J. K. DIMMICK.

RAMMING MACHINE.

APPLICATION FILED JULY 15, 1909.

979,832.

Patented Dec. 27, 1910.

6 SHEETS—SHEET 1.

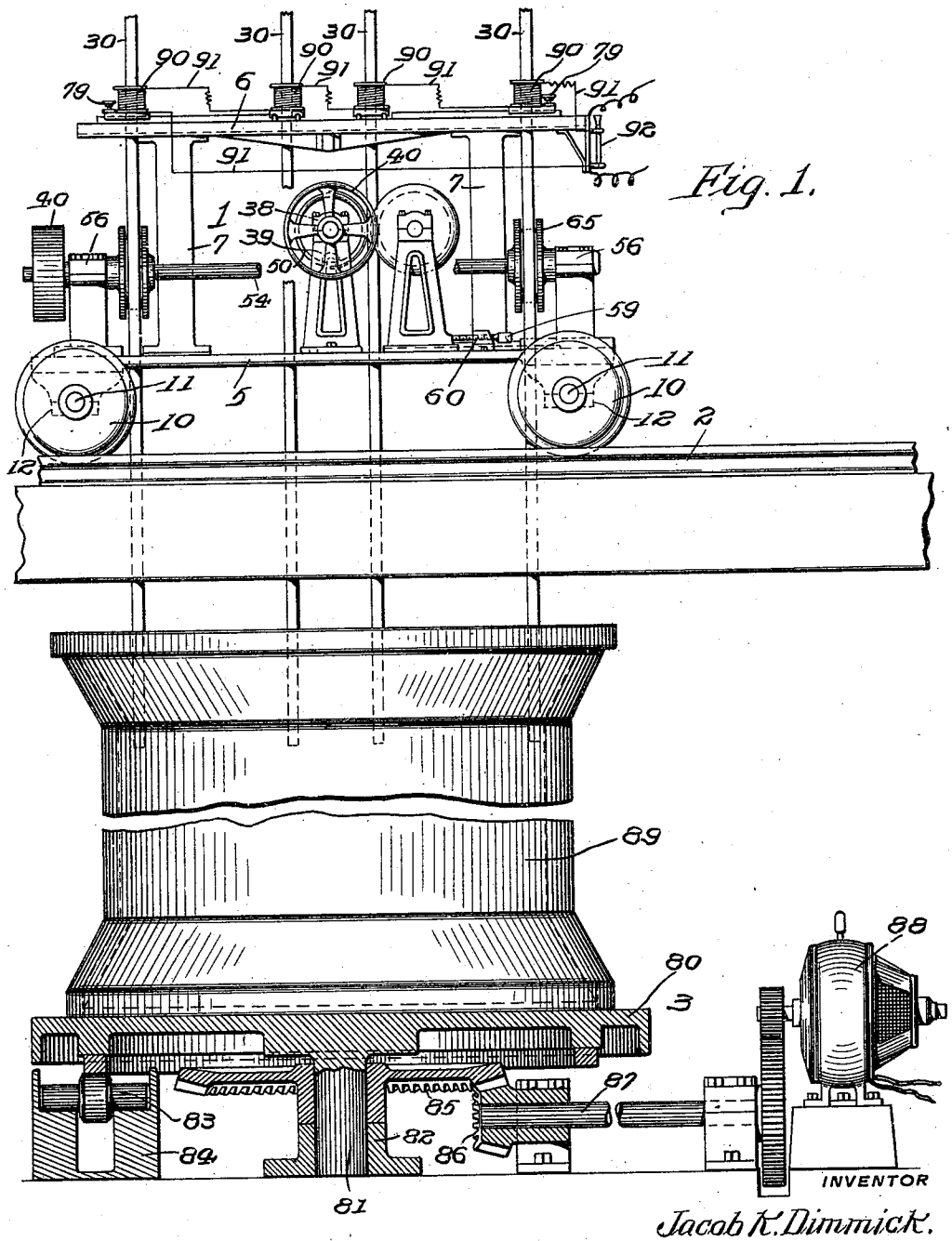

Fig. 1.

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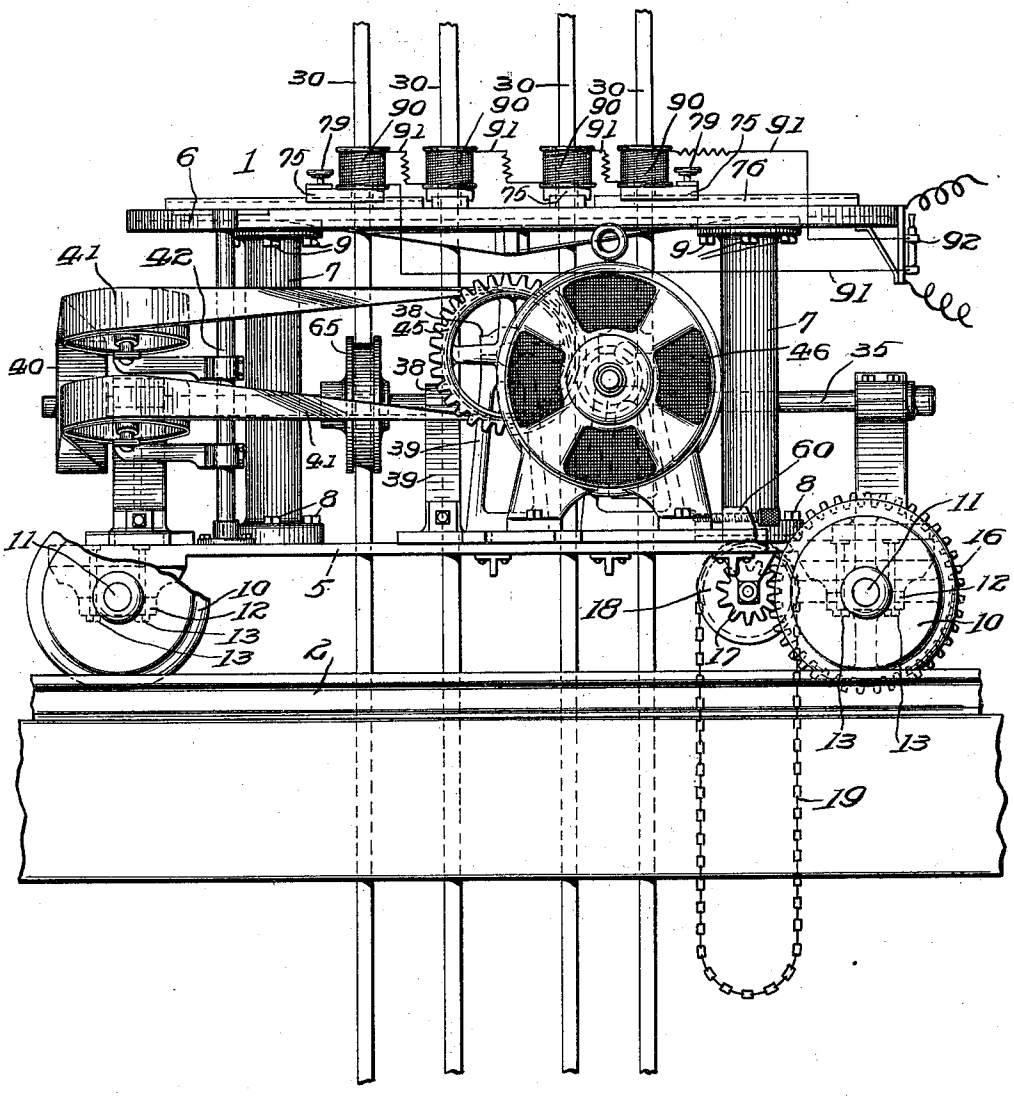
6 SHEETS—SHEET 2.

Fig. 2.



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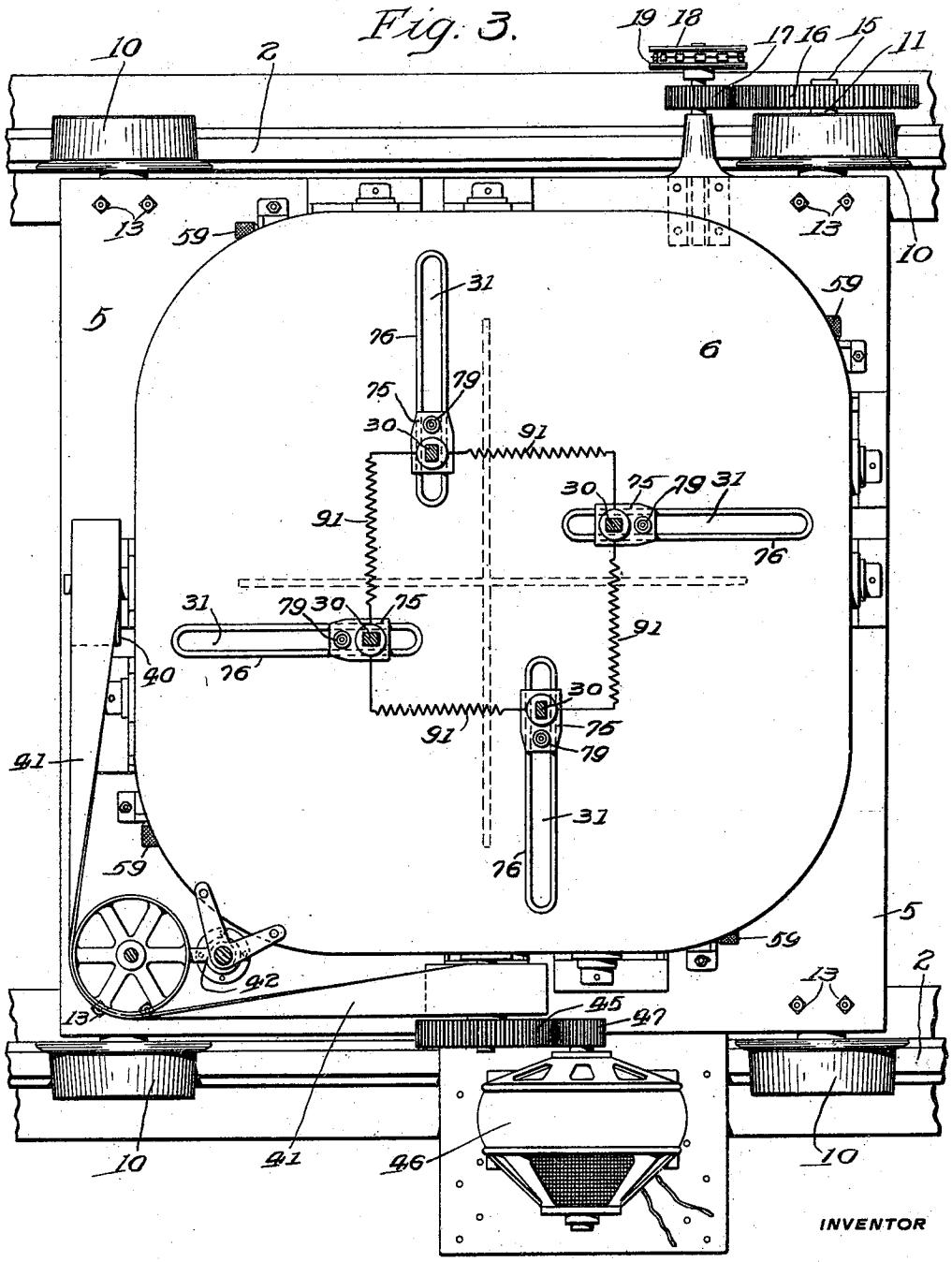
6 SHEETS—SHEET 3.

Fig. 3.



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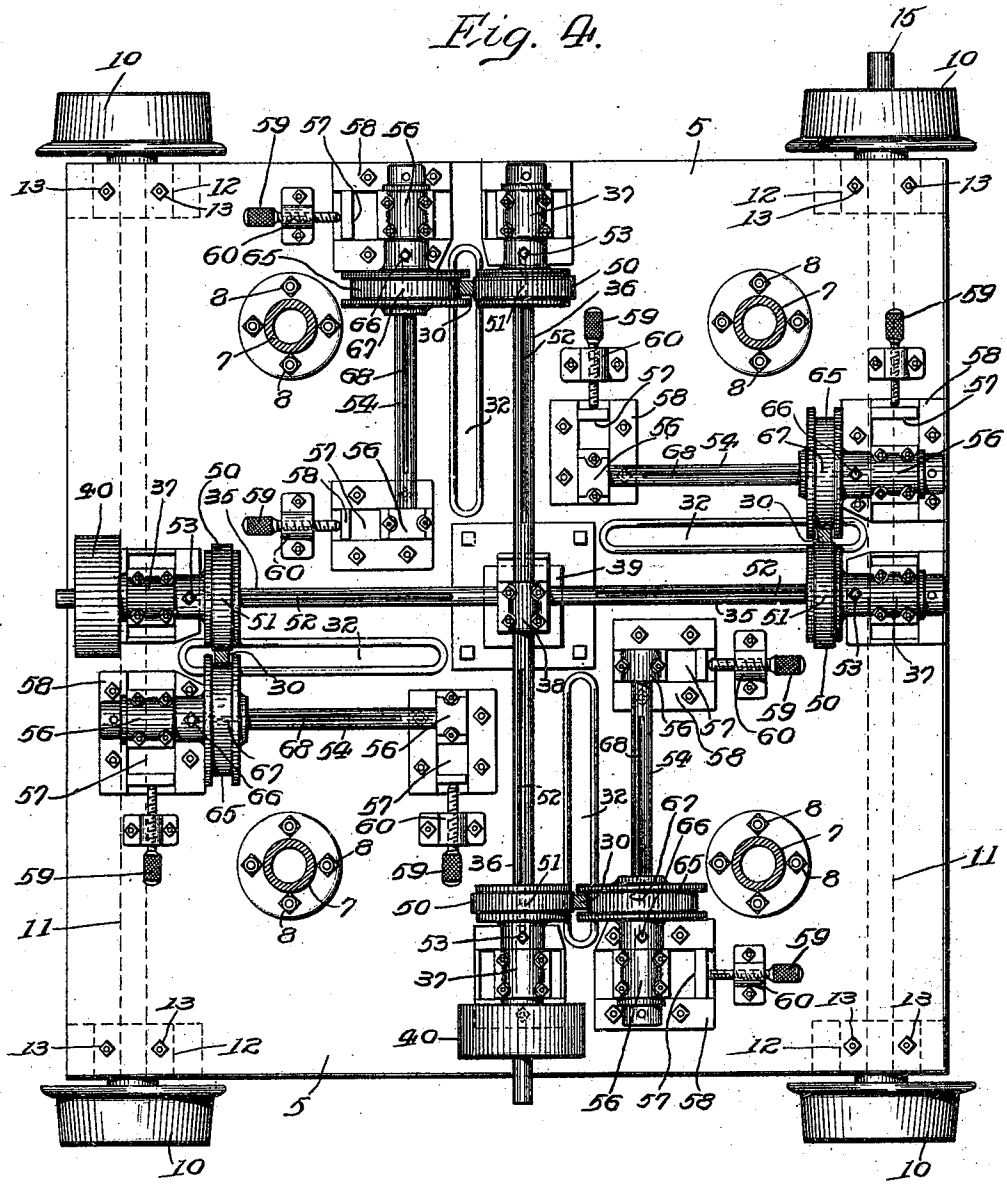
6 SHEETS—SHEET 4.

Fig. 4.



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6 SHEETS—SHEET 5.

Fig. 5

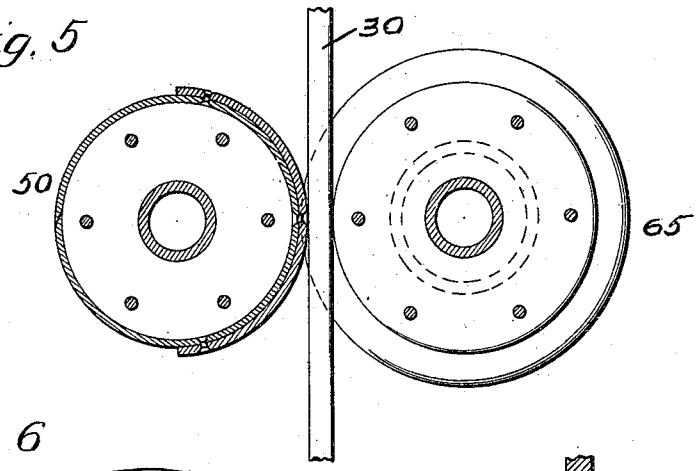


Fig. 6

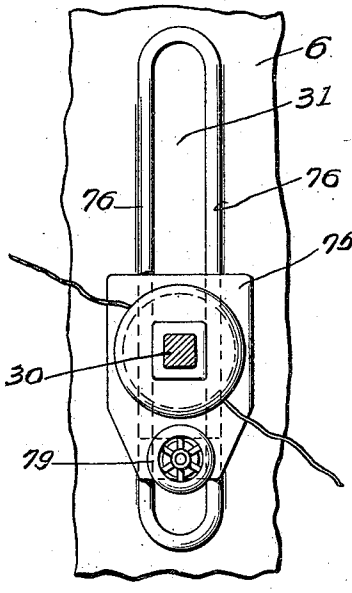


Fig. 7.

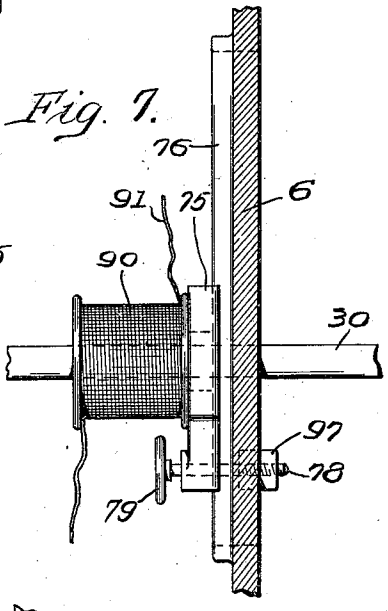
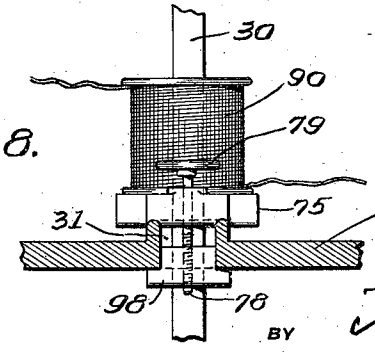


Fig. 8.



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6 SHEETS—SHEET 6.

Fig. 9.

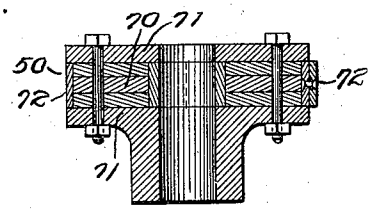


Fig. 10.

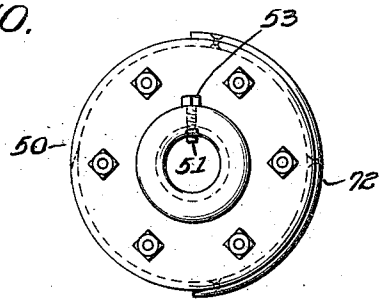


Fig. 11.

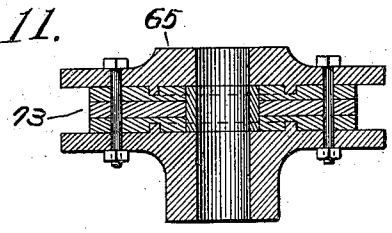
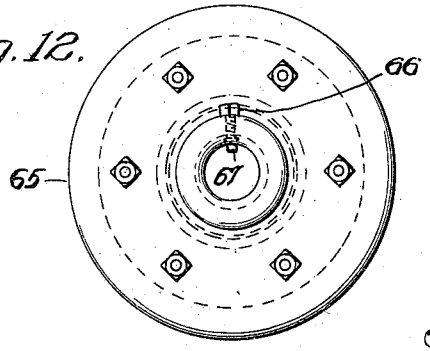


Fig. 12.



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UNITED STATES PATENT OFFICE.

JACOB K. DIMMICK, OF PHILADELPHIA, PENNSYLVANIA.

RAMMING-MACHINE.

979,832. Specification of Letters Patent. **Patented Dec. 27, 1910.**

Application filed July 15, 1909. Serial No. 507,768.

To all whom it may concern:

Be it known that I, JACOB K. DIMMICK, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Ramming-Machines, of which the following is a full, clear, and exact disclosure, reference being made to the accompanying drawings, forming a part of this specification.

The main objects of this invention are, to provide a simple efficient machine for ramming pipe molds; to provide in a ramming machine a plurality of reciprocatory rammers arranged about a center and having means for adjusting the rammers toward or away from the center; to provide a ramming machine having a plurality of reciprocatory rammers and means for reciprocating the rammers to cause the same to act with uniform pressures upon a mold; to provide in a ramming machine having a reciprocatory rammer, improved means for holding the rammer in operative position; to provide an improved reciprocatory ramming machine having reciprocatory rammers mounted upon an adjustable carriage, in combination with a rotary flask support; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a side elevation, partly in vertical section, of a ramming machine constructed in accordance with this invention, parts thereof being omitted for clearness; Fig. 2 an enlarged side elevation of the upper portion of the same; Fig. 3 an enlarged plan view of a portion of the same; Fig. 4 a horizontal section of the same with portions omitted; Fig. 5 a fragmentary vertical section of a portion of the same and Figs. 6, 7, 8, 9, 10, 11 and 12 are views of details of the same.

Referring to the drawings, one embodiment of this invention comprises a rammer carriage 1, horizontally adjusted upon tracks 2, fixed over a rotary flask support 3.

The rammer carriage 1 comprises a horizontal bed-plate 5, and a horizontal guide-plate 6, spaced above the bed plate and supported upon vertical columns 7, having flanged ends, the lower ends of the columns being rigidly bolted to the top side of the bed-plate by means of bolts 8, and the upper ends of the columns being rigidly bolted to the under side of the guide-plate by means of bolts 9.

The frame of the carriage is supported upon four wheels 10, mounted upon the tracks 2 and carried by rotary axles 11, mounted in babbitted bearings 12 rigidly secured to the under side of the bed-plate by means of bolts 13.

For moving the carriage upon its tracks, and locking it in any desired position, any suitable shifting device may be applied to one end 15 of one of the axles 11 which is extended outwardly from one of its wheels for this purpose, such as a gear 16 on the axle 11 driven by a pinion 17 driven by a sprocket 18 and chain 19.

The rammer carriage supports a plurality, in this instance four, vertically reciprocatory vertical rammers 30, the upper ends of which extend above the bed-plate and the lower ends of which extend below the bed-plate. A suitable elongated aperture 31 is provided in the guide-plate and in vertical alinement therewith a corresponding elongated aperture 32 is provided in the bed-plate, to receive each rammer 30 and to permit of its vertical reciprocation and lateral adjustment. These apertures or slots are symmetrically arranged about a center in pairs, the slots forming each pair, being parallel to each other and oppositely positioned and perpendicular to the slots forming the other pair. The rammers are preferably square in construction but may be of any other form.

For reciprocating the rammers, a pair of horizontal drive shafts 35 and 36 are rotatively mounted upon the bed-plate 5, the ends of the shafts being supported in babbitted bearings 37, projecting upwardly from and fixed upon the bed-plate. Each of these drive shafts extends between and parallel to two of the elongated apertures 32 in the bed-plate, and the drive shafts are arranged one above the other and extend substantially at right angles to each other. The central portions of these drive shafts may be supported in suitable bearings 38, mounted upon a standard 39 fixed upon the bed-plate.

Each of the drive shafts 35 and 36 is provided at one end and outside of the adjacent bearing 37 with a driving pulley 40 fixed thereon, and these driving pulleys are con-

nected to be driven one from the other by means of a quarter turned belt 41 driven over a mule stand 42 fixed at one corner of the bed-plate. One of the drive shafts is also provided with a driving gear 45, rigidly fixed upon one end thereof, and is driven by means of an electric motor 46 mounted upon the bed of the carriage and driving a pinion 47, which meshes with the gear 45 on the drive shaft.

Mounted upon each end of each of the drive shafts 35 and 36 and within its bearings 37 is an eccentric driving pulley 50, which is splined to its shaft by means of a key 51 which slides longitudinally in a key-way 52 extending substantially the full distance between the outer bearing of each end of the shaft and the central portion of the shaft. Each eccentric driving pulley 50 is provided with a set screw 53 engaging its key, whereby the pulley may be adjusted in a fixed position at any point in the length of its slot 52 to accommodate various sizes of flasks.

An idler shaft 54 is arranged parallel to each end of each driving shaft 35 and 36 and upon the opposite side of the elongated aperture 32 from the drive shaft. Each idler shaft is supported at each end in a bearing 56 fixed upon a pedestal 57, which is adjustable toward and away from the adjacent drive shaft, the lower end of the pedestal being mounted to move upon a suitable slider 58, and being adjusted toward and away from the drive shaft by means of a set screw 59 carried in a lug 60 fixed upon the bed of the carriage.

Mounted upon each idler shaft is an idler pulley 65, which is adjustable longitudinally upon the shaft by means of a set screw 66, which is adapted to engage a key 67 slidable in the longitudinal key-way 68 provided therefor in the shaft.

Each of the eccentric driving pulleys 50 is preferably constructed with a three-ply wooden center 70, having an iron flange 71 upon each side thereof, and with a leather covering 72 or other suitable covering, as may be determined, on the wood to insure the non-slipping of the pulley. Each idler pulley 65 is provided with a central groove 73, arranged concentrically upon its face adapted to receive one of the rammers and to guide the same as it reciprocates.

Each eccentric pulley is arranged in alinement with an idler pulley, and the pulleys are so proportioned that when a rammer is in position between them the eccentric pulley will press the rammer against the face of the idler pulley as the high parts of the eccentric pulley come in contact with the rammer, but the lower portions of the eccentric pulley will not thus grip the rammer.

Each rammer is slidably supported at its upper end above the guide-plate in an adjustable guide-block 75, which is slidably mounted upon horizontal ways 76, formed by a rim surrounding each elongated aperture in the guide-plate and projecting upwardly therefrom, the under surface of the guide-block being grooved to receive the opposite sides of the rim.

For holding back guide-block 75 in any desired position, a clamping plate 97 is arranged beneath the guide-block and upon the under side of the guide-plate, and a bolt 78 is threaded downwardly through the guide-block and into the clamping plate, a hand wheel 79 being fixed upon the upper end of the bolt whereby the bolt may be turned to tighten or to loosen the clamp plate. If desired, a similar clamping-plate may be provided upon the bed of the carriage to guide the lower portion of each rammer.

The rotary flask support 3 comprises a turn-table 80 rotatively mounted upon the upper end of a vertical shaft or standard 81, rotatively mounted in a fixed bearing 82. The turn-table is supported upon its under side adjacent its periphery upon roller bearings 83, mounted in a fixed annular support 84. For driving the turn-table the central shaft 81 of the table is provided with a beveled gear 85 fixed thereon, which is engaged by a beveled pinion 86 fixed on a shaft 87, driven by an electric motor 88 or other suitable means. The turn-table 80 is adapted to carry the usual flask 89.

For holding the rammers in an inoperative position, each guide-block 75 upon the guide-plate may be provided with an electromagnet or solenoid 90, projecting upwardly from the guide-block and surrounding the rammer mounted in the guide-block, and these magnets are suitably connected through leads 91 with a multiple contact switch 92, which is connected by flexible cords to any source of electric energy. When the solenoids are used the rammers are made of iron to be acted upon by the magnets. By this construction it is evident that when the switch is closed and a current is applied to the magnets, a force will be exerted upon the rammers, tending to lift them, and they will be held in inoperative positions as long as the magnets are energized, and that when the current is broken the rammers will be permitted to fall. Any suitable automatic mechanism for making and breaking a current might be substituted for the switch, and in that case the reciprocation of the rammers might be accomplished by the magnets, dispensing with the drive shafts and eccentric pulleys and idler pulleys heretofore described.

In the operation of this machine, after the flask has been mounted upon the turn-

table and the sand or other molding material has been inserted around a pipe pattern suitably placed in the flask, the carriage is moved into position centrally in vertical alinement with the flask. The rammers are then adjusted so that their lower ends project downwardly in the space in the flask surrounding the pattern. This is accomplished by adjusting the guide-blocks and the eccentric and idler pulleys. The turn-table is then set in operation through its motor, and the drive shafts upon the carriage are then set in motion by their motor, whereupon the eccentric pulleys lift the rammers as the high portions of the pulleys come into engagement with the rammers pressing them against the idlers, and when the rammers are released by the eccentric pulleys, they fall through the action of gravity and the lower ends of the rammers will impinge against the sand in the flask. The rammers are thus caused to reciprocate at each revolution of the drive shafts and to impinge with uniform pressures upon the molding material in the flask.

Although only one form has been described in which this invention may be embodied, it is obvious that many changes might be made in the construction illustrated without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described my invention, I claim and desire to protect by Letters Patent of the United States:—

1. A ramming machine comprising a carriage, a plurality of laterally adjustable longitudinally movable rammers carried thereby, means to reciprocate said rammers longitudinally and means to hold said rammers in inoperative positions, said latter means comprising an electro-magnet surrounding each rammer.

2. In a ramming machine, the combination with a reciprocatory rammer, of an electro-magnet surrounding said rammer, and to hold said rammer in an inoperative position.

3. In a ramming machine, the combination with a reciprocatory rammer of an electro-magnet surrounding said rammer, tending to lift said rammer and to hold said rammer in an inoperative position.

4. In a ramming machine, the combination with a reciprocatory rammer of a drive shaft, and an eccentric pulley carried by said drive shaft and adjustable longitudinally thereof for reciprocating said rammer.

5. In a ramming machine, the combination with a reciprocatory rammer of a drive shaft, an eccentric pulley carried by said drive shaft and adjustable longitudinally thereof, an idler shaft parallel to said drive shaft, and an idler pulley carried by said idler shaft and adjustable longitudinally thereof to coöperate with said eccentric pulley for reciprocating said rammer.

6. In a ramming machine, the combination with a horizontally adjustable carriage, of a vertically reciprocatory rammer mounted to reciprocate in said carriage and laterally adjustable with respect thereto, and means to reciprocate said rammer.

7. In a ramming machine, the combination with a horizontally adjustable carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage and each separately horizontally adjustable with respect thereto, and coöperating means to reciprocate said rammers independent of said carriage.

8. In a ramming machine, the combination with a horizontally adjustable carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage, and horizontally adjustable with respect thereto, a rotary drive shaft carried by said carriage, and means coöperating with said drive shaft for reciprocating said rammers independently.

9. In a ramming machine, the combination with a horizontally adjustable and vertically fixed carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage and horizontally adjustable with respect thereto, means for mechanically raising and releasing said rammers to drop by gravity, and a rotary flask support arranged beneath said rammers.

10. In a ramming machine, the combination with a horizontally adjustable carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage, and horizontally adjustable with respect thereto, and rotary means mounted upon said carriage to engage and lift each of said rammers relative to said carriage, irrespective of its position longitudinally, through a predetermined distance.

11. In a ramming machine, the combination with a vertically reciprocatory rammer, of an eccentric pulley arranged to engage one side of said rammer and an idler pulley arranged to engage the other side of said rammer to reciprocate said rammer.

12. In a ramming machine, the combination with a plurality of vertically reciprocatory horizontally adjustable rammers, of an eccentric pulley on one side of each of said rammers, an idler pulley on the opposite side of each of said rammers, said eccentric and said idler pulleys being axially adjustable, and means to rotate said eccentric pulleys to reciprocate said rammers.

13. In a ramming machine, the combination with a vertically reciprocatory rammer, of an eccentric pulley mounted upon one side of said rammer, and an idler pulley circular in cross section mounted upon the op-

posite side of said rammer to reciprocate the same.

14. In a ramming machine, the combination with a vertically reciprocatory rammer, of an eccentric pulley mounted upon one side of said rammer, and an idler pulley circular in cross section mounted upon the opposite side of said rammer to reciprocate the same, and means to hold said rammer in an inoperative raised position.

15. A ramming machine comprising a vertically reciprocatory rammer, and an electromagnet maintained in a fixed horizontal plane arranged adjacent said rammer to hold said rammer in an inoperative position.

16. A ramming machine comprising a vertically reciprocatory rammer, and a vertically fixed electro-magnet adjacent said rammer and tending to relatively lift said rammer and to hold the same in inoperative position.

17. A ramming machine comprising a vertically reciprocatory rammer, and an electro-magnet surrounding said rammer and tending to relatively lift said rammer and to hold the same in an inoperative position.

18. In a ramming machine, the combination with a carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage and horizontally adjustable with respect thereto, and means for reciprocating said rammers, relative to said carriage, said means acting to lift each rammer, irrespective of its position vertically, through a predetermined distance, the rammer then being permitted to fall.

19. In a ramming machine, the combination with a vertically fixed carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage and horizontally adjustable separately with respect thereto, and means for reciprocating said rammers, said means acting to lift each rammer, irrespective of its position vertically, through a predetermined distance, the rammer then being permitted to fall.

20. In a ramming machine, the combination with a laterally adjustable vertical reciprocatory rammer, of a horizontal drive shaft, an eccentric pulley carried by said drive shaft and adjustable longitudinally thereof, and means coöperating with said eccentric pulley for reciprocating said rammer vertically.

21. In a ramming machine, the combination with a laterally adjustable vertical reciprocatory rammer, of a horizontal drive shaft, an eccentric pulley carried by said drive shaft and adjustable longitudinally thereof, and means coöperating with said eccentric pulley for reciprocating said rammer vertically, said means comprising an idler shaft and an idler pulley carried by said shaft and adjustable longitudinally thereof, said idler being arranged opposite said eccentric pulley.

22. In a ramming machine, the combination with a carriage, of a plurality of rammers vertically reciprocatory and horizontally adjustable with respect to said carriage and carried thereby, a drive shaft rotatably mounted on said carriage, an eccentric pulley fixed upon said drive shaft and longitudinally adjustable with respect thereto opposite each of said rammers, and means cooperating with said eccentric pulleys for reciprocating said rammers vertically.

23. In a ramming machine, the combination with a horizontal adjustable carriage, of a plurality of rammers mounted to reciprocate in fixed paths vertically with respect to said carriage and each separately horizontally adjustable with respect thereto, and means to reciprocate said rammers vertically with respect to said carriage.

24. In a ramming machine, the combination with a horizontally adjustable carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage and horizontally adjustable with respect thereto, a rotary drive shaft carried by said carriage and means coöperating with said drive shaft for reciprocating said rammers vertically with respect to said carriage.

25. In a ramming machine, the combination with a horizontally adjustable and vertically fixed carriage, of a plurality of vertically reciprocatory rammers mounted upon said carriage and horizontally adjustable with respect thereto, means for reciprocating said rammers vertically with respect to said carriage, and a rotary flask support arranged beneath said rammers.

26. A ramming machine comprising a vertically reciprocatory rammer and a vertically fixed electromagnet adjacent said rammer to hold said rammer in an inoperative position.

27. A ramming machine comprising a vertically reciprocatory rammer and a vertically fixed electromagnet adjacent said rammer and tending to lift said rammer and to hold the same in inoperative position.

28. A ramming machine comprising a vertically reciprocating rammer and an electromagnet surrounding said rammer and tending to lift said rammer relative to said magnet and to hold said rammer in an inoperative position.

In witness whereof, I have hereunto set my hand this 22nd day of June A. D., 1909.

JACOB K. DIMMICK.

Witnesses:

JNO. H. GOODAPPLE,

JOHN PHILLIPS.

Correction in Letters Patent No. 979,832.

It is hereby certified that in Letters Patent No. 979,832, granted December 27, 1910, upon the application of Jacob K. Dimmick, of Philadelphia, Pennsylvania, for an improvement in "Ramming-Machines," an error appears in the printed specification requiring correction as follows: Page 3, line 47, the word "surrounding" should be stricken out and the words *tending to lift* inserted instead; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of January, A. D., 1911.

[SEAL.] C. C. BILLINGS,

Acting Commissioner of Patents.