

W. F. MEYERS.
MOLD FOR TEETH FOR DIAMOND SAWS.
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2 SHEETS—SHEET 1.

932,488.

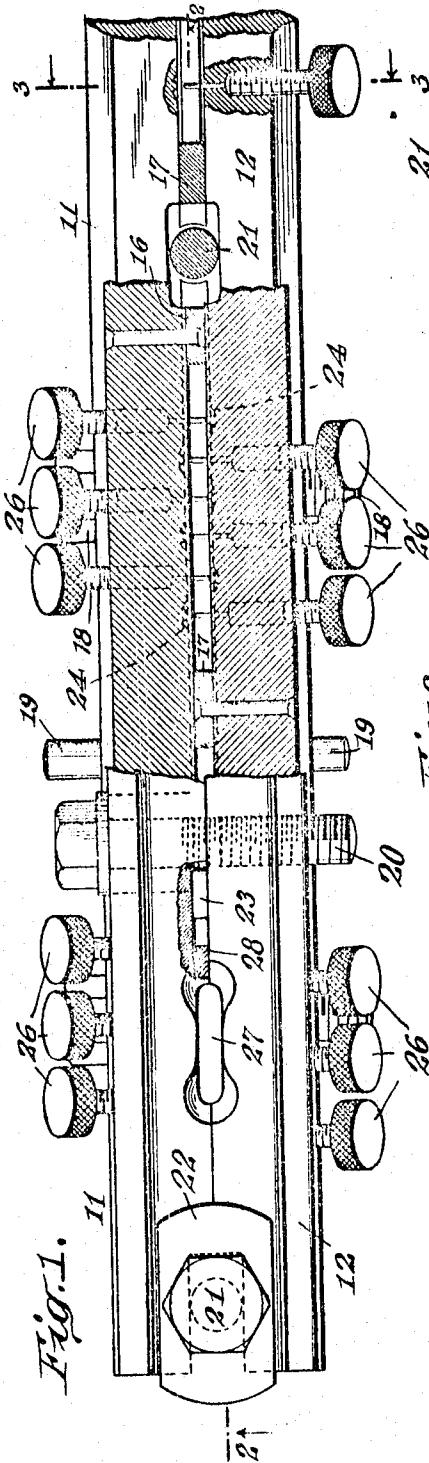
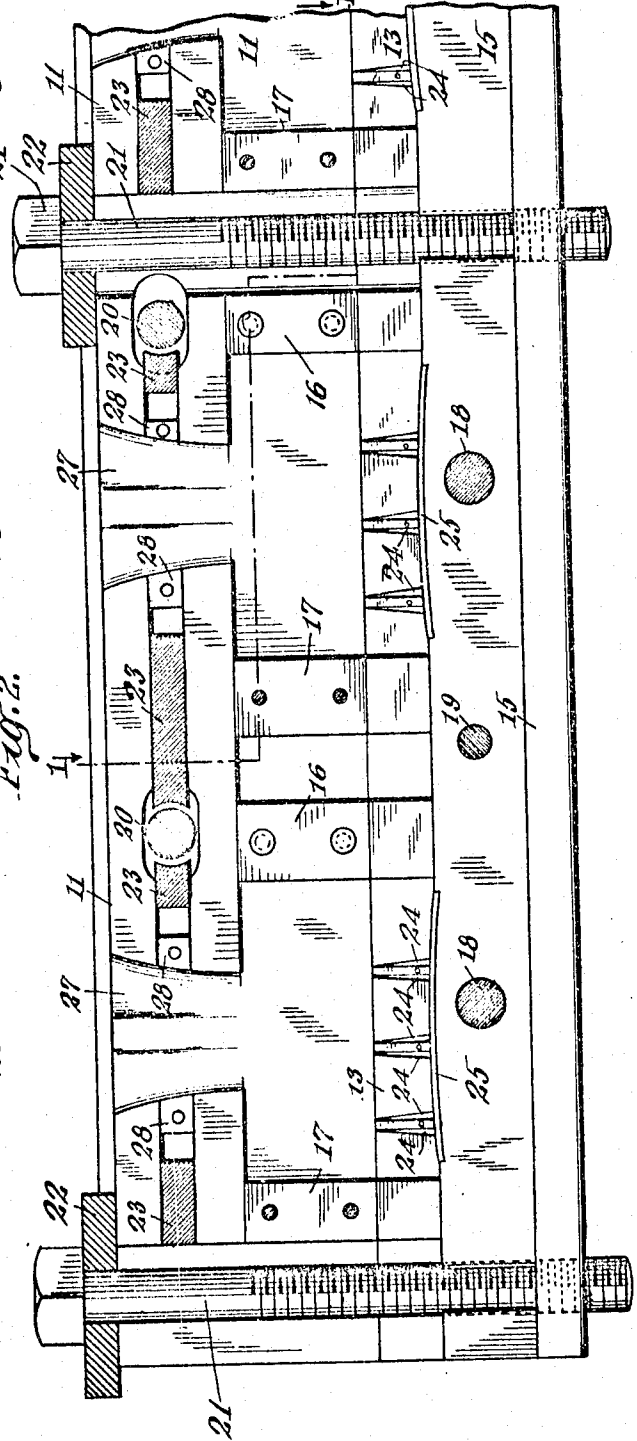


Fig. 2.

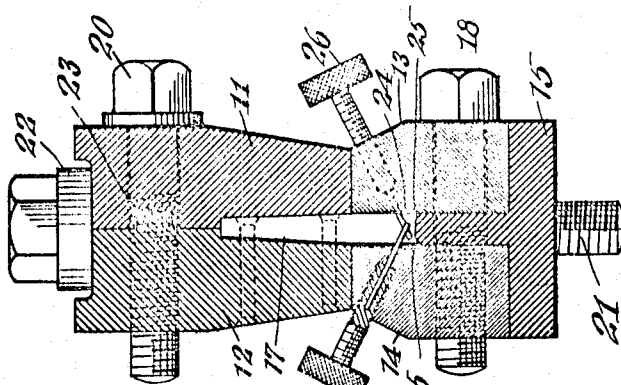


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8 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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MOLD FOR TEETH FOR DIAMOND SAWS.

932,488.

Specification of Letters Patent.

Patented Aug. 31, 1909.

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To all whom it may concern:

Be it known that I, WILLARD F. MEYERS, a citizen of the United States, residing at Long Island City, borough of Queens, city of New York, in the county of Queens and State of New York, have invented certain new and useful Improvements in Molds for Teeth for Diamond Saws, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to molds and particularly to molds for teeth for diamond saws for sawing stone.

One object of my invention is to overcome numerous difficulties heretofore encountered in the use of molds of this class. For example, as the molten metal cools in the mold and contracts the usual amount in passing from the molten to the solid state, the hard, incompressible diamonds in the bottom of the mold prevent the cutting edge of the tooth from contracting proportionately to the remainder, with the result that the cutting edge of the tooth is bowed outwardly; inasmuch as the saw cuts but approximately one-two hundred fiftieths of an inch per stroke, it is essential that the diamonds should be very accurately set and that each stone should do its share of the work, and I therefore make the bottom of the mold upwardly arched sufficiently to counteract the bowing due to the unequal contraction, so that, when the tooth has cooled and hardened, the cutting edge is true and all the diamonds are in line. It has also proved difficult to provide satisfactory vertical clamping means for such molds, since in the usual construction vertical bolts must screw into bores provided between two separate side pieces, half of the bore being in one and half in the other side piece, a construction weak and inconvenient. To obviate this, I employ a separate base piece constructed so as to bridge across the vertical clamping bolts so that the vertical clamping bolts may pass through it and leave the base integral, thus providing a bottom clamp as well as a top one. Furthermore, it has heretofore been found difficult to insure that the molten metal will run sufficiently in the corners around the diamonds to provide a firm and secure setting for the stone, and to remedy this I provide grooves in the mold as runways about the seats for the diamonds, thus furnishing greater space about the stone in which the

metal can flow. It has also proved difficult with the gates commonly used to run the metal evenly into the mold, so as to prevent any flaws in the tooth, and to overcome this difficulty I provide an improved gate of dumb-bell shape in cross-section, having the sides parallel and its ends enlarged and outwardly flaring.

Another object of my invention is to provide simple means for adjusting the length of the mold cavity, and to provide guides during such adjustment.

Other objects are simplicity, efficiency and reliability.

Still other objects and advantages of my invention will appear from the following description.

I shall now describe my invention with reference to the accompanying drawings and shall thereafter point out my invention in claims.

Figure 1 is a view partly in plan and partly in section of my mold assembled, the section being on planes indicated by the broken line 1—1 of Fig. 2. Fig. 2 is a sectional elevation on the plane indicated by the line 2—2 of Fig. 1, looking upward. Fig. 3 is a transverse section on a plane indicated by the line 3—3 of Fig. 1. Fig. 4 is a perspective view of the upper section of the mold shown at the left in Fig. 2. Figs. 5 and 6 are enlarged detail views showing the manner of embedding the diamonds, Fig. 5 being a plan view and Fig. 6 being a vertical section on the plane indicated by the line 6—6 of Fig. 5. Fig. 7 is a view in elevation of a portion of a completed tooth molded in my mold showing the straight operating edge. Fig. 8 is a similar view of a tooth molded in a mold having the usual straight bottom, showing the objectionable curved edge somewhat exaggerated.

In the embodiment of my invention shown in the drawings, I construct the mold in five main pieces, two upper side pieces or sections 11 and 12, and two lower side pieces 13 and 14, and a T-shaped base piece 15. The upper side pieces 11 and 12 are rabbeted to form the upper part of the mold cavity and the lower pieces 13 and 14 are spaced apart a distance equal to the width of the combined rabbets of the upper pieces by the stem of the T-shaped base piece, which extends upward between the lower side pieces and forms the bottom of the mold. To limit the length of each mold cavity, I provide in the rabbets partition pieces 16 rivet-

ed on the upper side piece 11 and similar partition pieces 17 on the side piece 12, and these partitions extend down to the base piece 15 and fit tightly in the cavity formed by the rabbets to form the ends of the mold.

In diamond saw construction the diamond studded teeth are set in notches in the edge of the saw blade and in use the saw blade stretches and widens the notches so that, with each successive setting of teeth, wider teeth are required to fill the notches. To meet this difficulty, the width of the mold cavities must be changeable, and for this purpose I make the upper side pieces longitudinally adjustable relative to each other so that the partition pieces 16 and 17 may be either brought closer together or moved farther apart and thus vary the length of the mold.

The lower side pieces 13 and 14 are secured to the tongue of the base 15 by the clamping bolts 18, which pass through holes in the piece 13 and the tongue and screw into the piece 14. Drift pins 19 may be employed to bring the holes in proper alinement. The pieces 11 and 12 are clamped together by bolts 20, which pass through apertures in the piece 11 and screw into the piece 12. To permit the relative longitudinal adjustment of these pieces above referred to, the apertures in the piece 11 are elongated as shown. The upper parts are clamped down on the lower parts by the usual vertical clamping bolts 21, which pass through similarly elongated slots between the side pieces 11 and 12 and screw into the base 15. Washers 22 close the upper ends of the slots for the bolts 21 and serve as the upper clamping means and the base 15 serves as the lower clamping means, thus providing a strong and convenient means for clamping and leaving the base piece 15 integral because of the fact that, while the holes for the clamp bolts 21 cut through the tongue or stem of the T-shaped base piece 15, the lower part of this base piece is of sufficient width to receive and bridge across the bolts 21 which serve as clamping means. A tongue 23 on the piece 12, fitting in a longitudinal groove in the piece 11, keeps the parts in correct vertical alinement during their adjustment, and the partitions 16 and 17, extending down between the pieces 13 and 14, also serve as guides to keep the upper side pieces in accurate lateral alinement with the lower side pieces.

In setting or embedding the diamonds in the edge of a tooth, it is very important that the steel or other metal shall flow around the diamond to a sufficient extent to firmly and securely hold the diamond in place, the diamonds being set alternately on the corners of the cutting edge of the tooth in zig-zag fashion and are correspondingly placed and held in the corners of the mold before the

metal is admitted. A difficulty in practice is found in the fact that the molten metal does not fully penetrate into the sharp corners and angles around the diamond, with the result that the setting of the diamond is not secure. In my invention triangular grooves 24 are provided in the lower side pieces adjacent to the diamond and are arranged in pairs with a groove on each side of a diamond leaving an intervening ridge against which the diamond rests, the grooves permitting the metal to flow freely around the diamond. Also the tongue portion of the base piece 15 has its corners removed, forming beveled faces which form grooves 25 with the side pieces, thus further facilitating the free access of the molten metal to all sides of the diamonds. These faces are easily beveled because of the fact that the base piece 15 is a separate piece and can be worked upon separately; and the fact that it is T-shaped in cross-section renders possible the use of the vertical clamping bolts 21 with a separate bottom piece, since, as above noted, the base piece is not cut in separate pieces by the holes for the bolts 21. The excess of metal entering the grooves 24 and 25 is readily surfaced off after the teeth are removed from the mold. A point of advantage of this construction is the fact that, inasmuch as the ridges against which the diamonds rest are in the same plane as the faces of the mold and are immovable, the diamonds in the completed teeth must always be in the same position relative to the edges of the teeth, in contrast to constructions, for example, in which the diamonds are held in place in recessed portions of the molds by a plurality of adjustable pins projecting in from the sides and bottom of the mold, the diamonds being supported on the points of the pins.

For holding the diamonds in the mold, I employ adjustable inclined pins 26. These pins form no part of this invention, but were the subject of a prior invention by me, for which I secured Letters Patent No. 387,986, dated August 14, 1888. Each of these pins consists of a screw having a milled head with an internal bore in which is inserted a small wire. The pins are adjusted with the wires in contact with the diamonds, as shown in Figs. 5 and 6, and the wires are fused with the molten metal.

It has been found in practice that with the gate ordinarily employed, the molten metal will not run evenly into the mold, since it tends to run faster in the middle of the orifice than at the edges, and therefore flaws and imperfections in the completed teeth are common. To obviate this I have provided an improved gate 27, which is of dumb-bell shape in cross-section. At its inner end the gate is merely oblong and toward the mouth the ends are rounded and flare out-

ward while the sides at the middle of the gate are parallel. This shape retards the flow of metal at the middle and allows it to flow freely at the ends or edges, resulting in a more even filling of the mold. At each edge of the gate plugs 28 are provided to prevent the molten metal from running into the horizontal groove in the upper side piece 11.

As the molten metal cools in the mold, it contracts the usual amount, but, due to the presence of the hard, incompressible diamonds on the cutting edge of the tooth, the contraction is necessarily uneven and the cutting edge is therefore bent or warped and, in the common practice heretofore, is bowed outwardly, as shown in Fig. 8. This throws the diamonds out of line and, since the cut is very slight with each reciprocation of the saw (approximately 1/250th of an inch), the efficiency is thereby greatly impaired. To counteract this, I bow or arch the bottom of the mold upward, as shown in Fig. 2, to an extent exactly equal to the outwardly bowing tendency due to the uneven contraction of the tooth, having determined this by experiment. The result is that in the completed tooth the diamonds are in exact alignment as shown in Fig. 7.

It is evident that as many molds may be made together as is desired. After the metal has cooled, the mold is taken apart and the excess metal which was contained in the grooves and in the gate is removed, after which the usual grooves on the sides of the tooth for the wedges are milled in.

It is obvious that various modifications may be made in the construction shown and above particularly described within the principle and scope of my invention.

I claim:—

1. In a mold, in combination with the sides, a T-shaped base piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold.

2. A mold for teeth for diamond saws having its bottom upwardly arched longitudinally of the mold.

3. In a mold, in combination with the sides, a T-shaped base piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold and having its lateral edges beveled to form grooves with the sides.

4. In a mold for teeth for diamond saws, side pieces having a plurality of grooves therein disposed about the situs of the diamonds.

5. A mold for teeth for diamond saws comprising side pieces having a plurality of grooves therein disposed about the situs of the diamonds, and a bottom having its lateral edges beveled to form grooves with the sides.

6. A mold for teeth for diamond saws comprising side pieces having a plurality of

grooves therein disposed about the situs of the diamonds and having its bottom upwardly arched longitudinally of the mold.

7. A mold for teeth for diamond saws comprising side pieces having a plurality of grooves therein disposed about the situs of the diamonds and having its bottom upwardly arched longitudinally of the mold, the lateral edges of the bottom being beveled to form grooves with the sides.

8. In a mold, in combination with side pieces having a plurality of vertical grooves therein disposed about the situs of the diamonds, a T-shaped base piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold.

9. In a mold, in combination with the sides, a T-shaped base piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold.

10. In a mold, in combination with side pieces having a plurality of vertical grooves therein disposed about the situs of the diamonds, a T-shaped base piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold and having its lateral edges beveled to form grooves with the sides.

11. In a mold, in combination with side pieces having a plurality of vertical grooves therein disposed about the situs of the diamonds, a T-shaped base-piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold.

12. In a mold, in combination with side pieces having a plurality of vertical grooves therein disposed about the situs of the diamonds, a T-shaped base piece having its stem extending upward as a tongue between the sides and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold and its lateral edges being beveled to form grooves with the sides.

13. A mold having a gate of dumb-bell form in cross-section.

14. A mold having a gate outwardly flaring at the ends and of dumb-bell form in cross-section.

15. A mold having a gate of oblong shape and of dumb-bell form in cross-section, the sides at the middle being parallel and the ends being rounded and outwardly flared.

16. The combination with the sides of a mold, of a base piece extending between the sides and clamping bolts for holding the base piece in place, the base piece having a portion receiving and bridging across the bolts.

17. The combination with the sides of a mold, of a base piece extending between the sides and having its lateral edges beveled to form grooves with the sides, and clamping

bolts for holding the base piece in place, the base piece having a portion receiving and bridging across the bolts.

18. The combination with the sides of a mold, of a base piece extending between the sides and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold, and clamping bolts for holding the base piece in place, the base piece having a portion receiving and bridging across the bolts.

19. The combination with the sides of a mold, of a base piece extending upward between the sides to form the bottom of the mold and having its lateral edges beveled to form grooves with the sides, the bottom being upwardly arched longitudinally of the mold, and clamping bolts for holding the base piece in place, the base piece having a portion receiving and bridging across the bolts.

20. The combination with the sides of a mold having a plurality of vertical grooves therein disposed about the situs of the diamonds, of a base piece extending between the sides and having its lateral edges beveled to form grooves with the sides, and clamping bolts for holding the base piece in place, the base piece having a portion receiving and bridging across the bolts.

21. A mold for teeth for diamond saws comprising side pieces adapted to slide longitudinally relatively to each other, and partition pieces carried alternately by opposite side pieces.

22. A mold for teeth for diamond saws comprising side pieces adapted to slide longitudinally relatively to each other, partition pieces carried by alternate sides of the mold, and a bottom arched upwardly longitudinally of the mold.

23. A mold for teeth for diamond saws comprising side pieces adapted to slide longitudinally relatively to each other, partition pieces carried by alternate sides of the mold, and a T-shaped piece extending upwardly as a tongue between the sides and forming the bottom of the mold.

24. A mold for teeth for diamond saws having side pieces adapted to slide longitudinally relatively to each other, partition pieces carried by alternate sides of the mold, and a T-shaped piece extending upwardly as a tongue between the sides and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold.

25. The combination with the sides of a mold having a plurality of vertical grooves therein disposed about the situs of the diamonds, of a base piece extending upward be-

tween the sides to form the bottom of the mold and having its lateral edges beveled to form grooves with the sides, the bottom being upwardly arched longitudinally of the mold, and clamping bolts for holding the base piece in place, the base piece having a portion receiving and bridging across the bolts.

26. A mold for teeth for diamond saws comprising sectional sides, the lower side pieces being stationary and the upper side pieces being adapted to slide longitudinally relatively to each other, a T-shaped base piece having its stem extending upwardly as a tongue between the lower side pieces and forming the bottom of the mold, and partition pieces carried alternately by the upper side pieces and extending between the lower side pieces to the bottom of the mold.

27. A mold for teeth for diamond saws comprising sectional sides, the lower side pieces being stationary and having a plurality of vertical grooves disposed about the situs of the diamonds and the upper side pieces being adapted to slide longitudinally relatively to each other, a T-shaped base piece having its stem extending upwardly as a tongue between the lower side pieces and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold and having its lateral edges beveled to form grooves with the sides, and partition pieces carried alternately by the upper side pieces and extending between the lower side pieces to the bottom of the mold.

28. A mold for teeth for diamond saws comprising sectional sides, the lower side pieces being stationary and having a plurality of vertical grooves disposed about the situs of the diamonds and the upper side pieces being adapted to slide longitudinally relative to each other, a T-shaped base piece having its stem extending upwardly as a tongue between the lower side pieces and forming the bottom of the mold, the bottom being upwardly arched longitudinally of the mold and having its lateral edges beveled to form grooves with the sides, partition pieces carried alternately by the upper side pieces and extending between the lower side pieces to the bottom of the mold, and a gate of dumb-bell form in cross-section and of oblong shape at its inner orifice, the sides of the gate at the middle being parallel and the ends being rounded and outwardly flared.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLARD F. MEYERS.

Witnesses:

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BERNARD COWEN.