H. A. SEDGWICK.

STRIKING MECHANISM.

APPLICATION FILED APR. 25, 1908.

975,372.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1

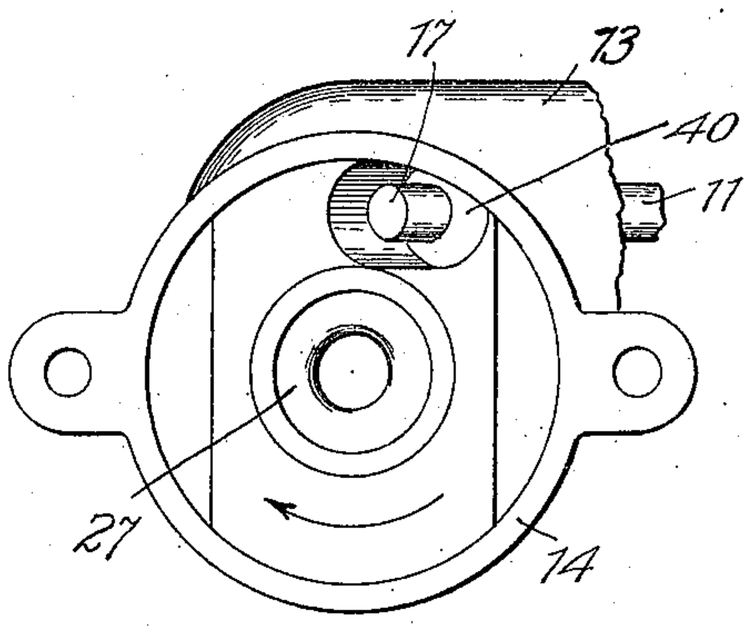

Fig. 5.

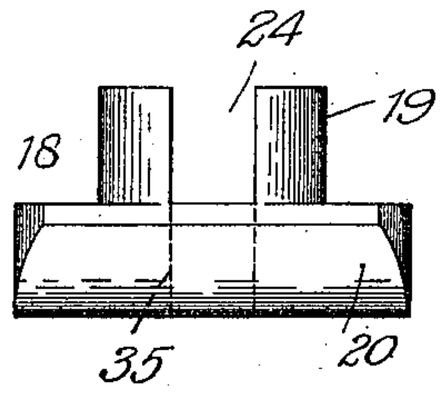

Fig. 6.

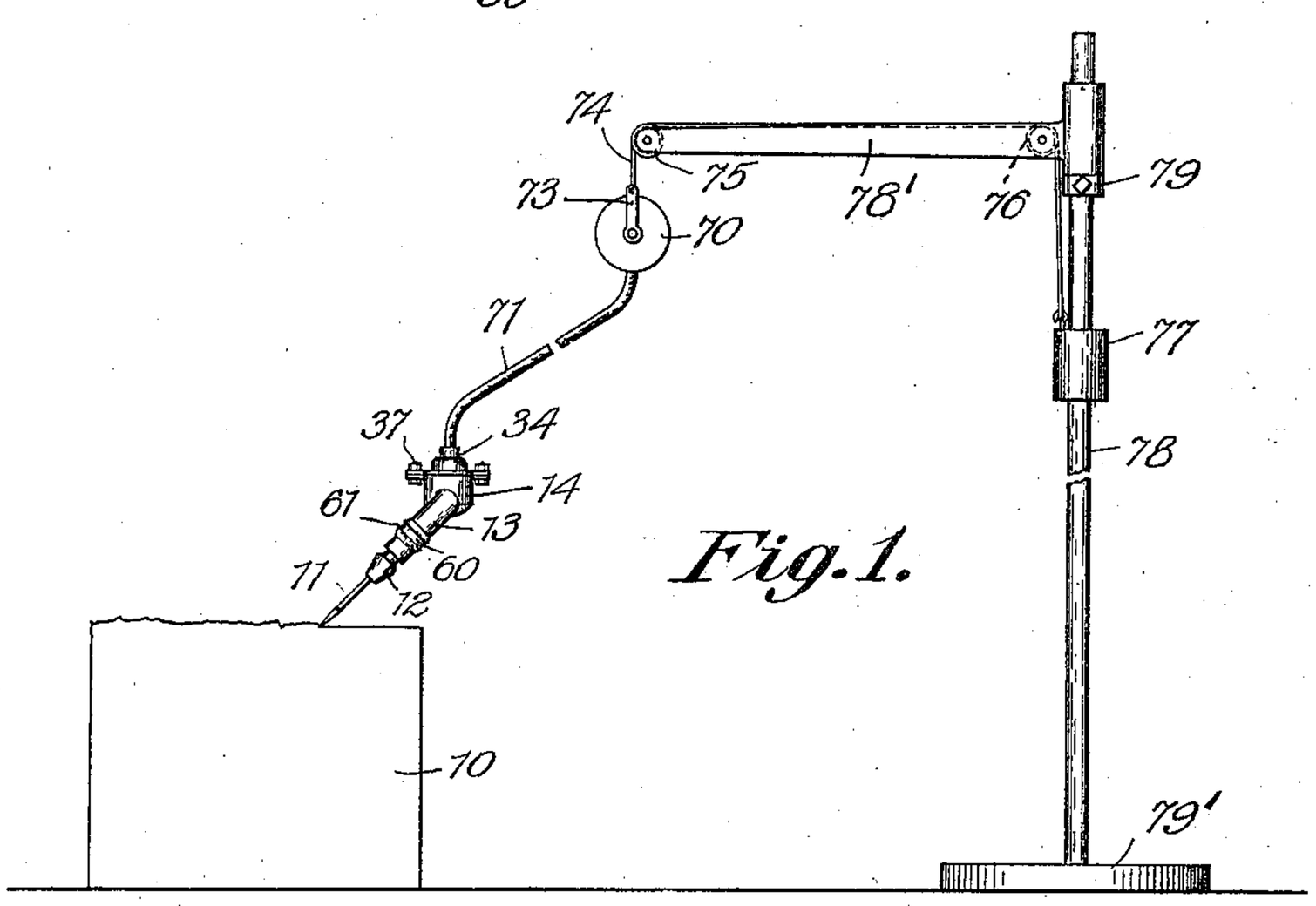

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

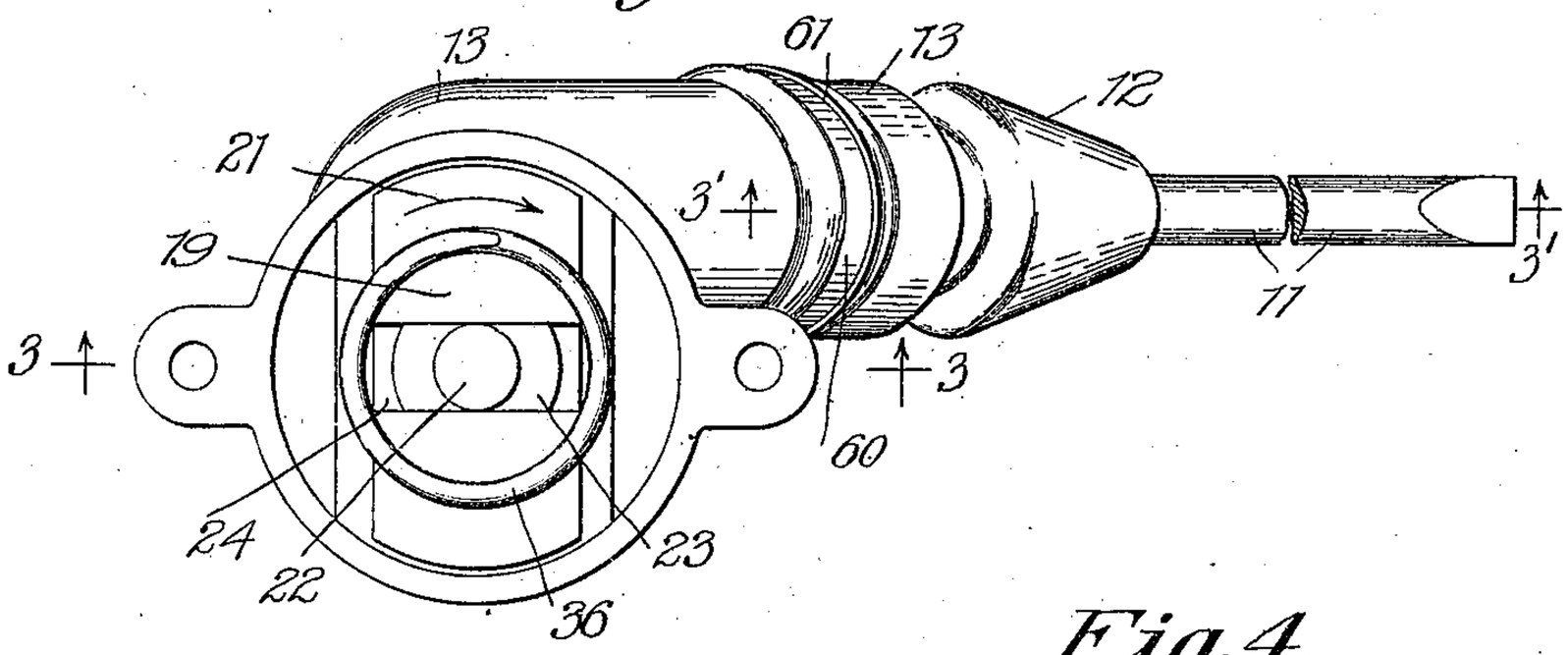

Fig. 4.

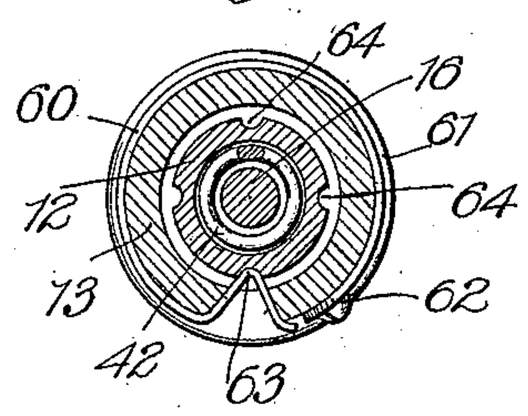

Fig. 3.

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UNITED STATES PATENT OFFICE.

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STRIKING MECHANISM.

975,372. Specification of Letters Patent. **Patented Nov. 8, 1910.**

Application filed April 25, 1908. Serial No. 429,116.

To all whom it may concern:

Be it known that I, HARRY A. SEDGWICK, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Striking Mechanism, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to striking mechanisms of the class which is perhaps best known and illustrated by the pneumatic chipping and riveting tools now in common use.

It is the object of my invention to provide a simple and efficient striking mechanism which may be driven by any sort of a motor, preferably by means of a flexible driving shaft. In this respect the striking mechanism of my invention is distinguished from pneumatic tools in which the tool must be supplied with compressed air to cause its operation. It is distinguished also from electrical striking mechanisms which depend for their operation upon a supply of current to electromagnetic mechanism. Thus my invention provides a striking tool or mechanism which can be operated in isolated places where a supply of compressed air is not available and where, in fact, electric current is not available. I prefer, however, to drive the striking tool of my invention by means of a small electro-motor, and my invention in its preferred form includes an electro-motor suitably suspended and movable, in a manner which will be more fully described.

In general, the striking mechanism of my invention comprises a rotating element and means for driving it at a high speed. A reciprocating member is arranged in such a way that a part of the reciprocating member will lie in the path of rotation of some part of the rotating element. The rotation of this element, therefore, causes the reciprocating member to be struck with a series of blows, the frequency of which depends upon the speed of rotation of the rotating element. In order that the reciprocating member with which the tools are directly connected shall be struck with a rebounding hammer-like blow, the rotating element is so arranged that when it strikes the reciprocating member it may rebound. This rebound throws some part at least of the rotating element out of its path of rotation. Some means is requisite, therefore, to return the rotating element to its normal position of rotation. In the preferred form of my invention, this is accomplished by means of a spring or other resilient member, against which the rebound of the rotating element must take place. The result is that the rotating element strikes the reciprocating member a series of blows, each blow being accompanied by a greater or less rebound of the rotating element, the rotating element being returned promptly, however, to its normal plane or position of rotation in order that the reciprocating member may be struck in proper manner the next succeeding blow.

It is one of the special features of my invention to provide a simple and efficient means for regulating the strength of the blows struck by the rotating element. This regulation of the strength of the blow is effected by varying the extent to which the reciprocating member projects into the normal path of rotation of the rotating element. The reciprocating member is provided with a shoulder which seats against an adjustable stop whereby the position of the stop determines the strength of the blow which is struck by the rotating element.

In the preferred form of my invention, I provide a means for retaining the stop in its adjustment except when altered at the will of the operator.

My invention provides a means also whereby the reciprocating member will be relieved from the blows of the rotating element whenever the tool is not in actual use. The hammer-like action of the device may therefore be stopped, although the motor or other driving device may continue to rotate the revolving element.

These and the other features of my invention will more fully appear from a consideration of the accompanying drawings in which—

Figure 1 illustrates the striking mechanism of my invention and the manner of using it, and also the preferred form of the adjustable motor means therefor. Fig. 2 is a plan view of the striking mechanism from which the cap-like cover and upper bearing have been removed. Fig. 3 is a central cross-sectional view taken in part on line

3—3 and in part on line 3′—3′ of Fig. 2. Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3. Fig. 5 is a plan view of the striking chamber, from which the rotating element and the associated mechanism have been removed, and Fig. 6 is a front elevation of the rotating element.

Like characters of reference are applied to corresponding parts in all of these figures.

The general outline of the striking mechanism is perhaps best illustrated in Fig. 1, where I have shown a block of stone or granite 10, upon which work is being done by the chisel 11. This chisel is operated by the striking mechanism of my invention, the tool being inserted in the cylindrical hole in the screw-threaded guide sleeve 12. The guide sleeve is screw-threaded into the socket 13, the socket being cast integral with the cylindrical striking chamber 14. As most clearly indicated in Fig. 3, the shank 15 of the chisel 11 extends through the hole in the sleeve 12 to a point where it engages the end of the plunger 16. This plunger forms the reciprocating member whose head 17 extends into the striking chamber and into the normal plane of rotation of the rotating hammer 18. The conformation of this hammer is best shown in Fig. 6. It is provided with a cylindrical boss 19, this boss being formed integral with the striking head 20. The striking head is formed into curved projections adapted to engage the head of the reciprocating plunger 16. The manner in which the head of the plunger projects into the striking chamber is best illustrated in Fig. 5. The arrow 21 indicates the direction of rotation of the revolving hammer and it will be apparent that as the hammer revolves the projections 20 engage the head of the plunger to cause its longitudinal reciprocation.

The rotation of the hammer element is effected by means of the driving spindle 22. This spindle is provided with a flattened cross arm 23, which is adapted to drop into the slot 24 in the boss 19 of the hammering element. The spindle is formed with a shoulder at 25 and a small collar 26 serves to convey the thrust of the spindle from the shoulder 25 to the cone 27 of the ball bearing 28, the hardened ball race 29 of which is set into a fitted receptacle in the base of the striking chamber, as shown. The spindle 22 is provided with a washer 30 and a collar 31 at its upper end, the collar engaging the cone of another ball bearing 32, whose ball race 33 is set into a socket in the cap 34 of the striking chamber. The spindle is thus equipped with ball bearings, which form also a pair of thrust bearings to prevent the longitudinal movement of the spindle. It will be noted, particularly in Fig. 3, that the longitudinal position of the spindle is such that there is a considerable space (perhaps a quarter of an inch, as shown in these drawings) between the lower edge of the cross arm 23 and the bottom of the slot 24 in the boss of the hammer. The cross piece of the hammer is provided with a hole, indicated in dotted lines at 35 in Fig. 6, through which the spindle passes. This sliding connection permits the hammer to have a considerable longitudinal movement. Fig. 3 shows the hammer in its lowermost position and the hammer spring 36, coiled around the boss of the hammer, tends to maintain the hammer in the position shown, the upward pressure of the spring being taken by the washer 30 and conveyed through the collar 31 to the thrust bearing 32. Fig. 2 shows the interior of the striking chamber with the spindle, hammer and hammer spring in place. The cap 34 has, however, been removed by loosening the cap bolts 37—37.

Turning now to the reciprocating plunger and the mechanism immediately associated therewith, there is illustrated in Fig. 3 a hardened steel bushing 40, fitted within the socket 13, this bushing being intended to take the wear of the reciprocating plunger. The replacement of this bushing when worn thus saves the expense of replacing the entire socket and driving chamber. The reciprocating plunger is provided at its foot with a flange-like shoulder 41 and a plunger spring 42 is coiled around the plunger shank between the shoulder and the bushing 40. This compression spring tends to force the plunger away from the striking chamber and thus to withdraw the head 17 from the plane of rotation of the projections on the hammer. The head of the plunger is, however, forced into the path of the hammer by the operator who inserts the shank of the chisel 11 into the sleeve 12, thus bringing it into engagement with the foot of the plunger and forcing it upward against the compression of the spring 42. The shoulder 43 of the chisel, coming into engagement with the end of the sleeve 12, limits the degree to which the plunger head can be forced into the striking chamber. It will be apparent that the rotation of the hammer element in the direction indicated by the arrow in Figs. 2 and 5 will cause the curved projections to strike against the head of the plunger. The result is that the plunger and the tool 11 will be driven downward. In order that the blow which causes this movement shall not be dead and unyielding, the hammer is provided with the resilient cushion already described. When the hammer strikes the head of the plunger it rebounds against the compression of the hammer spring 36. The hammer element is thus moved to a certain extent out of its normal path of rotation, thus producing upon the plunger a blow like the tap of a hand hammer. The spring 36 promptly returns the

hammer element to its normal path after each blow has been struck, whereby it is in proper position for each succeeding blow. The operator in pressing the chisel or other tool against the work causes the compression of the plunger spring 42 until the shoulder 43 engages the end of the sleeve 12, thus forcing the plunger up into a position where it may be struck by the hammering element. The operator maintains this pressure so that each blow is succeeded by the return of the plunger to the position in which it may be struck by the hammer. When for a moment, the workman wishes to discontinue the striking of the tool, he permits the shank of the chisel to remain in its outer position with the shoulder 43 a slight distance from the end of the sleeve 12. Under these conditions, the plunger spring 42 withdraws the head of the plunger from the striking chamber so that the hammer can rotate without striking its head. The operation of the mechanism is thereby temporarily discontinued, although the rotation of the hammer is continued so that the work may be commenced at any instant simply by forcing the chisel firmly against the work in hand.

We come now to the means for adjusting the strength of the blow. This is accomplished by varying the distance to which the shank of the tool will force the plunger into the path of the hammering element. All of the tools which are to be used with the striking mechanisms of my invention are provided with shanks of a certain length above the shoulder 43. If, therefore, the distance between the end of the sleeve 12 and the striking chamber be varied, the distance to which the shanks of the tools will raise the plunger from its outer position will be correspondingly altered. This variation in the position of the end of the sleeve is effected by screw-threading at 50 the interior of the lower end of the socket 13, and correspondingly threading the surface of the sleeve. The upper end of the sleeve is cylindrical to fit the interior of the socket, and thus more effectively guide and support the sleeve 12 than would be the case if it were screw-threaded throughout its length. By unscrewing the sleeve from the socket, the distance between the striking chamber and the shoulder 43 of the tool is increased, thereby effecting a decrease in the strength of the hammer blows because of the removal of the head 17 of the plunger from the path of the hammer. Thus, the operator by screwing the sleeve in or out of the socket may regulate the strength of the blow. In order that the sleeve may be conveniently retained in any desired position, regardless of the constant vibration of the mechanism, I provide a clamping spring 60 which encircles the socket in a suitable groove 61. One end of the spring is attached at 62, the other end is provided with a tongue 63 adapted to engage the slits 64—64 in the surface of the cylindrical extension of the sleeve 12. Fig. 4 illustrates the tongue of the spring in one of the slits. This spring-like retention of the sleeve is one which can readily be overcome by the operator so that the sleeve may be turned into any desired position, where it will be maintained by the spring-like detent mechanism. Thus, my invention provides means for adjusting positively the strength of the blow of the striking mechanism and for maintaining the adjustment at will. The preferred means for driving this striking mechanism is illustrated in Fig. 1. It takes the form of a small electric motor 70, this motor being connected by a flexible shaft 71 with the driving end 72 of the spindle 22. The motor is preferably supported in a sling 73. A small cable 74 passes from the sling over pulleys 75 and 76 to a counterweight 77. The counterweight is guided by a supporting column 78, upon which is rotatably mounted the crane arm 78′. The collar 79 can be adjusted in position by means of its set screw so that the height of the motor-supporting arm may be varied at will. The column 78 is provided with a base plate 79′ so that the entire mechanism may be moved from place to place at will. When in use, the operator can raise or lower the motor to any convenient height. The crane arm permits the motor to be swung in a circle about the column and the flexible shaft permits the striking mechanism to be retained in any desired position which is necessary for the work in hand.

The advantages of these various features of my invention will sufficiently appear from this description to those skilled in the art. It will be apparent that many variations and modifications may be made from the details herein disclosed, and I do not wish, therefore, to be limited to the precise details of this construction.

What I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, the combination with an element rotatable on its own axis having one or more striking projections integral with said element, a resilient support tending to maintain said rotatable element in a given path of rotation, and a reciprocating member interposed in the path of rotation of said striking projection or projections.

2. In a device of the class described, the combination of a driving spindle, a revolving element having one or more curved projections on its face slidably mounted on said spindle, a resilient support tending to maintain said revolving element in a given plane of rotation, and a reciprocating plunger having a part interposed in the plane of rotation

of said curved projections and adapted to be struck thereby upon the rotation of the revolving element.

3. In a device of the class described, the combination of a revolving element having one or more projections at or near its periphery, a spindle for driving the revolving element, said revolving element being slidably mounted on said spindle, resilient means tending to maintain the revolving element in a fixed plane of rotation, and a reciprocating tool actuating member interposed in the plane of rotation of the projections on the rotating element.

4. In combination, a rotating disk with projections thereon, resilient means tending to hold said rotating disk in a fixed plane of rotation, and a reciprocating member having a part interposed in the normal plane of rotation of said projections.

5. In combination, a revolving hammer having one or more curved projections near its periphery, said revolving hammer being free to move longitudinally on its axis of rotation, a reciprocating tool actuating member interposed in the plane of rotation of said projections and adapted to be struck thereby, and resilient means adapted to cushion the recoil and return said revolving hammer to its normal plane of rotation after the projections impinge upon the reciprocating member.

6. In a device of the class described, the combination of a revolving element having a projection at or near its periphery, a reciprocating tool actuating member interposed in the path of said projection at an angle such that the impact of the projection upon the reciprocating member will cause a longitudinal motion of said reciprocating member, and resilient means adapted to return the revolving element to a fixed plane of rotation after the revolving element has been moved out of such plane due to the impact of the reciprocating member.

7. In combination, an element revolving on its own axis and having a striking projection near its periphery said projection integral with said revolving element, a reciprocating tool actuating member, means for interposing the reciprocating member in the normal plane of rotation of the striking projection, and means for returning said projection to its normal plane of rotation when forced out of said plane upon impact with said reciprocating member.

8. In combination, an element revoluble on its own axis, a striking projection integral with said revoluble element, means tending to maintain said striking projection in a given path of rotation, and a tool actuating member adapted to be impinged by said striking projection and to deflect the revolving element and its striking projection from its normal path when impinged thereby.

9. In combination, a driving spindle, a revolving element driven thereby and longitudinally slidable on said spindle, resilient means tending to maintain the revolving element in a normal plane of rotation, and a reciprocating plunger whose head is interposed in the path of rotation of the striking element and whose line of reciprocation lies in the plane of the tangent of the circle in which the striking element rotates and at an acute angle with respect to said tangent.

10. In combination, an element revoluble on its own axis, a striking hammer integral with said element, means for rotating said element, a spring tending to maintain said element in a given path of rotation, a reciprocating plunger having a head interposed in the path of rotation of said hammer, a spring tending to withdraw the head of the plunger from said path, and a reciprocating tool actuated by the plunger, said plunger being forced against the tendency of the said spring when pressure is applied to the outer end of said tool.

11. In combination, an element revoluble on its own axis, a striking hammer integral with said element, means for rotating said element, a spring tending to maintain said element in a given path of rotation, a reciprocating plunger having a head interposed in the path of rotation of said hammer, a spring tending to withdraw the head of the plunger from said path, a reciprocating tool actuated by the plunger, said plunger being forced against the tendency of said spring when pressure is applied to the outer end of said tool, and a stop for limiting the distance to which the plunger head may be forced into the path of rotation of said hammer.

12. In combination, an element revoluble on its own axis, a striking hammer integral with said element, means for rotating said element, a spring tending to maintain said element in a given path of rotation, a reciprocating plunger having a head interposed in the path of rotation of said hammer, a spring tending to withdraw the head of the plunger from said path, a reciprocating tool actuated by the plunger, said plunger being forced against the tendency of said spring when pressure is applied to the outer end of said tool, a stop for limiting the distance to which the plunger head may be forced into the path of rotation of said hammer, and means for varying the effective position of said stop.

13. In a device of the class described, the combination with a rotating striking hammer, of a reciprocating plunger whose head is adapted to be projected into the path of rotation of said hammer, a spring tending to withdraw the head of the plunger from the path of rotation of the striking hammer, a socket having an opening in which

said plunger reciprocates, a sleeve, a tool having a shank passing through said sleeve into engagement with said plunger, the head of the plunger being forced into the path of rotation of the striking hammer when pressure is applied to the end of the tool, and a shoulder on said tool engaging said sleeve, said sleeve having screw-threaded engagement with the plunger socket whereby the motion of the tool and plunger, and consequently the strength of the blows thereon, may be regulated by turning the sleeve relatively to the socket.

14. In a device of the class described, the combination with a rotating striking hammer, of a reciprocating plunger whose head is adapted to be projected into the path of rotation of said hammer, a spring tending to withdraw the head of the plunger from the path of rotation of the striking hammer, a socket having an opening in which said plunger reciprocates, a sleeve, a tool having a shank passing through said sleeve into engagement with said plunger, the head of the plunger being forced into the path of rotation of the striking hammer when pressure is applied to the end of the tool, a shoulder on said tool engaging said sleeve, said sleeve having screw-threaded engagement with the plunger socket whereby the motion of the tool and plunger, and consequently the strength of the blows thereon, may be regulated by turning the sleeve relatively to the socket, and a spring detent for holding the sleeve against undesirable rotation.

15. In a device of the class described, the combination with a rotating striking hammer, of a reciprocating plunger whose head is adapted to be projected into the path of rotation of said hammer, a socket having an opening in which said plunger reciprocates, a sleeve, a tool having a shank passing through said sleeve into engagement with said plunger to force the head of the plunger into the path of rotation of the striking hammer, and a shoulder on said tool engaging said sleeve, said sleeve having screw-threaded engagement with the plunger socket whereby the motion of the tool and plunger, and consequently the strength of the blows thereon, may be regulated by turning the sleeve relatively to the socket.

16. In a device of the class described, the combination with a rotating striking hammer, of a reciprocating plunger whose head is adapted to be projected into the path of rotation of said hammer, a socket having an opening in which said plunger reciprocates, a sleeve, a tool having a shank passing through said sleeve into engagement with said plunger to force the head of the plunger into the path of rotation of the striking element, a shoulder on said tool engaging said sleeve, said sleeve having screw-threaded engagement with the plunger socket whereby the motion of the tool and plunger, and consequently the strength of the blows thereon, may be regulated by turning the sleeve relatively to the socket, and means for clamping said sleeve against rotation.

17. In a device of the class described, the combination with an element rotatable on its own axis and having a striking part rigidly carried therewith, of a resilient support tending to maintain said rotatable element in a given path of rotation, and a reciprocating member interposed in the path of rotation of said striking part.

18. In combination, an element revolving on its own axis and having a striking projection near its periphery, said projection being rigidly carried with said revolving element, a reciprocating tool actuating member, means for interposing the reciprocating member in the normal plane of rotation of the striking projection, and means for returning said projection to its normal plane of rotation when forced out of said plane upon impact with said reciprocating member.

19. In combination, an element rotatable on its own axis, a striking projection rigidly carried with said movable element, means tending to maintain said striking projection in a given path of rotation, and a tool actuating member adapted to be impinged by said striking projection and to deflect the revolving element and its striking projection when impinged thereby.

In witness whereof, I hereunto subscribe my name this 22nd day of April, A. D. 1908.

HARRY A. SEDGWICK.

Witnesses:
EDWIN L. PLUMMER,
E. J. BRYDEN.