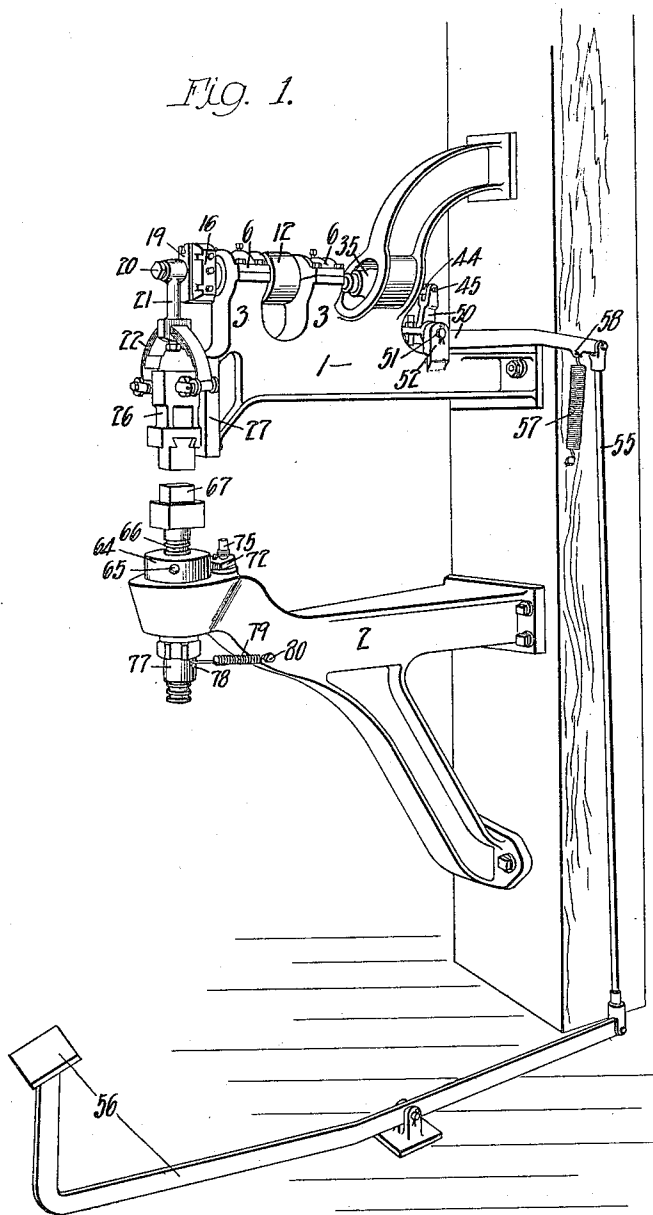


1,154,666.

H. C. SMITH.
POWER HAMMER.
APPLICATION FILED NOV. 20, 1914.

Patented Sept. 28, 1915.
3 SHEETS—SHEET 1.



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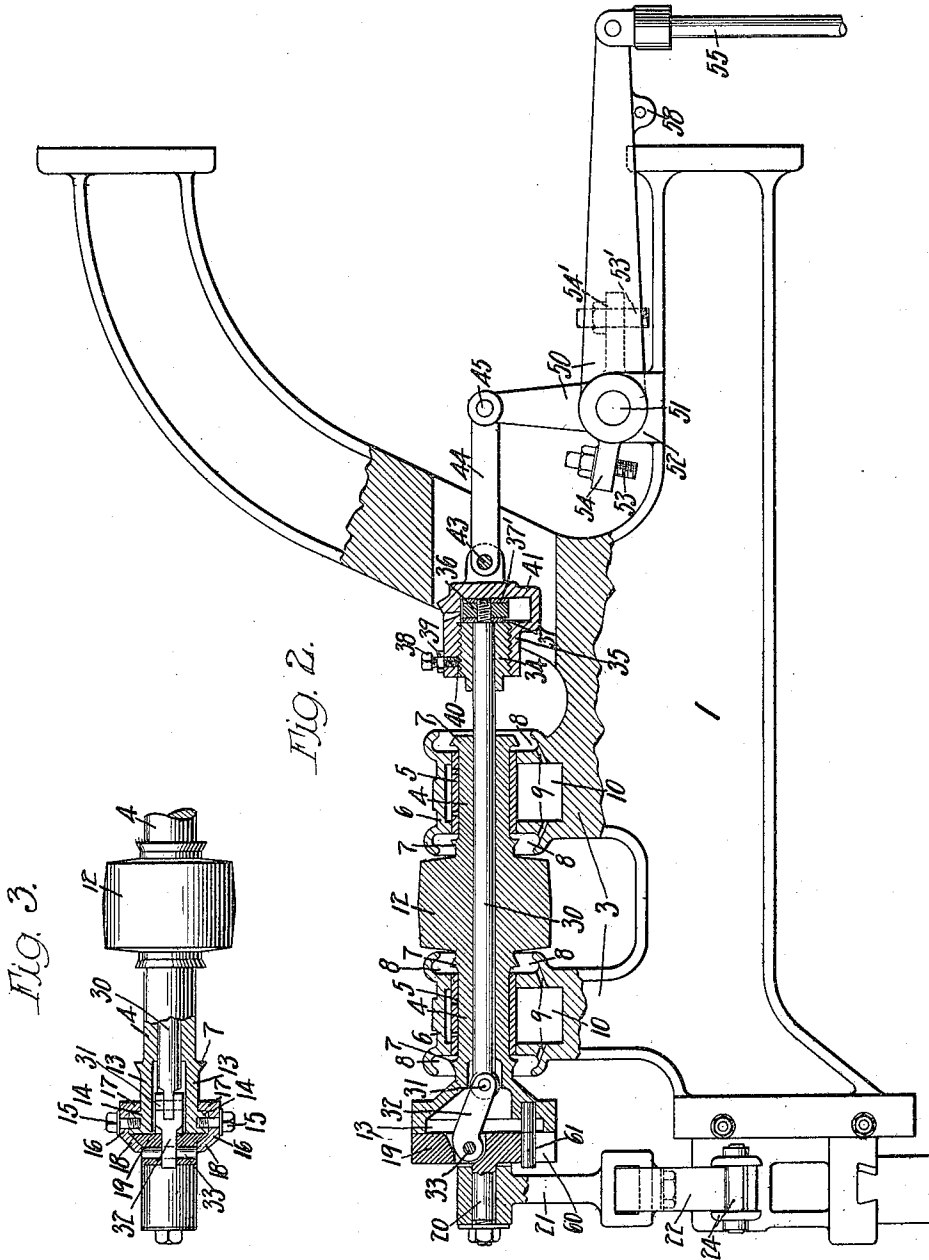


Fig. 3.

Fig. 2.

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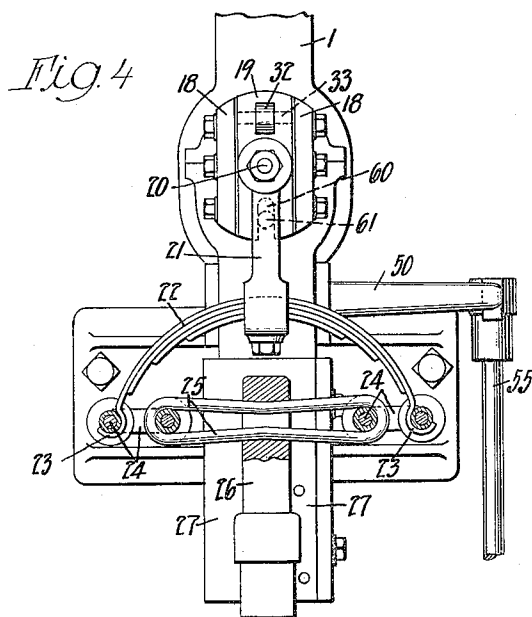


Fig. 5

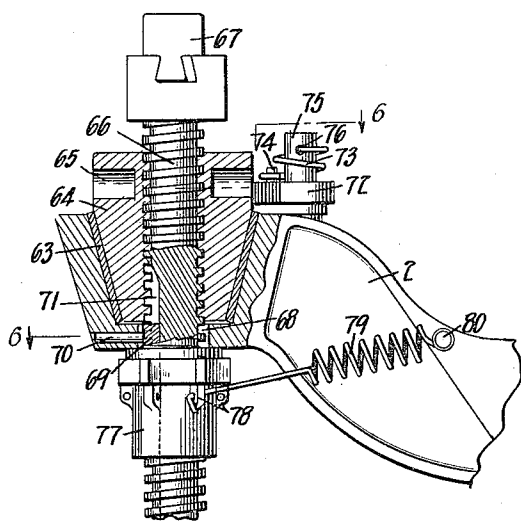
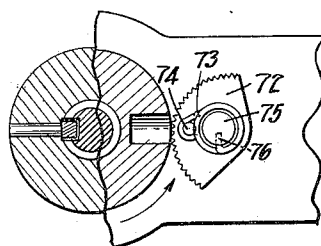


Fig. 6



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UNITED STATES PATENT OFFICE.

HENRY COLLIER SMITH, OF DETROIT, MICHIGAN.

POWER-HAMMER.

1,154,666.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY COLLIER SMITH, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Power-Hammer, of which the following is a specification.

This invention relates to power hammers and some of its objects are to provide means whereby the stroke of the hammer may be varied while the shaft that drives the hammer is in motion; to provide means for automatically causing the stroke to become zero when the operator leaves the machine or ceases to control the hammer; to provide means for adjusting the anvil, for maintaining it in adjusted position, and for preventing it from rebounding; and to improve the construction of the machine generally.

The invention consists in the means for accomplishing the above mentioned objects shown, described and particularly pointed out in the subjoined claims.

In the drawings, Figure 1 is a perspective view of one embodiment of my invention. Fig. 2 is a side elevation of the upper or hammer bracket, parts being broken away to show the construction of the hammer-operating means. Fig. 3 is a plan view of the pulley shaft and crank head, parts being broken away. Fig. 4 is a front elevation of the hammer and hammer bracket, parts being broken away. Fig. 5 is a vertical longitudinal section of the end of the anvil support. Fig. 6 is a view on the line 6—6 of Fig. 5.

Similar reference characters refer to like parts throughout the several views.

In the embodiment shown, the hammer and anvil are carried, respectively, in brackets 1 and 2 that may be attached to a post or other support in any desired manner. The brackets may be given various forms, but the upper or hammer bracket preferably includes a pair of upstanding bearing boxes 3 in which a pulley shaft 4 may be supported by bushings 5, held in place by caps 6. These bearings may be of the ring-oiling type (the rings not being shown), and the pulley shaft may be provided with the circumferential flanges 7, the function of which is to direct lubricant that has passed through the bearings into the annular cups 8 at each end thereof. From the cups, the lubricant flows through passages 9 back into the wells 10 of the bearing boxes.

The pulley shaft has formed integrally therewith, or secured rigidly thereto, preferably at a point between the bearings, the pulley 12, and its front end is extended laterally to form spaced walls 13, each of which is provided with a flange 14 (Fig. 3). Bolts 15 serve to clamp to these flanges the guides 16 comprising ribs 17, that engage behind the flanges 14, and inclined portions 18 between which and the front faces of the walls 13 the crank arm 19 is arranged to slide. Integrally formed with, or otherwise secured to the crank arm, is a forwardly projecting crank-pin 20, from which a connecting rod 21 extends to and supports the central portion of the leaf-spring 22. The ends of the latter are made concave, as indicated at 23, and engage the loops 24, thus tensioning the flexible strap 25 (of leather or other suitable material) from which the hammer 26 is hung. This hammer is vertically reciprocable in guides 27 of well known form.

The crank arm and pin are reciprocable in the guides 16, and the stroke of the hammer is thus controlled by mechanism that will now be described:—Extending longitudinally through an axial bore formed in the pulley shaft is the rod 30, to the front end of which is pivotally connected at one end of a link 32, the opposite end of the latter being in turn pivoted to the crank arm at 33. It is obvious that if the rod is moved in either direction through the pulley shaft, the crank pin will be moved in the guides 16 toward or from the axis of the pulley shaft, thus diminishing or increasing the stroke of the hammer, as the case may be. The rear end of the rod 30 is received in a bore of the screw plug 34 that is threaded into a cavity formed in the housing 35; and the extreme rear end of the rod is preferably reduced and has threaded thereon a collar 36 between which and the plug and housing the hard washers 37 and 37' respectively, may be interposed. The plug may be locked in adjusted position by the set-screw 38 and lock-nut 39 and may have its outer end squared to allow the application of a wrench. A soft filling 40 of copper, or the like, is preferably interposed between the end of the set-screw and the threads on the plug. The housing may be provided with an oil well 41. From the foregoing it will be seen that the rod and collar are rotatable in the plug and hous-

ing, and that a longitudinal movement of the housing in either direction is transmitted undiminished to the rod.

Pivotally connected at 43 to the housing is one end of a link 44, the opposite end of which is pivoted at 45 to one arm of a bell crank 50, mounted to turn about a pivot 51, the latter being supported, if desired, in ears 52 formed on the bracket 1. The movement of the bell crank in counterclockwise direction is limited by the set-screw 53 that passes through the lug 54 on the bell crank and is arranged to engage with the bracket, whereby the possibility of striking an undesirably heavy blow is avoided; and the movement of the bell crank in the opposite direction is similarly limited by the set-screw 53' that is threaded in the lug 54'. The bell crank may be swung in counterclockwise direction (Fig. 2) to throw the crank-pin off center by means of the link 55 and treadle 56 in an obvious manner. Should the foot of the operator be removed from the treadle, the bell crank will immediately be swung in a clockwise direction by the spring 57, one end of which may pass through an ear 58 and the other end of which may be anchored to the pin 59 driven into the support. In order, however, to prevent the crank-pin 20 from thereby being carried over beyond the axis of the driving shaft, the crank-arm is preferably slotted at 60 to receive the pin 61 carried by the front end of the pulley shaft. It will, therefore, be seen that whenever the treadle is free no stroke will be imparted to the hammer although the shaft is driven continuously.

The outer end of the lower bracket 2 has formed therein a conical depression in which rests, preferably upon a bushing 63, a conical adjusting nut 64, the upper end of which may be perforated, as indicated at 65, to allow the insertion of a turning rod (not shown). The nut is threaded to receive a screw 66 that supports at its upper end any desired type of anvil 67; and the lower end of the screw extends downwardly through an opening 68 in the bracket. Projecting inwardly from the wall of the opening is a key 69, the shank 70 of which is received in a hole in the bracket and the blade of which is inserted in a keyway 71 formed in the screw. The key thus prevents the screw from turning about its axis. Any tendency of the adjusting nut 64 to turn about its axis in the direction of the arrow (Fig. 6) (which is caused by blows upon the anvil) is resisted by the serrated cam 72, the teeth of which are held in engagement with the nut by the spring 73, one end of which is connected to a pin 74 projecting from the cam, and the other end of which is wrapped around a pivot 75, about which the cam may turn, and inserted in a hole therein, as shown at 76. The screw and conical nut are

prevented from rebounding from the bracket 2 by the set-nut 77 that is preferably provided with a series of perforated ears 78 through which one end of a tension spring 79 may be inserted. The opposite end of the spring may be secured rigidly to the bracket by the pin 80. The tendency of this spring is to hold the nut screwed up into close engagement with the lower surface of the bracket.

When the parts are to be assembled on the anvil bracket, the key 69 is raised into the hole 68 and its shank is inserted into the opening in the bracket. The nut 64 is threaded upon the screw 66, the key-way 71 is brought into alinement with the key, and the nut and screw are lowered until the nut comes into contact with the bushing 63. The nut 77 is then turned on the screw from below and brought up into clamping engagement with the bracket, after which the spring 79 is made fast to the proper ear 78 to hold the nut tightly against the bracket.

It is clear that many changes may be made in the details of construction without departing from the spirit of my invention; and it is also obvious that the working tool which is actuated by the shaft might be other than a hammer, for example, a percussion drill. I do not, therefore, wish to be limited otherwise than as indicated by the subjoined claims.

I claim:—

1. A device for striking blows comprising a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a connecting rod for transmitting movement from the crank-pin to the blow-striking member, and manually operable means for moving the rod longitudinally of the shaft whereby the stroke of the blow-striking member may be varied while the driving shaft is in motion.

2. A device for striking blows comprising a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a

connecting rod for transmitting movement from the crank-pin to the blow-striking member, manually operable means for moving the rod in a direction such as to cause the crank-pin to move away from the axis of the shaft, means tending to move the rod in the opposite direction whereby the crank-pin is caused to move back toward the axis of the shaft when the manually operable means is allowed to become inoperative, and means for limiting the said backward movement of the crank-pin.

3. A device for striking blows comprising a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a connecting rod for transmitting movement from the crank-pin to the blow-striking member, manually operable means for moving the rod longitudinally of the shaft whereby the stroke of the blow-striking member may be varied while the driving shaft is in motion, a spring tending to move the rod in one direction, and means for limiting the movement that may be imparted to the rod by the spring.

4. A device for striking blows comprising a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a connecting rod for transmitting movement from the crank-pin to the blow-striking member, manually operable means for moving the rod in a direction such as to cause the crank-pin to move away from the axis of the shaft, a spring tending to move the rod in the opposite direction whereby the crank-pin is caused to move back toward the axis of the shaft when the manually operable means is allowed to become inoperative, and means for limiting the said backward movement of the crank-pin whereby the crank-pin is prevented from passing beyond the axis of the driving shaft.

5. A device for striking blows comprising a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide

extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a connecting rod for transmitting movement from the crank-pin to the blow-striking member, manually operable means for moving the rod in a direction such as to cause the crank-pin to move away from the axis of the shaft, means tending to move the rod in the opposite direction whereby the crank-pin is caused to move back toward the axis of the shaft when the manually operable means is allowed to become inoperative, said driving shaft and said crank-arm constituting two members, means carried by one of the last-mentioned members coöperating with means on the other member whereby the crank-pin is prevented from passing beyond the axis of the shaft in its backward movement.

6. A device for striking blows comprising a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a connecting rod for transmitting movement from the crank-pin to the blow-striking member, manually operable means for moving the rod in a direction such as to cause the crank-pin to move away from the axis of the shaft, means tending to move the rod in the opposite direction whereby the crank-pin is caused to move back toward the axis of the shaft when the manually operable means is allowed to become inoperative, said driving shaft and said crank-arm constituting two members, a pin carried by one of the last mentioned members coöperating with a slot on the other member whereby the crank-pin is prevented from passing beyond the axis of the shaft in its backward movement.

7. A device for striking blows comprising a rotatable driving shaft, a rod movable longitudinally of the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, means connecting said rod and crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is

made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a lever, means connecting the rod and the lever whereby a movement of the lever causes longitudinal movement of the rod but allows the rod to rotate about its own axis, means for normally holding the rod in such position that the crank-pin lies in the axis of the driving shaft, and manually controlled means for moving the lever in one direction to cause the crank-pin to depart from the axis of the shaft.

8. A device for striking blows comprising a rotatable driving shaft, a rod movable longitudinally of the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, means connecting said rod and crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a blow-striking member, a lever, a housing connected to the lever and embracing the rod, the arrangement being such that the rod is allowed to rotate in the housing but prevented from moving longitudinally in respect thereto, a spring for normally holding the rod in such position that the crank-pin lies in the axis of the driving shaft, the lever being manually movable against the force of the spring to cause the crank-pin to depart from the axis of the shaft whereby the length of the stroke of the striking member may be varied.

9. A device for striking blows comprising a rotatable driving shaft, a rod movable longitudinally of the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, means connecting said rod and crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank arm in respect to said driving shaft, a blow-striking member, a lever, a housing connected to the lever and embracing the rod, the arrangement being such that the rod is allowed to rotate in the housing but prevented from moving longitudinally in respect thereto, a spring for normally holding the rod in such position that the crank-pin lies in the axis of the driving shaft, and a treadle for manually moving the lever in one direction against the force of the spring to cause the crank-pin to depart from the axis of the shaft whereby the length of the stroke of the striking member may be varied.

10. A device for striking blows comprising a driving shaft, a member movable longi-

tudinally of the driving shaft, a crank-pin operatively connected to said member and movable thereby transversely in respect to the axis of the driving shaft, a blow-striking member operatively connected to said crank-pin, means for moving the longitudinally movable member in respect to the shaft to cause the crank-pin to depart from the axis of the shaft whereby the stroke of the blow-striking member is increased, means for limiting the distance the crank-pin may be moved from the axis, and means for normally holding the crank-pin in the axis of the shaft.

11. A device for striking blows comprising a driving shaft, a blow-striking member reciprocable radially in respect to said shaft, means for guiding the blow-striking member in its reciprocatory movement, a crank-pin, means connecting the crank-pin and the blow-striking member whereby the former constitutes a support for the latter, means carried by the driving shaft and movable in a plane at an angle to the shaft for supporting the crank-pin, and means movable longitudinally of the driving shaft and operatively connected to the crank-pin supporting means, whereby the stroke of the crank-pin may be varied at will while the driving shaft is in rotation to cause the blow-striking member to strike blows of desired intensity.

12. A device for striking blows comprising a driving shaft, a blow-striking member reciprocable radially in respect to said shaft, a crank-pin, means connecting the crank-pin and the blow-striking member whereby the former constitutes a support for the latter, means movable longitudinally of the driving shaft and operatively connected to the crank-pin, whereby the stroke of the latter may be varied at will while the driving shaft is in rotation to cause the blow-striking member to strike blows of desired intensity.

13. A device for striking blows comprising a driving shaft, a blow-striking member reciprocable radially in respect to said shaft, a crank-pin, means connecting the crank-pin and the blow-striking member whereby the former constitutes a support for the latter, means movable longitudinally of the driving shaft and operatively connected to the crank-pin, whereby the stroke of the latter may be varied at will while the driving shaft is in rotation to cause the blow-striking member to strike blows of desired intensity, and means for normally causing the crank-pin to assume a position wherein no stroke is imparted to the blow-striking member by the rotation of the driving shaft.

14. A device for striking blows comprising a driving shaft, a member movable longitudinally in respect to said shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank arm

movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, means operatively connecting the longitudinally movable member with the crank arm whereby longitudinal movement of the former causes the latter to move transversely in respect to the driving shaft, a blow-striking member, means for transmitting movement from the crank-pin to the blow-striking member, and manually operable means for manipulating the longitudinally movable member whereby the stroke of the blow-striking member may be varied while the shaft is in motion.

15 15. In combination, a driving shaft, a member reciprocable radially in respect to said shaft, a crank-pin, means connecting the crank-pin and the reciprocable member whereby the former constitutes a support for the latter, means carried by the driving shaft and movable in a plane at an angle to the shaft for supporting the crank-pin, and means movable longitudinally of the driving shaft and operatively connected to the crank-pin supporting means, whereby the stroke of the crank-pin may be varied at will while the driving shaft is in rotation to cause the stroke of the reciprocable member to assume a desired length.

30 16. In combination, a driving shaft, a rod movable longitudinally in respect to the driving shaft, a guide extending transversely of the driving shaft and secured to rotate therewith, a crank-arm movable in said guide transversely of the driving shaft, a crank-pin carried by said arm, a link pivoted to the rod and to the crank-arm whereby longitudinal movement of the rod in respect to the driving shaft is made to cause a transverse movement of the crank-arm in respect to said driving shaft, a reciprocable member, a connecting rod for transmitting movement from the crank-pin to the reciprocable member, manually operable means for moving the rod in a direction such as to cause the crank-pin to move away from the axis of the shaft, means tending to move the rod in the opposite direction whereby the crank-pin is caused to move back toward the axis of the shaft when the manually operable means is allowed to become inoperative, and means for limiting the said backward movement of the crank-pin.

55 17. In combination, a driving shaft, a member reciprocable radially in respect to said shaft, means for guiding the blow-striking member in its reciprocatory move-

ment, a crank-pin, means connecting the crank-pin and the reciprocable member whereby the former constitutes a support for the latter, means carried by the driving shaft and movable in a plane at an angle to the shaft for supporting the crank-pin, and means movable longitudinally of the driving shaft and operatively connected to the crank-pin supporting means, whereby the stroke of the crank-pin may be varied at will while the driving shaft is in rotation to cause the reciprocable member to have a stroke of desired length.

18. A blow-striking device comprising a rotatable driving shaft, a crank pin supported thereby and movable toward and from the axis thereof, a blow-striking member operably connected to said crank-pin, means movable longitudinally in respect to the driving shaft for causing the crank pin to depart from the axis of the driving shaft to increase the throw of the crank pin, means tending to move the crank pin toward the axis of the driving shaft, means for limiting the movement of the crank pin by the last mentioned means, and manually operable means for moving the longitudinally movable means to vary the stroke of the blow-striking member while the driving shaft is in rotation.

19. A blow-striking device comprising a rotatable driving shaft, a crank pin supported thereby and movable toward and from the axis thereof, a blow-striking member operably connected to said crank pin, means movable longitudinally in respect to the driving shaft for causing the crank pin to depart from the axis of the driving shaft to increase the throw of the crank pin, means tending to move the crank pin toward the axis of the driving shaft, means for limiting the movement of the crank pin by the last mentioned means, said movement limiting means being so arranged as to come into operation only when the axis of the crank pin coincides with that of the driving shaft, and manually operable means for moving the longitudinally movable means to vary the stroke of the blow-striking member while the driving shaft is in rotation.

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

HENRY COLLIER SMITH.

Witnesses:

L. M. SPENCER,

HUGO W. KREINBRING.