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M. McHALE.

ROCK DRILL MAKING AND SHARPENING MACHINE.

APPLICATION FILED JULY 16, 1910.

1,001,545.

Patented Aug. 22, 1911.

3 SHEETS-SHEET 1.

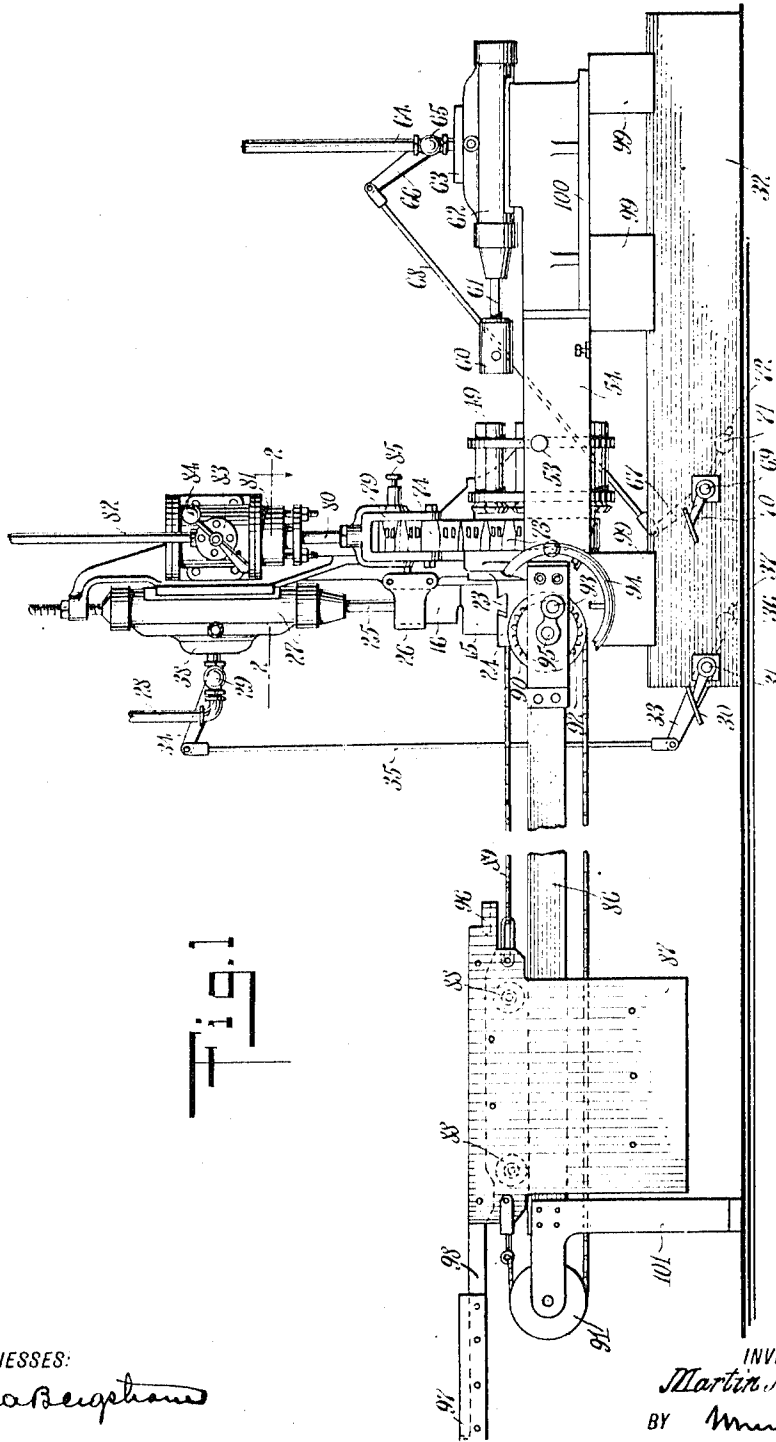


Fig. 1

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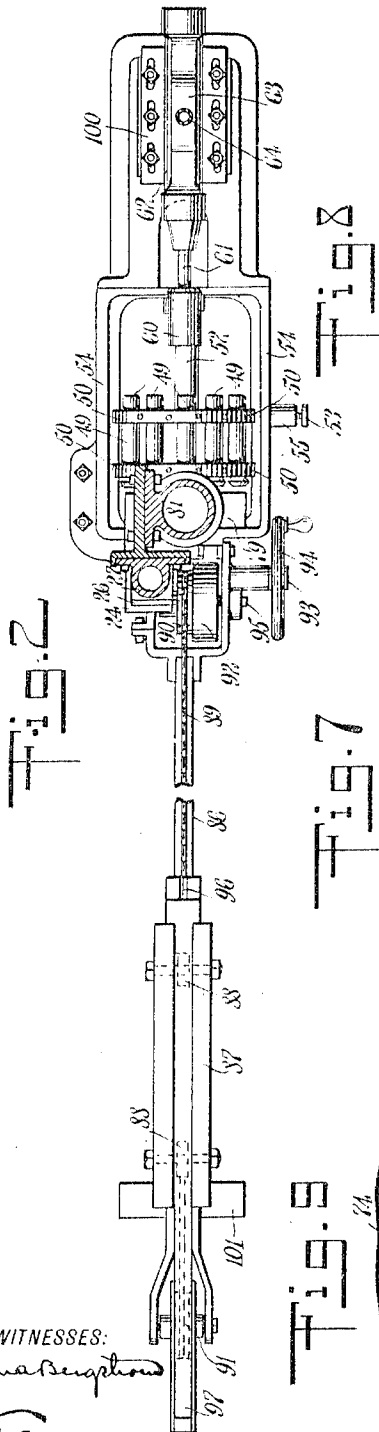
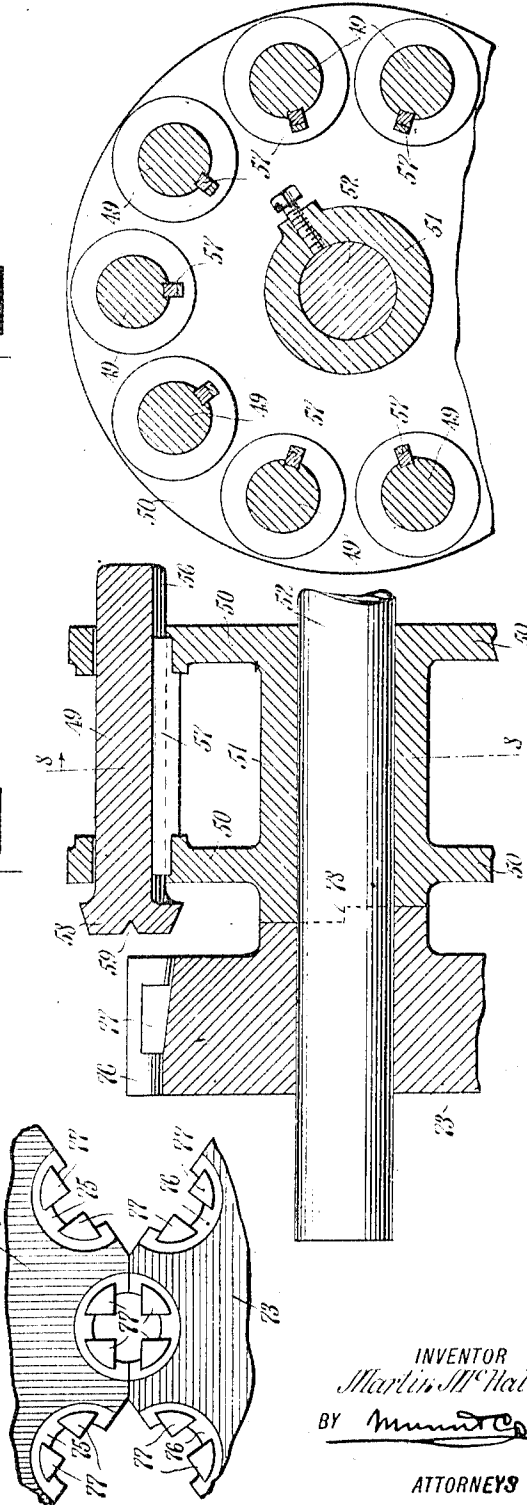


Fig. 2

Fig. 7

Fig. 8



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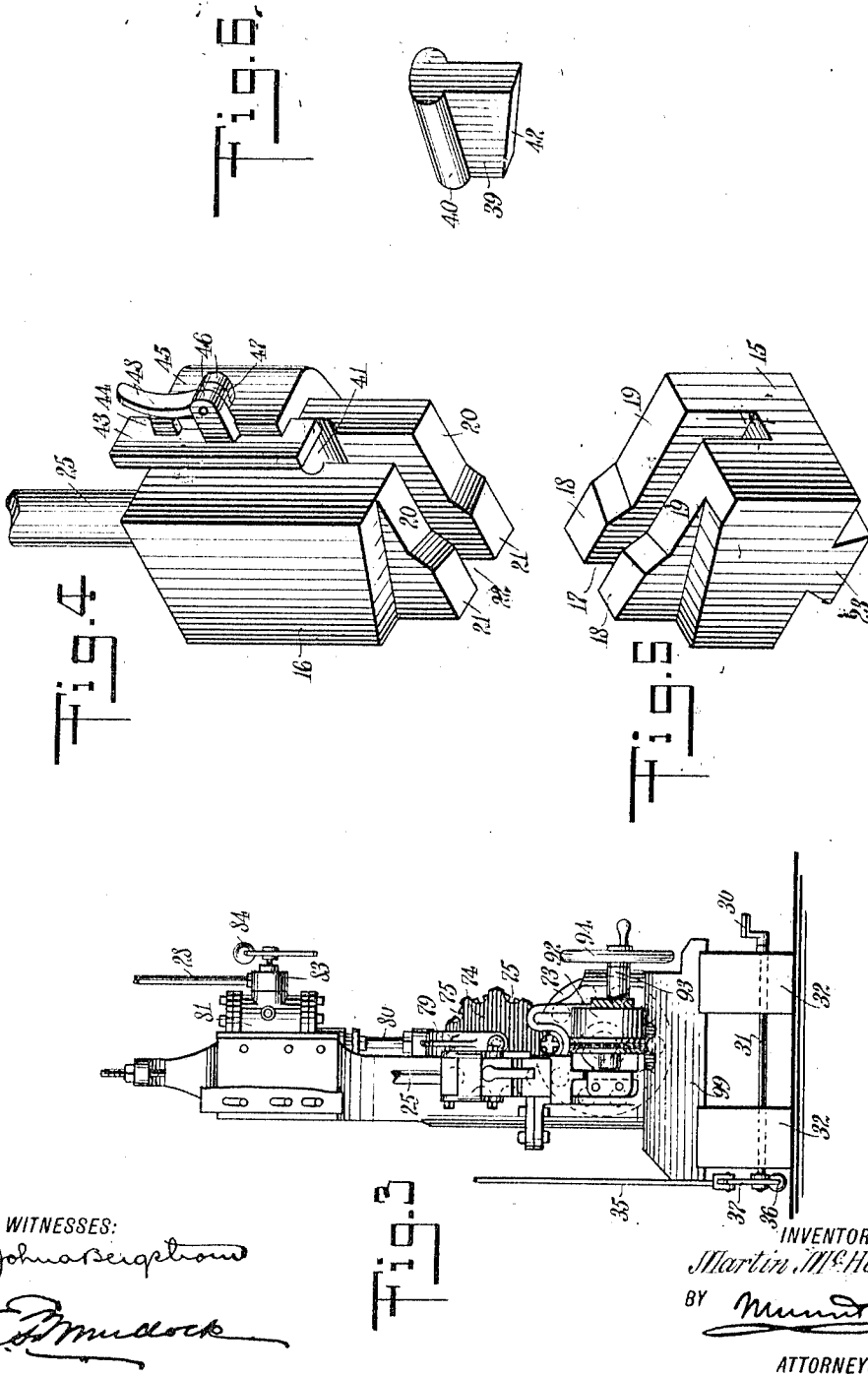
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MARTIN McHALE, OF PHOENIX, BRITISH COLUMBIA, CANADA

ROCK-DRILL MAKING AND SHARPENING MACHINE.

1,001,545.

Specification of Letters Patent.

Patented Aug. 22, 1911.

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To all whom it may concern:

Be it known that I, MARTIN McHALE, a subject of the King of Great Britain, and a resident of Phoenix, in the Province of British Columbia and Dominion of Canada, have invented a new and Improved Rock-Drill Making and Sharpening Machine, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide a machine of the character named with means for shaping through successive operations the heads of drills as desired to provide means for readily and quickly varying the dies for forming the said heads; to provide a machine of the character named with a sharpening and setting mechanism which may be rapidly and easily varied as to size and design; to provide a battery of guiding members to operate in conjunction and in unison with the sharpening and setting devices carried by the said sharpening mechanism; and to provide a machine of the character named with an adjustable anvil having a plurality of pockets to hold drills of various lengths.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a side elevation of a machine constructed and arranged in accordance with the present invention; Fig. 2 is a horizontal section taken on the line 2—2 in Fig. 1; Fig. 3 is a rear end elevation of the same; Fig. 4 is a detail view in perspective, and on an enlarged scale, of the male fuller die employed in this invention; Fig. 5 is a detail view in perspective, and on an enlarged scale, of the female fuller die employed in this invention; Fig. 6 is a detail view, on an enlarged scale and in perspective, of the die clock for truing the vanes of the drill head; Fig. 7 is a detail view in longitudinal section, of the turret dolly frame and dolly mounted therein, and the adjacent lower member of the turret guide plates employed for aligning the drill to receive the dolly; Fig. 8 is a detail view in vertical section, the section being taken on the line 8—8 in Fig. 7; and Fig. 9 is a detail view, fragmentary in form and on an enlarged scale, showing the rotary guides for holding the drills while being set by the dollies.

In the preliminary stage of forming a drill, the end of the bar on which the drill head is to be formed is placed over the female fuller die 15. The die 15 constitutes the anvil on which the male fuller die 16 drops. The die 15 has formed therein a vertical slot or recess 17. Upon the upper edge of the walls forming the recess 17 are flat surfaces 18 and 19. The surfaces 18, 19 are provided to receive the surfaces 21, 21 when the die 16 rests upon the die 15. The surfaces 19, 19 are in this position separated from the surfaces 20, 20 the thickness of the radial vanes of the drill head. The drills for which the present machine is designed are provided with four laterally extended radially disposed vanes. When in the operation of the die 16 the metal of the bar is beaten down so that the surfaces 21, 21 rest upon the surfaces 18, 18, the metal is so swaged that two vanes extend laterally between the surfaces 19, 19 and the surfaces 20, 20, while two vanes are extended vertically into the recesses 17 and 22 in the die 15 and the die 16. This operation results in roughing into shape the head for the drill.

The die 15 is provided with a dovetail extension 23 which rides into a groove formed in the anvil 24. The die 16 is rigidly secured to a piston rod 25 and mounted in a guide head 26. The piston rod 25 is provided with the usual piston head disposed in a cylinder 27. The cylinder 27 is provided with the usual automatic operating head 28, by the operation of which a rapid succession of reciprocations is imparted to the piston rod 25 and the die 16 mounted thereon. The cylinder 27 forms part of an air engine which may be of any approved type, the air supply being delivered by a pipe 28. The supply through the pipe 28 is controlled by a valve 29 which is operated from a foot pedal 30, which pedal 30 is rigidly attached to a shaft 31 mounted in suitable bearings in the sill 32 of the machine. The shaft 31 is connected with the valve 29 by means of a lever arm 33, a lever arm 34 and a connecting rod 35 pivotally attached to and extending between the said lever arms. The shaft 31 is rocked to the position wherein the valve 29 is closed, by means of a weight 36 adjustably mounted upon a rod 37 extended from the shaft 31. The cylinder 27 is of the type wherein there is normally maintained trapped air under the piston connected with the piston rod 25.

By this means the die 16 is maintained normally in position raised above the die 15.

The operation of swaging the heads of the drills to form the vanes thereof is continued until the same is ready for sizing. To size the vanes a die 39 is placed in the recess 22, the rounded head 40 of the said die extending into the cylindrical recess 41 formed at the upper end of the said recess 22. The die 39 is provided with a flattened and laterally inclined face 42, which, when struck upon the top of the vertically disposed vane shapes the top of the said vane to correspond with the inclination of the face 42. The drill is gradually rotated until each of the vanes thereof have been shaped or sized by the die 39 and the face 42 thereof.

It is to hold the die 39 in the recesses 22 and 41 that the locking plate 43 is provided. The locking plate 43 has formed thereon an extension 44 which rests upon the overturned guide plate 45 and between the hinge lugs 46, 46 formed thereon. Between the hinge lugs 46, 46 is pivotally mounted an eccentric head 47. Rigidly connected therewith is a lever 48. When the lever 48 is thrown to the position as shown in Fig. 4 of the drawings and the plate 43 is lowered so that the extension 44 thereon is between the lugs 46, the eccentric head 47 impinges upon the extension 44 and locks the plate 43 rigidly in position. In this position the plate 43 is extended to the rear of the die 39 and prevents the withdrawal of the same from the recesses 22 and 41.

When the head of the drill is thus roughly formed, the next step in the operation is to set or sharpen the cutting edges on the vanes. It is for this purpose that I employ the dollies 49, 49. It will be understood that the present machine is designed to accommodate all of the usual sizes of drills. For this purpose the machine is provided with a series of dollies 49 which are slidably mounted in annular flanges 50 extended from a hub 51, which flanges and hub constitute a turret mounted on a shaft 52. The turret when rotated into position is locked by a latch pin 53 extended through the side plates 54 of the machine. The spring for setting the pin 53 is mounted within a casing 55. The dollies are, as stated, slidably mounted in the flanges 50, a groove 56 being formed in each of the said dollies to receive a feather 57 on which the said dollies slide. Each of the dollies is provided with a suitable head 58, having formed therein die grooves 59 diametrically disposed and crossed at an angle of 90° at the center. The grooves 59 are provided to form the cutting edges of the vanes of the drill when the dolly 49 is driven against the end of the said vanes after the same have been roughed as above described.

To drive the dollies 49 against the head of the drill I have provided a weighted hammer head 60, which is rigidly mounted on a piston rod 61. The piston rod 61 is suitably provided with a piston head within a cylinder 62 of a suitable air or steam engine. The cylinder 62 is provided with an automatic head 63 to which air is admitted through a pipe 64 in a manner similar to that above described with reference to the operation of the cylinder 27 and engine connected therewith.

The supply of compressed air from the pipe 64 is controlled by a valve 65, which in turn is controlled through lever arms 66 and 67 and a connecting rod 68 pivotally attached to the said lever arms. The lever arm 67 is rigidly attached to a shaft 69, to which is rigidly attached a foot pedal 70. The foot pedal 70 is operated to open the valve 65 to admit air to the cylinder 62. The said valve is closed by a weight 71 mounted on an extended rod 72 which operates to rotate the shaft 69 to close the valve 65.

When the valve 65 is opened by means of the automatic head 63, the air is admitted to the cylinder in such a manner as to cause a rapid reciprocation of the piston rod 61 and the hammer 60 connected therewith. This operates to impart a rapid successive number of impacts upon the dolly 49 which at the time happens to be in line with the hammer 60.

The drill head is maintained in aligned position with each of the dollies by means of two turret plates 73 and 74. The turret plates 73 and 74 are each provided with a series of half circular dies 75 and 76. The plates 73 and 74 are arranged to be rotated in unison in a manner similar to the mutual rotation of gear wheels, with the result that when the dies are brought in line with the rotative centers of the two plates the two half dies unite to form a full circular die, as shown in Fig. 9 of the drawings. These dies are provided with aligning blocks 77. The blocks 77 are square cornered to fit within the recesses between the vanes of the drill as formed in the fuller dies 15 and 16. By thus holding the heads of the drills, the same are alined to present the cutting edges thereof to the grooves 59, 59 in the dollies 49. To accommodate various sizes of drills, the half dies 75 and 76 are formed to various diameters and the blocks 77 therein are shaped to correspond.

The lower turret plate 73 carrying the dies 76 is connected with the dolly turret, the hubs of the two turrets being truncated to abut at 78. This arrangement insures the constant alinement of the dies 76 corresponding to the dollies 49. The upper turret plate 74 is mounted in a yoke frame 79. The yoke frame 79 is mounted on the lower end

of a piston rod 80, which carries a piston head suitably disposed in a cylinder 81. The cylinder 81 is adapted for employment as an air pressure cylinder, the compressed air being received from a pipe 82, and controlled for admission into the said cylinder through a valve 83 which is opened and closed by a handle 84.

When in the operation the dolly turret and the lower die turret 73 are rotated to present the proper dolly and die 76 for the drill being treated, the piston rod 80, yoke frame 79 and the upper turret plate 74 are raised from contact with the said lower turret plate 73. The upper turret plate is then rotated to correspond with the lower turret plate, a latch pin 85 being withdrawn from the series of registering holes with which the turret plate 74 is provided, and the said plate shifted as stated. When the said plate 74 is adjusted, the pin 85 is released and permitted to drop into one of the said registering holes to align the plate 74, and to maintain the alinement in the successive operations and until further adjustment. The latch pin 85 and means for locking the plate thereby is of usual construction.

When employing the turret plates 73 and 74 for holding the heads of the drills being treated, and after the plates have been adjusted to any particular size of drill head under treatment, the valve 83 is so operated by the handle 84 that the piston rod 80 and frame 79 carried thereby are alternately lifted when the drill is being removed or placed in the die 76 in the lower plate 73.

The pressure applied by means of the cylinder 81 is positive, and sufficiently strong to prevent any vibration on the part of the drill head during the sharpening process, occasioned by the successive strokes of the hammer 60 upon the dollies 49. In this manner the setting and sharpening of the drill heads is quickly and accurately performed when using a machine of the character herein described.

Mounted upon an extended rail 86 is a weighted anvil 87. The anvil 87 is mounted on carrying wheels 88, 88, and is moved lengthwise on the said rails 86 by means of a chain 89, which is engaged by a pulley 90 and supported by an idler 91. The pulley 90 is driven by an internal gear wheel 92, with which the teeth of a small pinion are meshed, the pinion being formed on the end of a shaft 93, which supports a hand wheel 94 in position convenient for its manipulation by the operator in charge. The internal gear wheel 90 is mounted on a shaft 95, as seen particularly in Figs. 1 and 2 of the drawings.

The anvil 87 is provided with pockets 96 and 97 respectively. The pocket 96 is located at the forward end of the anvil 87. The pocket 97 is mounted upon an apron 98

secured to the anvil in the manner shown in Fig. 1 of the drawings. The purpose of the construction of the anvil 87 wherein are formed the two pockets 96 and 97, is to provide for a quick and ready adaptation of the machine for supporting drills of different lengths. It will be understood that when the drills are being set and sharpened by means of the dollies 49, the butt end of the drill rod rests in one or the other of the said pockets 96 or 97, and in such manner that the blow of the hammer 60 is transmitted through the dolly 49 and the drill rod, directly upon the anvil 87 and the pocket 96 or 97, as the case may be, thereby relieving the dies 75 and 76 from the strain of the impact of the hammer blow.

The bed of the machine is supported on heavy sill plates 99, 99 in which the face plate 100 of the engine embodying the cylinder 62 is mounted. The sill plates 99 in turn are supported upon the sills 32. The rails 86 of the extended frame for mounting the anvil 87 are supported at the far end by standards 101.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a rock drill making and sharpening machine, a plurality of movable turret plates having peripherally carried therein matched die members for holding the head of drills when matched; and means connecting said turret plates for moving the same in harmony.

2. In a rock drill making and sharpening machine, a plurality of rotatable turret plates having disposed in the periphery thereof a plurality of matched half dies, said dies differing in size and shape; and a synchronizing mechanism for disposing in matched relation the said dies.

3. In a rock drill making and sharpening machine, a plurality of rotatable turret plates having disposed in the periphery thereof a plurality of matched half dies, said dies differing in size and shape; a synchronizing mechanism for disposing in matched relation the said dies; and means for moving said plates to and from each other to close and open said dies.

4. In a rock drill making and sharpening machine, a rotary dolly turret having slidably mounted therein a plurality of differently shaped shaping dollies.

5. In a rock drill making and sharpening machine, a rotary dolly turret comprising separated plates having alined perforations; a plurality of dollies slidably and guidedly mounted in said plates, said dollies being shaped to differently shape the ends of drills of the character mentioned.

6. In a rock drill making and sharpening machine, a dolly turret comprising a plurality of separate disk flanges rotatable

about a common center, and having near the periphery thereof a series of perforations, said perforations in said flanges being alined; a plurality of guide members being disposed between said flanges; and a plurality of dollies slidably mounted in said perforations in guided relation with said guide members.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MARTIN McHALE. [L.S.]

Witnesses:

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GEO. U. WEST.