Dec. 15, 1931. G. H. RIBLETT 1,836,337

TEMPERING MACHINE

Filed June 13, 1931 2 Sheets-Sheet 1

Fig. 1.

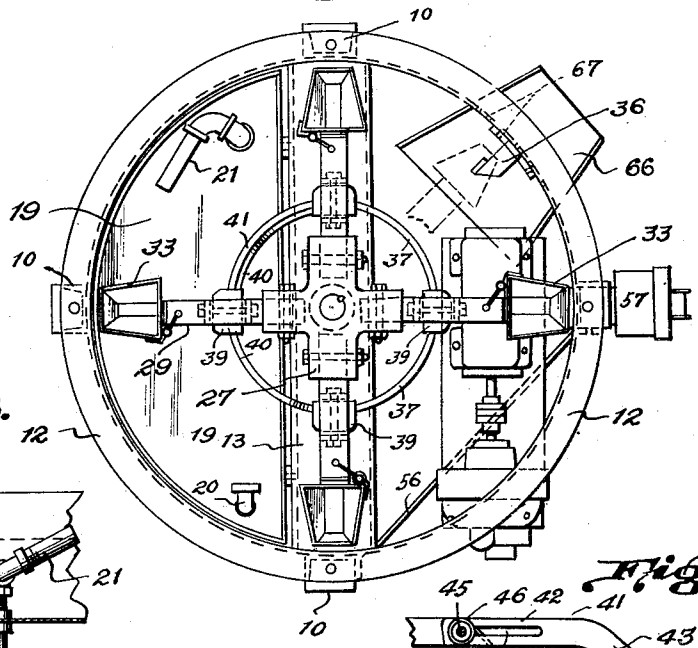


Fig. 8.

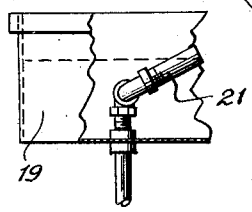


Fig. 10.

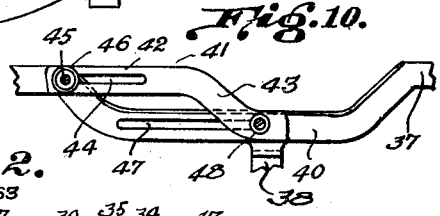


Fig. 2.

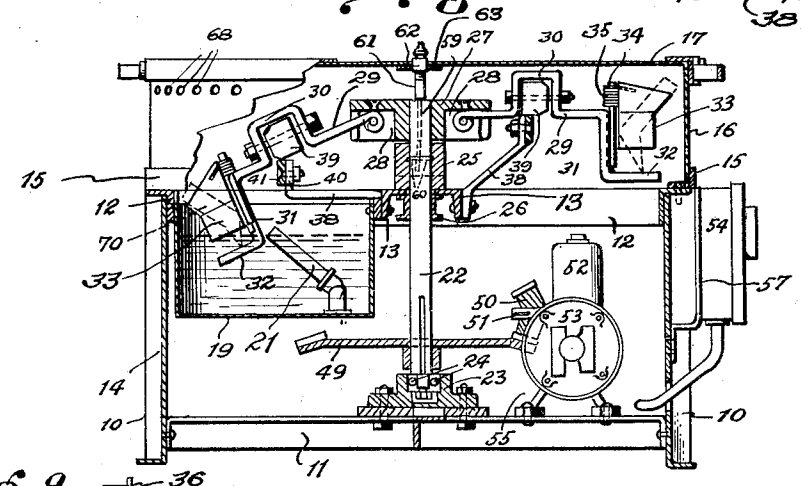
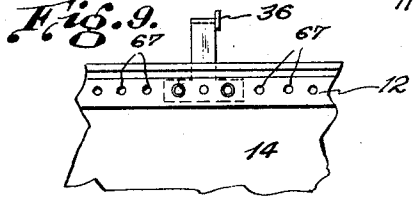


Fig. 9.



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Fig. 3.

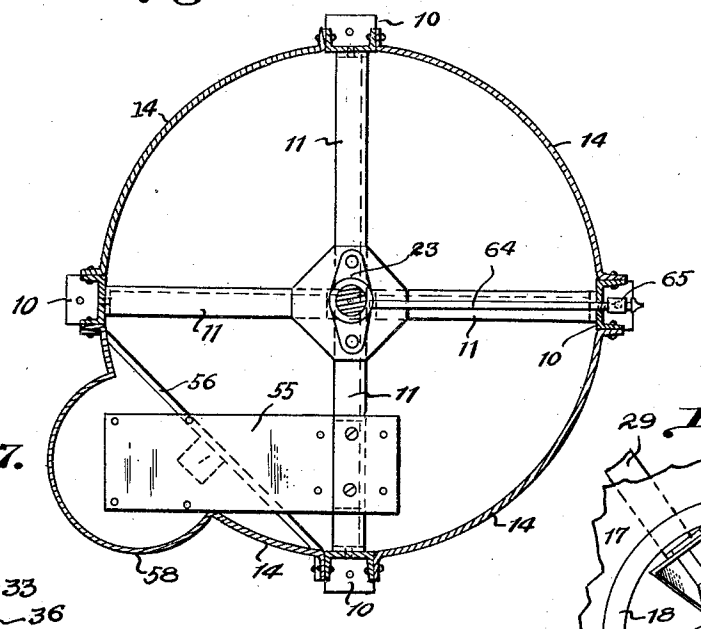


Fig. 7.

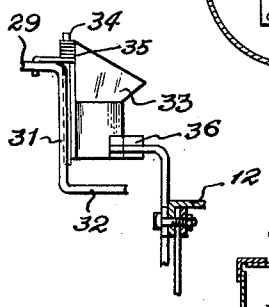


Fig. 5.

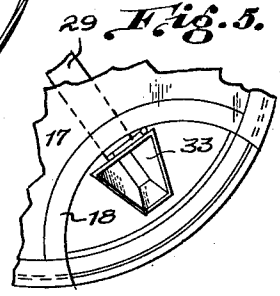


Fig. 4.

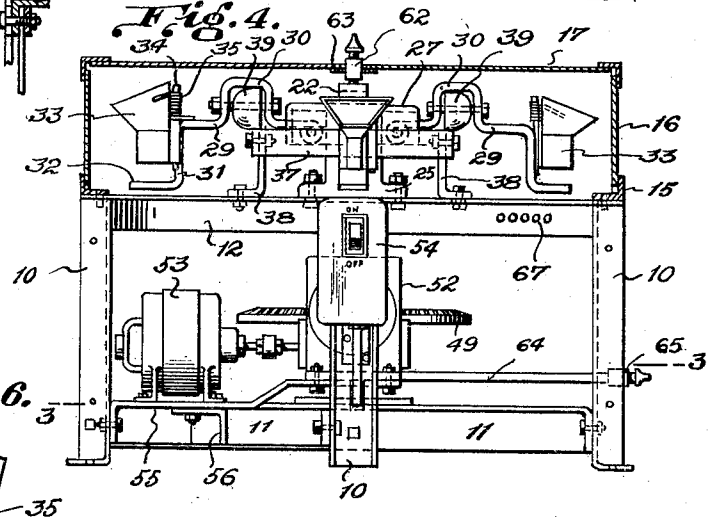
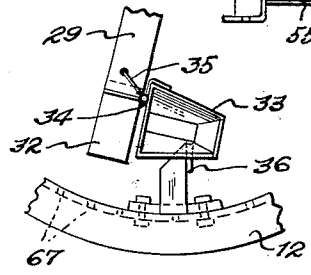


Fig. 6.



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Patented Dec. 15, 1931 1,836,337

UNITED STATES PATENT OFFICE

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TEMPERING MACHINE

Application filed June 13, 1931. Serial No. 544,237.

This invention relates to improvements in machines for tempering previously sharpened implements, such as bits for coal-cutting machines. The method ordinarily employed is carried out by hand. In this manual treatment, a bit is first heated to the required temperature and is treated in the usual manner to provide the cutting edge. After the sharpening, the heated implement is plunged into the tempering bath for the required period, it is then subjected to the temperature of the air and the metal permitted to anneal before the implement is plunged into the quenching bath for final cooling. As to the length of the tempering and annealing periods, the workman depends on his experience and judgment. As the lengths of these periods are short, from five to six seconds, the workman is liable to misjudge the time required for either treatment and there results an improper tempering or annealing of the implement and there is also a lack of uniformity in the temper of the sharpened bits. Furthermore, the workman is required to give his entire attention to the treatment of the tool from the initial heating to the final quenching. In the course of a day's work the workman is required to devote a large part of his time to the tempering and annealing of the implements.

The principal object of the instant invention is to provide a machine that operates automatically to carry out the tempering and annealing treatment so that the workman, after he has sharpened a bit, simply drops it into the machine and the tempering and annealing are performed without any further attention on his part. Provided with such a machine, the workman can give his entire time to the sharpening operation. As the machine is driven at a regular rate of speed, the periods for tempering and annealing treatments are respectively the same in successive operations, so that uniform tempering and annealing are imparted to the implements as they are successively treated. The construction and operation of the machine are described in detail hereinafter.

In the accompanying drawings, in which similar reference characters designate corresponding parts,

Figure 1 is a plan view of a machine embodying the invention, the upper part being removed.

Figure 2 is a vertical section.

Figure 3 is a horizontal section on the line 3—3 of Fig. 4.

Figure 4 is an elevation, with the upper casing in section and the plates of the lower casing removed.

Figure 5 is a detail plan view, showing a part of the cover and the chute leading to one of the implement receptacles positioned below the chute.

Figure 6 is a detail plan view showing the trip for moving a receptacle to discharge position.

Figure 7 is a side view of the same.

Figure 8 is a detail view, showing the adjustable discharge pipe for the tank.

Figure 9 is a detail view, showing the adjustable trip.

Figure 10 is a detail view, showing a development of the depressed part of the track and the auxiliary track for varying the length of the depressed part of the track.

Referring to the drawings in detail, the supporting frame of the machine comprises the four uprights 10 quadrantly positioned and a spider 11 connecting the lower parts of the uprights. Secured on the upper ends of the uprights is the flanged ring 12. Extending diametrically across the flanged ring between the upper ends of two opposite uprights is the channel beam 13. Secured between the uprights are the plates 14, curved to provide a cylindrical casing for the lower part of the machine. On the flanged ring 12 is secured a second flanged ring 15, seated in which is the upper cylindrical casing 16, suitably held in place. Extending over the cylindrical casing 16 is the removable cover 17. This cover is provided with an opening 18, the purpose of which will be explained further on. In one side of the lower casing is mounted the tank 19 approximately semi-cylindrical in shape, secured at its upper edges to the flanged ring 12 and to the channel beam 13. This tank fits in the space

between one side of the beam 13 and the opposite peripheral wall of the lower cylindrical casing. Leading to the tank is the water-supply pipe 20 and leading from the tank is the discharge pipe 21, the latter being adjustable to determine the level of the water in the tank.

Mounted in the cylindrical casing, considered as a whole, is the vertical shaft 22 coincident with the axis of the casing. The lower end of the shaft is journaled in the step 23 secured on the central part of the spider 11. Interposed between the lower end of the shaft and the step are the antifriction rolls 24. The upper part of the shaft extends through the beam 13 and is journaled in the spacing block 25 secured on the beam. On the shaft, immediately below the beam, is fixed the collar 26 to prevent upward movement of the shaft. Fixed on the upper end of the shaft is the cruciform housing 27 having a recess 28 in the under side of each of the four extensions. Hinged in each recess is the inner end of the arm 29 extending radially from the axis of the shaft. This arm is formed of a metal strip bent include the yoke 30, the vertical part 31 and the horizontal step 32. Pivoted to the vertical part 31 of the arm is the bottomless receptacle 33 by a pin 34 passing through complementary hinge parts on the receptacle and the arm. The pivotal connection is at one of the vertical corners of the receptacle so that the latter can be turned to one side. A coiled spring 35 on the upper end of pin 34 and with its ends respectively attached to the arm and to the receptacle, normally tends to hold the latter against the face of the part 31 with the open bottom of the receptacle above the step 32. When the receptacle is revolved by the arm, at a certain part of the revolution, to be explained further on, the receptacle is engaged by the trip 36 adjustably mounted on the inner face of the flanged ring 12.

Concentric with the shaft 25 is the circular track 37, held in place by the braces 38 extending from the channel beam 13. On this track ride the rollers 39 journaled in the inverted U-shaped parts or yokes 30 of the hinged arms 29. One side of the track, the part extending over the tank 19, is depressed, as at 40. When one of the arms 29 moves over the tank and its roller 39 rides on the depressed part of the track, the outer end of the arm is lowered so that the receptacle 33 carried by it travels in the tank. The length of the depressed part of the track can be regulated by the auxiliary track-section 41 mounted on the main track at the end of the depression. This auxiliary track section has a horizontal part 42 and an inclined part 43. In the horizontal part 42 is an elongated slot 44 through which extends the pin 45 projecting from the outer face of the main track. A washer 46 fast on the outer end of the pin 45 holds the auxiliary track on the pin, permitting it to slide back and forth thereon. In the adjacent part of the main track is the horizontal slot 47 and through this slot and the adjacent end of the auxiliary track extends the bolt 48 provided with a nut for clamping the two parts together. By adjusting the auxiliary section along the main track, the length of the depression in the latter can be varied. By varying the length of the depression the immersion of the receptacle carried by a passing arm can be varied.

On the lower part of the shaft 22 is splined the gear 49 meshing with the pinion 50 keyed on the shaft 51 of the speed-reducing device 52 driven by the electric motor 53 controlled by a switch at the switch-box 54. The motor, speed-reducing device and switch-box are stock material, well known in the electric art. The motor and speed-reducing device are mounted on the base-plate 55 secured on one of the arms of the spider 11 and on the brace 56 secured between two of the uprights 10. The switch-box is carried by the bracket 57 attached to one of the uprights 10. The motor and its mounting project somewhat beyond the generally cylindrical contour of the lower part of the machine casing and one of the plates 14 is shaped, as at 58, to fit over the projecting part of the motor. The drive of the motor is transmitted through the speed-reducing device and the gears 50 and 49 to the shaft 22.

Extending into the upper end of the shaft 22 is the vertical bore 59, communicating at its lower part with radial passages 60 leading to the bearing surfaces between the shaft and the spacing block 25. Threaded into the upper end of the bore 59 is the tubular receptacle 61 to contain oil for lubricating the bearing surfaces. The upper end of the receptacle is closed by the screw-cap 62 having an annular flange 63. When the cap is in closed position and the cover 17 is in place, the cap extends through a central opening in the cover and the latter rests on the flange 63. The lower bearing of the shaft is lubricated by oil from the pipe 64 leading through the lower part of the casing above one of the arms of the spider 11. The inner end of the pipe extends through the wall of the step 23 to discharge the oil between the bearing faces of the step and the shaft. The outer end of the pipe extends through one of the uprights 10 and is closed by the screw cap 65.

In the operation of the machine, the drive of the motor 53 is transmitted through the speed-reducing device 52 and the gears 49—50 to the shaft 22, to rotate the latter at the required speed. The rotation of the shaft revolves the arms 29 with the rollers 39 riding on the track 37. As the rollers travel on the raised part of the track the receptacles 33, carried by the arms, successively pass

beneath the opening 18 in the cover, and as the rollers travel on the depressed part 40 of the track the receptacles are lowered to travel through the tank 19. Water is ordinarily used for tempering and is supplied to the tank by the pipe 20 and the depth of the water is regulated by adjusting the discharge pipe 21.

In sharpening a bit, it is first heated to the required temperature and is then treated in the usual manner by the workman to produce the new cutting edge. This requires but little time and the bit retains sufficient heat for the subsequent tempering, except adjacent to the new cutting edge, which becomes somewhat cooled owing to the thinness of the metal at that part and to the sharpening treatment. The main part of the bit, owing to its comparatively large bulk, at the completion of the sharpening operation, retains sufficient heat for the tempering treatment. The heat of the main part of the bit is conducted to the edge or blade part in a few seconds after the sharpening is completed.

After a bit has been sharpened, it is immediately placed in one of the receptacles 33 as the latter passes beneath the opening 18 in the cover 17. As the receptacle continues its travel the roller 39 on its carrying arm 29 rides onto the depressed part 40 of the track 37 and the receptacle with the contained bit is lowered into the tank 19. The level of the tempering bath in the tank and the travel of the receptacle are such that only the edge part of the bit is immersed, as indicated at 70, Fig. 2, the bit being shown in dotted lines. During the travel of the receptacle from the opening 18 to the tank the heat in the main part of the bit is conducted to the previously cooled blade or edge part so that the latter is at the required temperature for tempering. As the travel of the receptacle continues, the edge part of the bit is carried through the liquid in the tank and the tempering is effected. The length of the immersion can be regulated by adjusting the auxiliary track-section or ramp 41 on the main track to vary the length of the travel of the receptacle in the tank. When the receptacle approaches the farther end of the tank, the roller 39 rides up on the inclined part of the main track or upon the adjusted ramp and the arm 29 carried by the roller is raised to a horizontal position as the roller moves onto the elevated part of the track. This raising of the arm lifts the receptacle and the contained bit from the tempering bath and as the receptacle continues its travel, it is engaged by the trip 36 and is turned on the pivot 34 against the action of the spring 35. In this movement of the receptacle, it is turned clear of the step 32 and the bit drops into the chute 66 mounted in the lower casing beneath the trip 36. The chute carries the bit to the quenching tank (not shown) to be further cooled. The interval between the time the bit emerges from the tempering tank and the time it is released from the receptacle is sufficient to permit annealing of the metal forming the bit. This interval can be varied by adjusting the strip around the flanged ring 15 and for this purpose the flanged ring 12 is provided with a series of holes 67 to receive the bolts holding the trip.

The casing including the upper and lower sections and the cover completely enclose the working parts of the machine and protect the operator against injury, it also protects the mechanism from falling objects. Extending around the upper part of the casing is a circle of vents 68 for the escape of vapors and for cooling the interior of the casing.

The machine so produced is a self-contained unit with motor and starting switch completely wired ready to operate. After the machine is started, except to drop the sharpened bits into the revolving receptacles, the operator need not give any attention to the tempering and annealing operation, as the machine is automatic in that respect and he can give his whole attention to sharpening the bits. While the machine is particularly designed for treating bits for coal-cutting machines, yet it can be employed in treating other implements.

What I claim is:

1. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and having a depressed part, a tank mounted beneath the depressed part of the track, an arm hinged to the shaft adapted to travel on the track as the arm is revolved by the rotation of the shaft, and a receptacle carried by the arm to be lowered into the tank as the arm travels on the depressed part of the track.

2. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and having relatively raised and depressed parts, a tank mounted beneath the depressed part of the track, an arm hinged to the shaft adapted to travel on the track as the arm is revolved by the rotation of the shaft, a receptacle pivotally mounted on the arm to be lowered into the tank as the arm travels on the depressed part of the track, and a trip for turning the receptacle on its pivot to discharge its load as the arm travels on the raised part of the track.

3. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and including a depressed part, a tank mounted beneath the depressed part of the track, an arm hinged at its inner end to the shaft, a roller carried by an inter-

mediate part of the arm to ride on the track as the arm is revolved by the rotation of the shaft, and a receptacle mounted on the outer part of the arm to be lowered into the tank by the lowering of the arm as the roller rides on the depressed part of the track.

4. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and including a depressed part, a tank mounted beneath the depressed part of the track, an arm hinged at its inner end to the shaft and including a yoke in its intermediate part, a roller journalled in the yoke of the arm to ride on the track as the arm is revolved by the rotation of the shaft, and a receptacle mounted on the outer part of the arm to be lowered into the tank by the lowering of the arm as the roller rides on the depressed part of the track.

5. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and including relatively raised and lowered parts, a tank mounted beneath the depressed part of the track, an arm hinged at its inner end to the shaft, a roller carried by an intermediate part of the arm to ride on the track as the arm is revolved by the rotation of the shaft, a receptacle pivotally mounted on the outer part of the arm to be lowered into the tank by the lowering of the arm as the roller rides on the depressed part of the track, and a trip mounted adjacent to the raised part of the track to engage and turn the receptacle to discharge position as the receptacle is carried past the trip by the arm with the roller riding on the elevated part of the track.

6. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and including relatively raised and lowered parts, a tank mounted beneath the depressed part of the track, an arm hinged at its inner end to the shaft, a roller carried by an intermediate part to ride on the track as the arm is revolved by the rotation of the shaft, a receptacle pivotally mounted on the outer part of the arm to be lowered into the tank by the lowering of the arm as the roller rides on the depressed part of the track, a support adjacent to the raised part of the track, a bracket adjustably mounted on the support, and a trip carried by the bracket to engage and turn the receptacle to dislodge its load as the roller and arm travel over the raised part of the track.

7. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and having relatively raised and depressed parts, a tank mounted beneath the depressed part of the track, an arm hinged at its inner end to the shaft and adapted to travel on the track as the arm is revolved by the rotation of the shaft, a step on the outer end of the arm, a receptacle having an open bottom pivoted to the arm above the step, a spring normally operated to hold the receptacle with its bottom above the step to hold the load in the receptacle, said receptacle being lowered into the tank as the arm travels the depressed part of the track, and a trip mounted adjacent to the raised part of the track to engage the passing receptacle to turn the latter against the action of the spring to clear the step to discharge the load through the open bottom of the receptacle.

8. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular track concentric with the shaft and having relatively raised and depressed parts, a tank mounted beneath the depressed part of the track, a housing fixed on the upper end of the shaft having a plurality of radial recesses, a series of arms hinged at their inner ends in the respective recesses and travelling on the track in spaced relation as the shaft rotates, and a receptacle carried by each arm to be lowered into the tank as the arm travels on the depressed part of the track.

9. In a tempering machine, the combination of a vertical shaft and means for rotating the same, with a circular main track concentric with the shaft and having relatively raised and depressed parts, a tank mounted beneath the depressed part of the track, an arm hinged to the shaft adapted to travel on the track as the arm is revolved by the rotation of the shaft, an auxiliary track-section adjustably mounted on the main track to vary the length of the depressed part of the main track, and a receptacle carried by the arm to be lowered into the tank as the arm travels on the depressed part of the track adjusted as to length by the auxiliary track-section.

In testimony whereof I affix my signature.

GUY H. RIBLETT.