C. R. HAZEL.

GLASS STIRRING MACHINE.

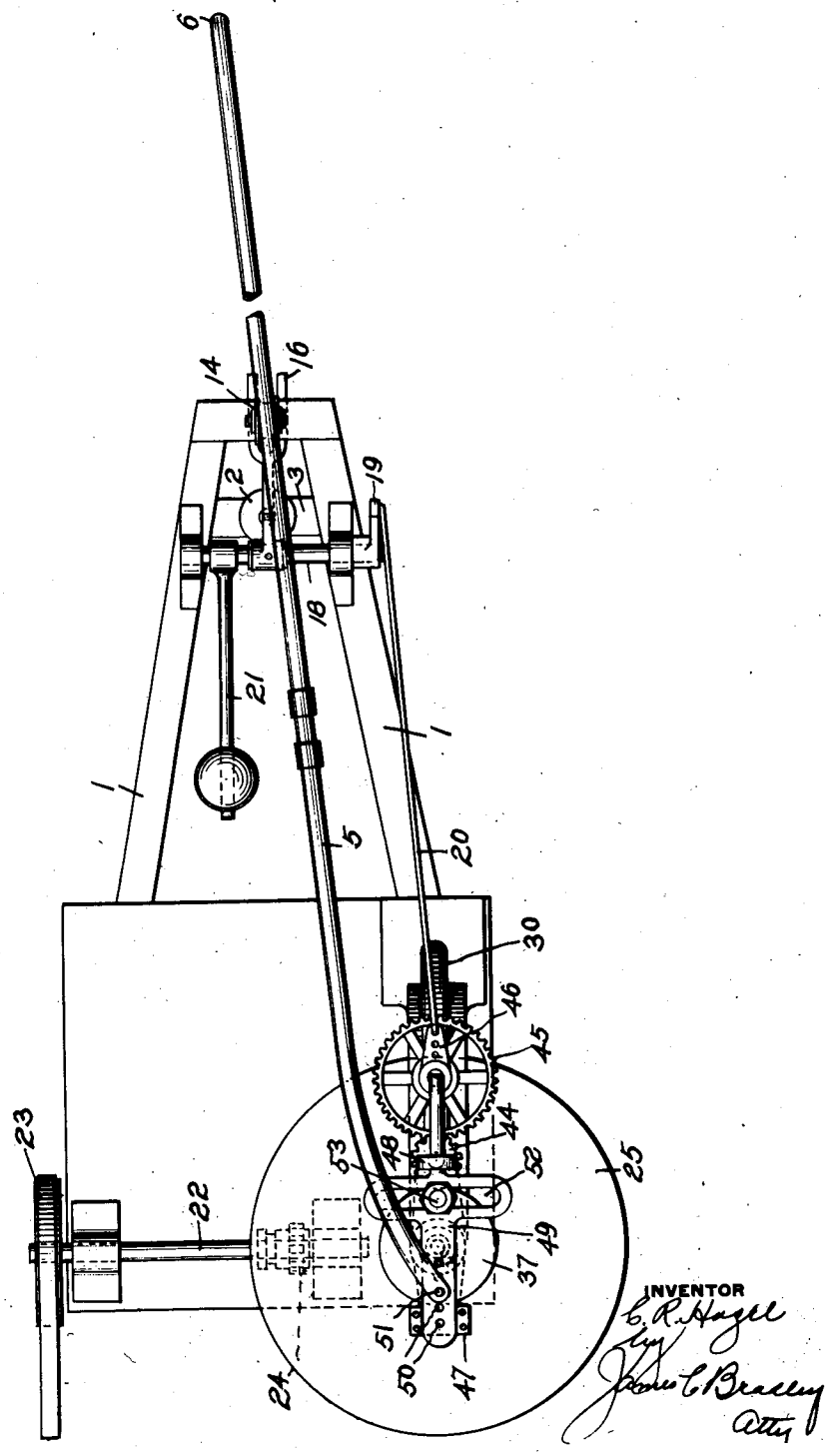
APPLICATION FILED MAY 18, 1918.

1,361,853.

Patented Dec. 14, 1920.

3 SHEETS—SHEET 1.

FIG. 1.



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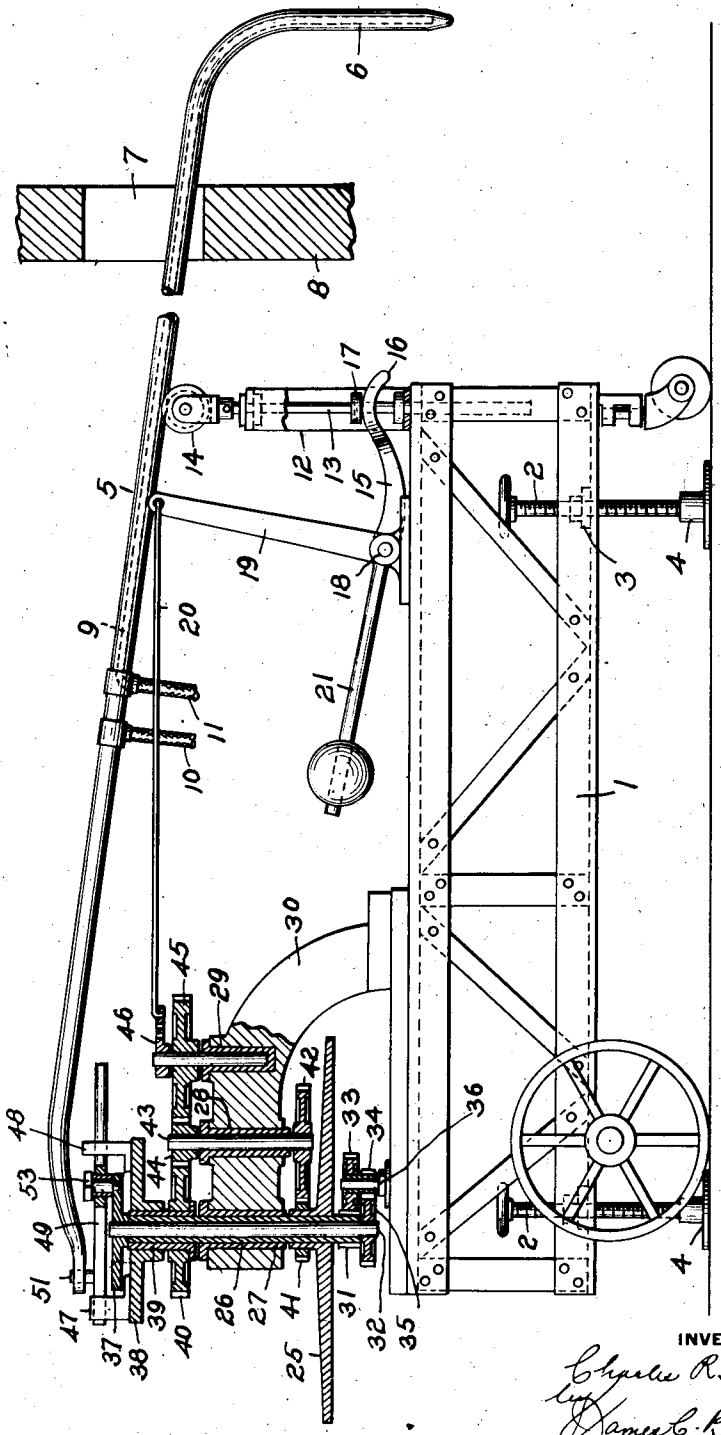
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3 SHEETS—SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

FIG.3.

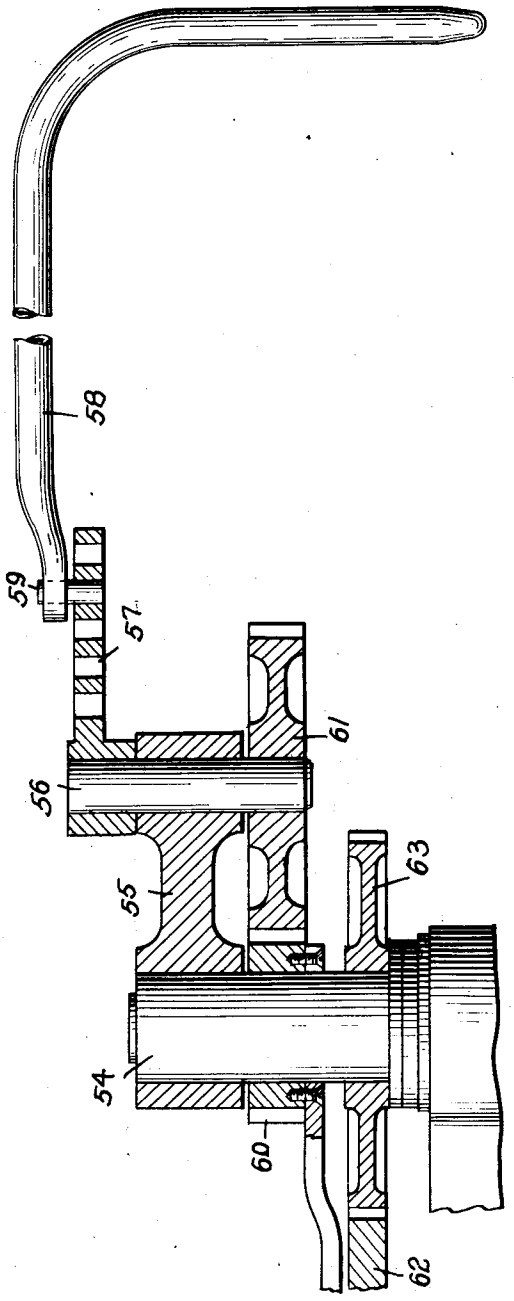
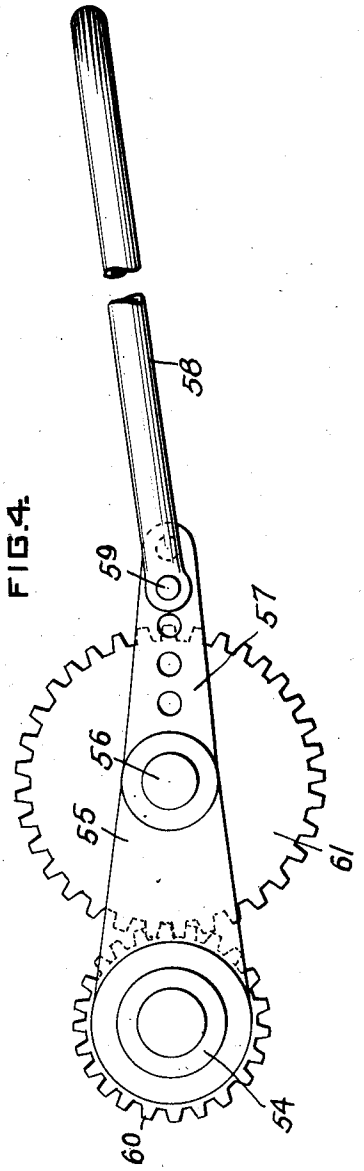


FIG.4.



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UNITED STATES PATENT OFFICE.

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GLASS-STIRRING MACHINE.

1,361,853. Specification of Letters Patent. Patented Dec. 14, 1920.

Application filed May 18, 1918. Serial No. 235,224.

To all whom it may concern:

Be it known that I, CHARLES R. HAZEL, a citizen of the United States, and a resident of Charleroi, in the county of Washington and State of Pennsylvania, have made a new and useful Invention in Glass-Stirring Machines, of which the following is a specification.

The invention relates to machines for stirring molten glass. It has for its principal objects; the provision of an improved machine wherein the stirring element is given a path of travel such as to give a complete agitation of the body of glass; the provision of a machine in which the path of travel of the stirring element is constantly changed and in which the path of travel is not repeated to the end that a maximum quantity of the glass is exposed to the action of the stirring element; and in general the provision of a machine, simple in construction, efficient in action, and requiring a minimum amount of attention and repair. Certain embodiments of the invention are illustrated in the accompanying drawings wherein:

Figure 1 is a plan view of the apparatus, Fig. 2 is a partial side elevation and partial section taken through the apparatus, Fig. 3 is a section through a part of a modified form of apparatus, and Fig. 4 is a plan view of the apparatus of Fig. 3.

The apparatus is particularly designed for use in the manufacture of glass which requires very thorough agitation, such as optical glass, and this agitation is secured by means of a stirring rod having its end down turned, and adapted to be inserted through the opening of the usual type of covered pot. Briefly stated the mechanism comprises a power driven device adapted to give the end of the stirring rod or element a circular movement with a constantly changing center and also an up and down movement. The preferred embodiment of the invention is illustrated in Figs. 1 and 2, to which attention is now directed.

The apparatus is preferably mounted upon a truck 1, so that the machine may be conveniently moved from place to place. In order to provide for the vertical adjustment of the machine to meet varying requirements the frame is provided with a plurality of jack screws 2, working in the nuts 3, on the frame and swiveled at their lower ends in the foot members 4.

The stirring rod 5 is provided with the down turned end 6 projecting through the opening 7 in the pot 8. As is customary, this stirring rod is made hollow and provided with a smaller pipe 9 upon its interior and a pair of hose connections 10, 11, so that the rod may be cooled by the circulation of water.

A yoke 12 is provided at the forward end of the machine, which yoke has swiveled therein the vertical rod 13 carrying at its upper end the grooved roller 14. This roller acts as support for the rod 5 and provides for the universal movement of the rod. The rod 13 is moved by means of a lever 15 having a forked end 16 fitting across the rod beneath the collar 17. This lever is carried by a transverse shaft 18, which shaft is provided with another lever 19 operated from a connecting rod 20 as hereinafter set forth. The weight of the stirring rod is counterbalanced by means of the counterweight lever 21.

The mechanism shown at the left hand end of the machine for giving the stirring rod its desired movement is driven from the transverse shaft 22 shown in Fig. 1, such shaft being provided at one end with a pulley 23 driven from the belt shown and at the other end with the friction drive member 24. This friction drive member engages the under side of the friction disk 25. The friction disk 25 is keyed to the sleeve 26, and such sleeve rotates in the bushing 27. The bushing 27, as well as the bushings 28 and 29, are mounted in the bearing bracket 30, rigidly secured to the upper side of the truck framework.

The sleeve 26, on which the disk 25 is mounted, is provided at its lower end with a pinion 31 and a movement of rotation is imparted to the shaft 32 by means of the train gearing including the spur gears 33, 34 and 35, the latter gear being keyed to the shaft 32, while the gears 33 and 34 are keyed to a common sleeve mounted to rotate upon the bearing pin 36, such bearing pin being secured to the top of the truck. This gearing arrangement imparts a movement of rotation to the disk 37 carried at the upper end of the shaft 32, such movement of rotation being relatively slow because of the train of reducing gearing 31, 33, 34 and 35.

At the upper end of the shaft 32 is mounted a plate 38 keyed to the sleeve 39, such

sleeve being mounted for rotation on the sleeve 26. The spur gear 40 is also keyed to the sleeve 39, and a movement of rotation is imparted to such gear 40 from the disk 25 by means of the train of gearing including the spur gear 41 keyed to the hub of the disk, the gear 42, the shaft 43 and the pinion 44 keyed to the upper end of the shaft 43.

The pinion 44 also rotates the gear 45, such gear being provided at its upper end with the crank 46 to which the connecting rod is attached. The crank 46 is provided with a plurality of attaching openings at varying distances from the axis of the crank so that the length of throw of the crank may be varied, thus varying the extent of the vertical movement of the stirring rod 5.

The plate 38 is provided with a pair of upwardly projecting guide members 47 and 48, and mounted in these members for reciprocation is the cross head 49. This cross head is provided, as shown in Fig. 1, with a plurality of holes 50, any one of which is adapted to receive the pin 51 carried by the rear end of the stirring rod 5, thus providing a means for adjusting the lateral movement of the stirring rod. The forward end of the cross head is provided with a transverse guide in the form of a slot 52, which slot carries the crank pin 53 secured to the disk 37.

The gearing arrangement is such that the disk 37 and plate 38 move in the same direction, the plate making eight revolutions to seven by the disk. The pin 53 is thus in effect rotated with respect to the cross head once for each eight revolutions of the cross head, and the cross head is reciprocated correspondingly, the movement of reciprocation in one direction equaling twice the radius of rotation of the pin 53. The distance of the pin 51 carrying the end of the stirring rod is thus constantly shifted either toward or away from the axis of rotation of the cross head, so that the end of rod describes a spiral path. When the parts are in the position of Fig. 1 the pin 51 is at a minimum distance from the axis of rotation of the cross head, the distance becoming a maximum when the pin 53 is rotated one hundred and eighty degrees.

During the movement of the rod as above described which is in substantially a horizontal plane, the rod is given an up and down movement by means of the lever 15 co-acting with the rod 13. The arrangement of gearing is such that approximately one up and down movement of the rod is given for each complete revolution of the plate 38. The gears 45 and 40 are, however, preferably of slightly different size so that the up and down movement of the rod is varied constantly with respect to the rotary movement of the end of the rod. The path of the end of the stirrer is thus made a constantly varying one and the degree of mixing secured is made more complete than if the stirrer were given a more constant or uniform path of movement.

The operation briefly restated is as follows: The drive shaft 22 causes the rotation of the friction disk 25, thus rotating the gear 41, and the rotation of gear 41 causes the rotation of the gear 42 which drives the shaft 43 and the gear 44 carried thereby. The latter gear drives the gear 40, thus rotating the plate 38 mounted for rotation on the sleeve 26. The sleeve 26 drives the shaft 32 by means of the train of reducing gearing 31, 33, 34 and 35, so that the disk 37 carried thereby is rotated, such rotation being in the same direction as that of the plate 38 but slightly slower as heretofore explained. At the same time an up and down movement of the stirring rod is provided by means of the rod 20 and crank arms 19 and 15, the rod being operated from the crank 46, which is rotated from the gear 45 meshing with the gear 44. The disk 37 and plate 38 coöperate to give the cross head a movement of rotation and a gradual reciprocation, so that the distance between the pin 51 and the axis of rotation of the cross head is constantly increased and then decreased, giving a spiral movement to the end of the rod.

Figs. 3 and 4 illustrate a modification designed to give a movement to the rear end of the stirring rod, somewhat similar to that described above, but not in a spiral, the curves produced having equal radii, with constantly shifting centers. The rest of the mechanism is substantially the same as heretofore described in connection with Figs. 1 and 2. In this construction 54 is the operating shaft which is keyed to the crank 55. Mounted for rotation in the end of this crank is the pin 56 carrying the crank arm 57 to which the rear end of the stirring rod 58 is pivoted by means of the pin 59. The shaft 56 is driven from the shaft 54 by means of the pinion 60 meshing with the spur gears 61 carried upon the lower end of the shaft. The shaft 54 is driven by a gear 62 meshing with the gear 63. It will be seen that by this arrangement the crank 57 is slowly rotated during the rotation of the crank 55 so that the rear end of the stirring rod is made to describe a series of circles all with different centers.

What I claim is:

1. In combination in a glass stirring machine, a stirring rod having a pivotal support intermediate its ends, means for moving one end of the rod in a constantly shifting path of rotation and means whereby the pivotal support is moved up and down.

2. In combination in a glass stirring machine, a stirring rod having a pivotal support intermediate its ends, means for mov-

ing one end of the rod in a constantly changing path of rotation, and means whereby the pivotal support is moved up and down during the circular movement, but with a cycle which is non-synchronous with respect to the rotary movement of the end of the rod.

3. In combination in a glass stirring machine, a stirring rod mounted intermediate its ends for pivotal and longitudinal movement, a rotary operating member, a cross head mounted for reciprocation on the operating member and to which the rod is pivoted, a pivot for the cross head off center with respect to the center of rotation of the operating member, and means for shifting said pivot circumferentially to vary the path of rotation of the pivotal connection between the cross head and rod.

4. In combination in a glass stirring machine, a stirring rod mounted intermediate its ends for pivotal and longitudinal movement, a rotary operating member, a cross head mounted for reciprocation on the operating member and to which the rod is pivoted, a pivot for the cross head off center with respect to the center of rotation of the operating member, and means whereby the said pivot is constantly shifted circumferentially with respect to the axis of rotation of said operating member.

5. In combination in a glass stirring machine, a stirring rod mounted intermediate its ends for pivotal and longitudinal movement, a rotary operating member, a cross head mounted for reciprocation on the operating member and to which the rod is pivoted, a pivot for the cross head off center with respect to the center of rotation of the operating member, a guide on the cross head transverse to the direction of reciprocation of the cross head, and a pivot engaging said guide and mounted for rotation about the axis of rotation of said operating member.

6. In combination in a glass stirring machine, a stirring rod mounted intermediate its ends for pivotal and longitudinal movement, a rotary operating member, a cross head mounted for reciprocation on the operating member and to which the rod is pivoted, a pivot for the cross head off center with respect to the center of rotation of the operating member, a guide on the cross head transverse to the direction of reciprocation of the cross head, a pivot engaging said guide and mounted for rotation about the axis of rotation of said operating member, and means whereby said operating member is given a different rate of rotation from that of said pivot.

7. In combination in a glass stirring machine, a stirring rod having a pivotal support intermediate its ends, means for moving one end of the rod in a circular path with a constantly changing radius of rotation, and means whereby the pivotal support is moved up and down.

8. In combination in a glass stirring machine, a stirring rod having a pivotal support intermediate its ends, and means for moving one end of the rod in a circular path with a constantly changing radius gradually increasing and then gradually decreasing, so that the movement of said end follows a spiral path.

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