantially as described.

3. The longitudinally-perforated core, in combination with the socket-plate having the air-channels, substantially as described.

4. The divided core as constructed with tenon and socket joint and the longitudinal and branch perforations or passages, substantially as described.

5. The screw-coupling *d*, in combination with the stationary guide and core, substantially as described.

6. The traveling guide-plate Z, in combination with the tampers, stationary guides H, and fixed guides *a*, substantially as and for the purpose set forth.

7. The tamper-cage as constructed with the upper and lower flanged plates and the two sleeved end pieces bolted thereto, substantially as described.

8. The conical feed-valves, in combination with their thin plate-carrier, slotted tubes, the hopper, rods J, and the tappets M, substantially as described.

9. The thin plate valve-carrier, tooth-like guards, slotted tubes, hopper, rods J, and tappets M, in combination, substantially as described.

10. The combination of the spring-tappets M, the tamper-cage, rods J, plate-carrier, and the feed-valves, substantially as described.

11. The combination of the encircling hammers, the guiding feed-tubes H, the hopper, and mold, substantially as described.

12. The combination of direct material con-

ducting or feed tubes with the hopper and feed-valves above and the mold below, substantially as described.

13. The intermediate direct material-conducting tubes or feed-conductors, in combination with the pipe-mold, and a suitable feeding trough or hopper located above the tampers, substantially as described.

14. The lifting divided core having the central and branch air-passages and its socket-plate, in combination, substantially as described.

15. The combination of a mold and a series of cores therein, one or more of said cores being movable independently of the others, whereby air may be admitted around said movable core or cores to facilitate the removal of the pipe from the series of cores.

JOHN H. WALSH.

Witnesses:
CHARLES F. BROWN,
D. N. B. COFFIN.