(No Model.) 2 Sheets—Sheet 1.

A. BEAUDRY.

POWER HAMMER.

No. 545,763. Patented Sept. 3, 1895.

FIG:1.

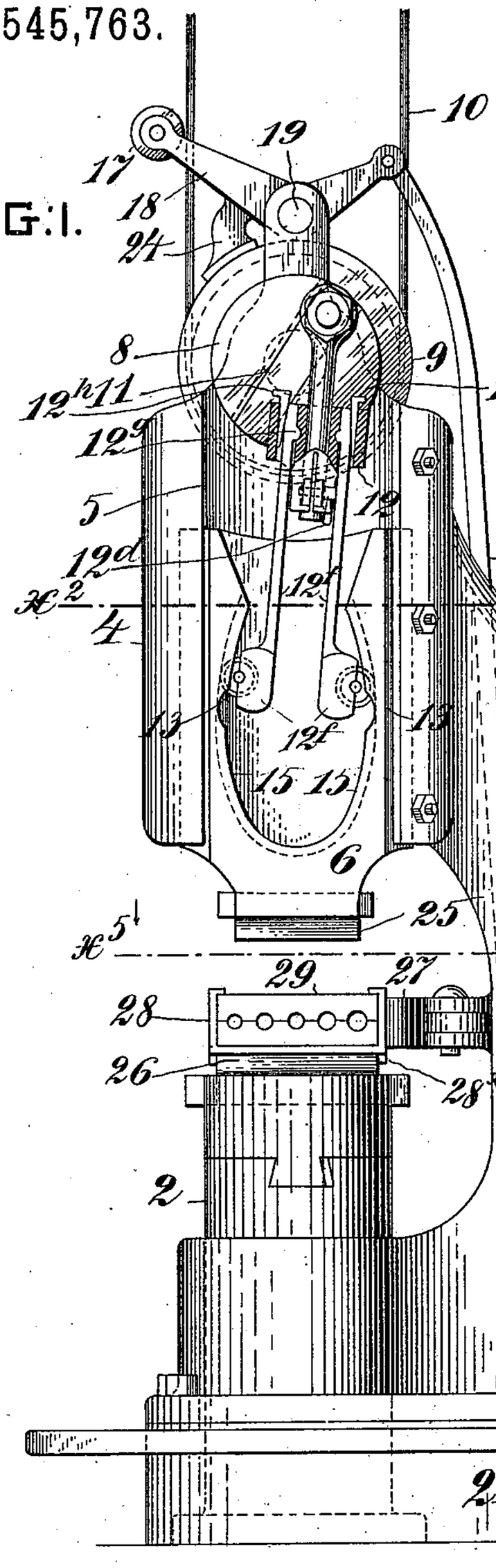


FIG:5.

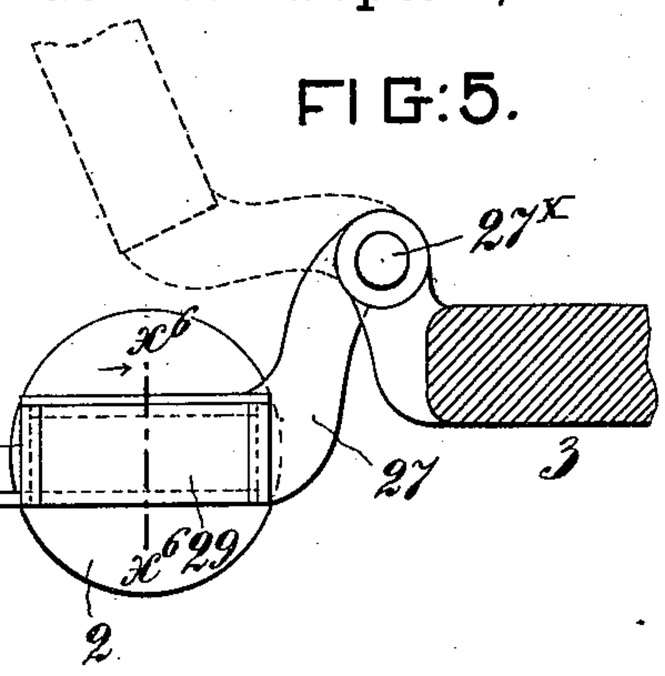


FIG:6.

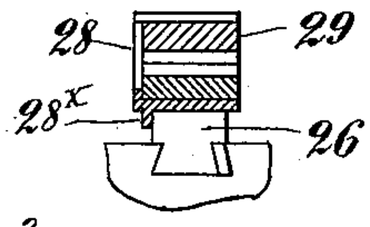


FIG:4.

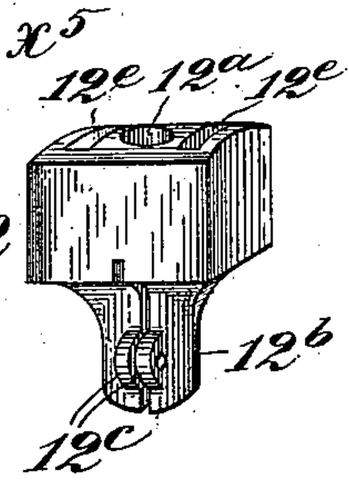


FIG:2.

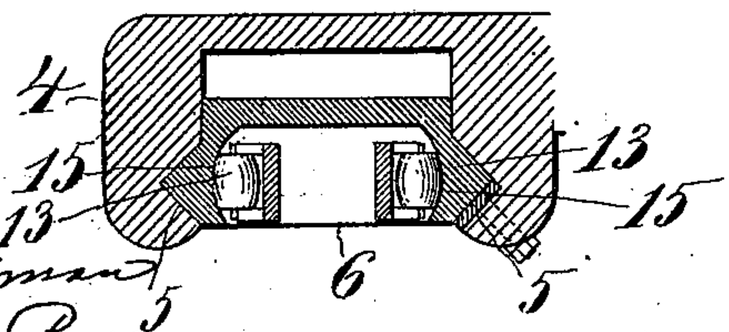
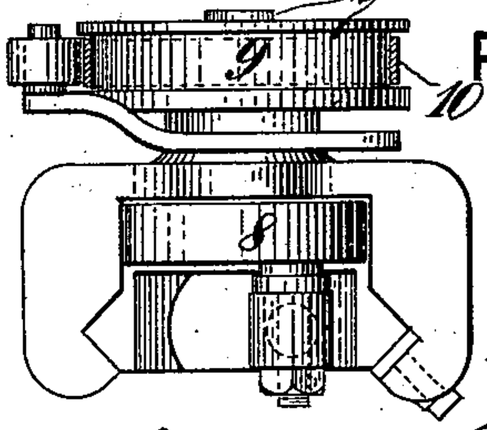


FIG:3.



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his Attorney

(No Model.) 2 Sheets—Sheet 2.

A. BEAUDRY.

POWER HAMMER.

No. 545,763. Patented Sept. 3, 1895.

FIG: 7.

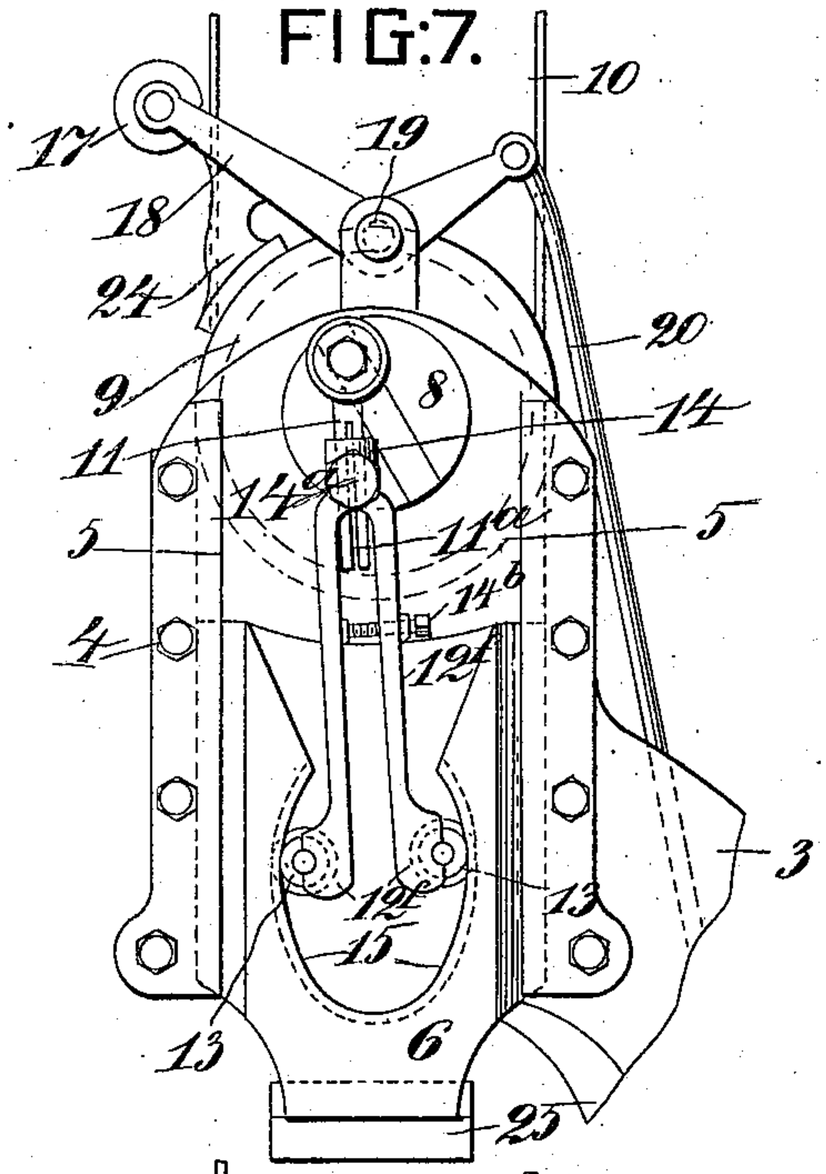


FIG: 9.

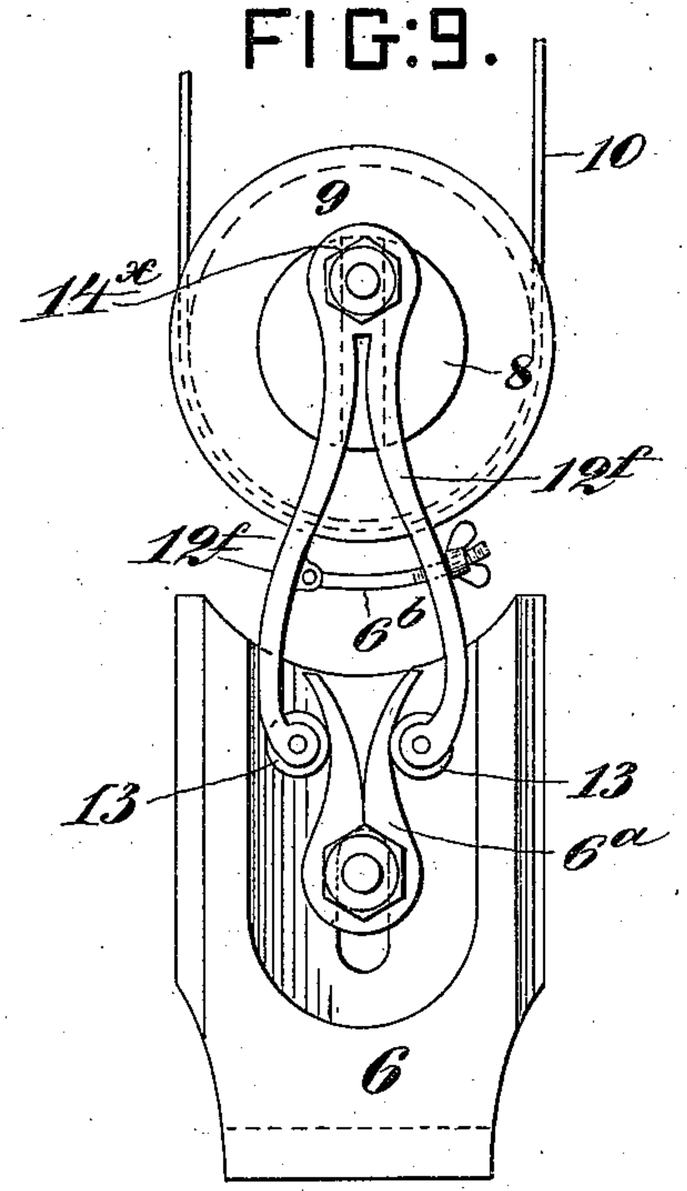


FIG: 8.

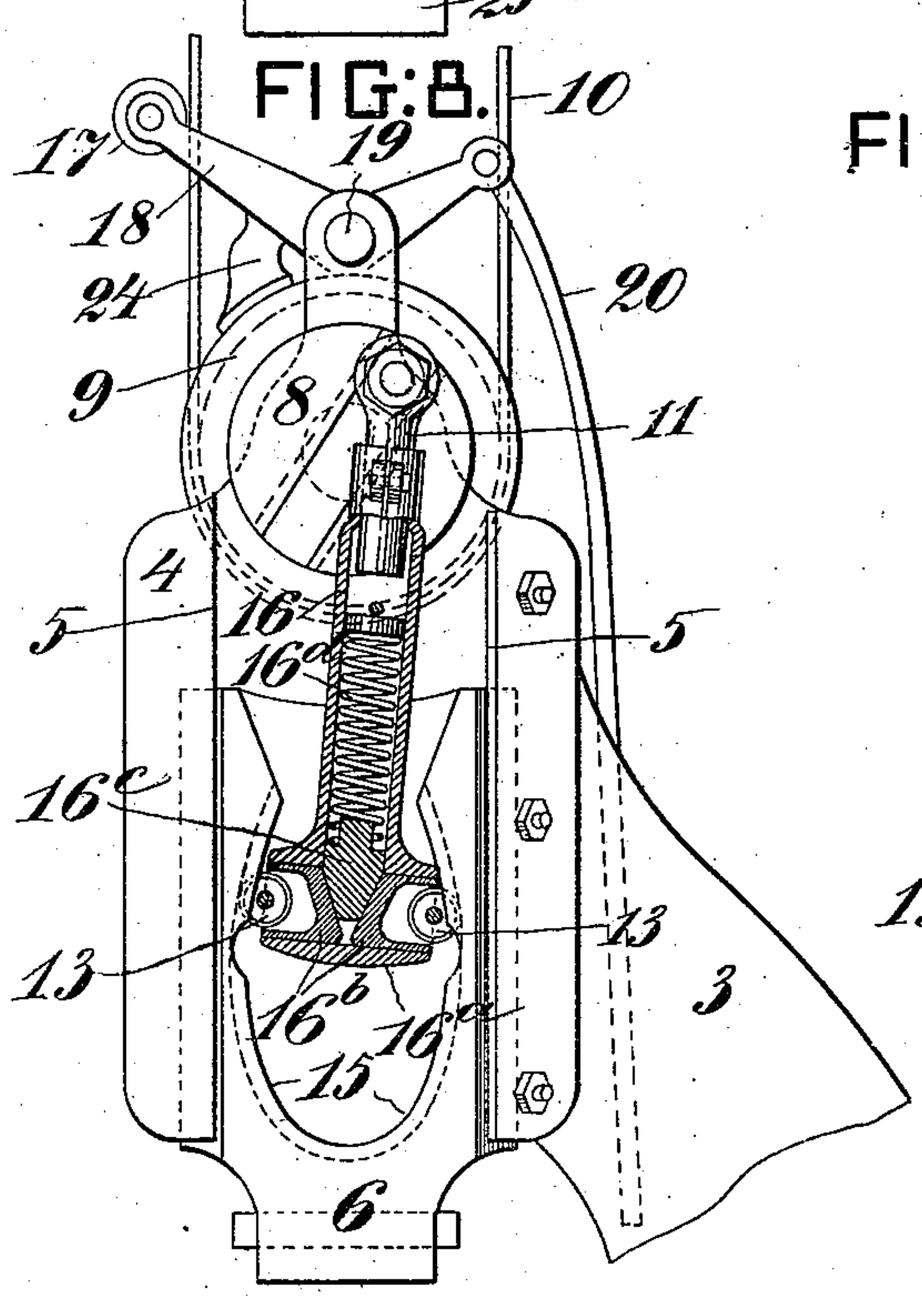
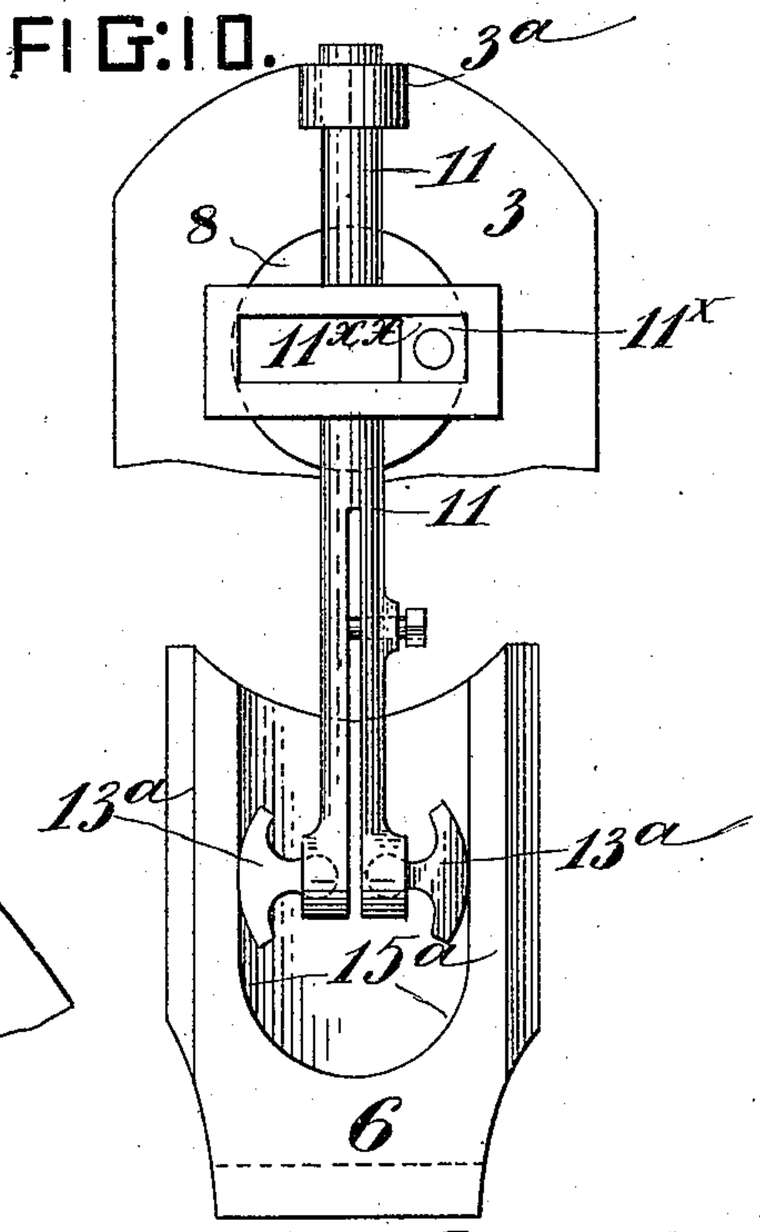


FIG: 10.



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UNITED STATES PATENT OFFICE.

AUGUSTIN BEAUDRY, OF SOMERVILLE, MASSACHUSETTS.

POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 545,763, dated September 3, 1895.

Application filed September 25, 1894. Serial No. 524,065. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTIN BEAUDRY, a citizen of the United States, residing at Somerville, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Power-Hammers, of which the following is a specification.

This invention relates to that class of power-hammers wherein the hammer-head reciprocates in guides and the motion is imparted thereto from a crank carried by a rotating shaft.

The object of the present invention is to connect the hammer-head with the operating-crank through the medium of an elastic or spring connection, and to provide a frictional grip between said connection and the hammer-head, whereby rigidity between the moving head and the crank-pin is avoided.

The invention also contemplates the provision of an auxiliary die-carrier, together with certain features of construction, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a side elevation of the hammer, portions of the elastic or spring connection being shown in section for better illustration; and Fig. 2 is a transverse section taken in the plane indicated by line x^2 x^2 in Fig. 1. Fig. 3 is a plan view of the hammer-head, showing the driving mechanism thereof. Fig. 4 is a perspective detail view, on an enlarged scale, and showing the adjustable connecting block or piece detached. Fig. 5 is a plan view showing the auxiliary die, the frame being in section on line x^5 x^5 in Fig. 1; and Fig. 6 is a section of the same along line x^6 x^6, Fig. 5, showing certain features to be hereinafter referred to. Figs. 7, 8, 9, and 10 are side elevations showing various modified arrangements of the spring-connection and of the frictional grip between the same and the hammer-head. These views will be hereinafter more particularly referred to.

Referring, primarily, to Figs 1 to 6, 1 is the bed of the hammer, 2 the anvil, 3 the frame rising from the bed, and 4 the position of the frame, in which are formed the guides or ways 5 for the reciprocating head 6. At the upper part of the portion 4 of the frame is mounted the crank-shaft 7, on which are fixed a crank 8 and a pulley 9, the latter serving, also, as a fly-wheel. 10 is the belt on the pulley, through which the crank-shaft is rotated. To the pin of the crank 8 is coupled a crank-rod or plunger 11, on which is adjustably secured the connecting block or piece 12, the construction of which will be readily understood from Figs. 1 and 4. As seen in these views, the block 12 is provided with a central bore 12^a to receive the end of the crank rod or plunger 11, and at its lower end said block 12 has a reduced split portion or sleeve 12^b, through which the bore 12^a also passes. Perforated lugs 12^c are provided to receive a screw or bolt 12^d whereby the block 12 may be securely clamped on the rod 11 when set to the proper position. The upper larger portion of piece 12 is rectangular in cross-section, and at opposite sides of the central bore 12^a therein are formed parallel vertical channels 12^e, wherein are secured the upper ends of spring-arms 12^f. In order to secure the arms 12^f in place in said channels, each of said arms is provided on its inner side with a projection 12^g, adapted to engage a recess in the wall of the channel 12^e. Wedges or keys 12^h are driven into the upper open ends of the channels 12^e, at the side of arms 12^f opposite the projections and serve to hold the said arms securely in place in the channels. The arms 12^f will be, by preference, of spring steel, and each arm carries at its lower end a roller 13, and these rollers are pressed outward laterally by the elasticity of the arms which carry them into elastic contact with curved tracks 15, formed in the lateral walls of a recess in the face of the hammer-head. These tracks will be preferably slightly concave in cross-section, as seen in Fig. 2, and they are curved longitudinally, as seen in Fig. 1. By this curvature of the tracks they will be, of course, farthest apart at about midway of their length, and in the movement of the spring rod and rollers longitudinally to and fro they carry the hammer-head with them by reason of the fact that any movement of the rod and rollers independently of the hammer-head forces the rollers inward toward each other and so increases the tension on the branches of the rod 12. This is due to the convergence of the tracks. The effect of this construction is to

connect the lower end of the spring-rod to the hammer-head by an elastic grip, which will yield to an extent sufficient to overcome gradually the inertia of the hammer-head at the ends of the strokes and avoid severe strain and wear due to a positive coupling of the parts. When the crank-shaft is rotated, the crank and spring-rod impart the necessary reciprocating motion to the hammer-head, which is, of course, arranged directly over the anvil. It is desirable, in order to adapt the hammer-head to articles varying in thickness, to provide means for varying the distance between the face of the hammer-head and the center of the crank-shaft, and this is effected by setting the block 12 in or out along the crank-rod 11, as before stated. I do not, however, consider this adjustment essential in all cases, for the block 12 might be made integral with rod 11.

In order to enable the operator to stop and start the hammer conveniently, the belt 10 is arranged to run loosely about the pulley 9 under normal conditions when the hammer is at rest, and a tightening-roller 17 is employed to be pressed against the belt and thus tighten it on the pulley. This roller 17 is carried by a bent lever 18, fulcrumed at 19 on the machine-frame, and the other end of this lever extends down a treadle 21 on the base 1 of the hammer. This treadle is of a U shape, and the rod 20 is at the back of the frame, as seen in Fig. 1, the point 22, where it is coupled to the rear branch of the treadle, being therefore indicated in dotted lines. Pressure downward on the treadle applies the roller 17 to the belt, and when this pressure is removed the parts are retracted by a spring 23 under the treadle, or arranged in some other convenient manner. In order to check the momentum of the pulley 9 when the belt is slackened, a brake-shoe 24, carried by the lever 18, is arranged to bear on the rim of the pulley, it being applied with a pressure due to the tension of spring 23.

25 represents an upper die or the face of the hammer-head, and 26 represents a lower die or the face of the anvil. It is desirable in this form of hammer to shift the dies quickly, so as to adapt the hammer to different kinds of work readily. For example, the plain pieces 25 and 26 may be in use for flat forging, and it will be desired to use the hammer temporarily for truing up to gage pins or rods. To facilitate such temporary shifts I provide the hammer with a die carrier and shifter such as I will now describe with reference to Figs. 1, 5, and 6.

On the frame 3 is hinged at 27^x a strong arm 27, which swings horizontally and has at its free end a die-carrier 28, on which rests a pair of dies 29, such as are in use for swaging cylindrical rods and the like, to gage. The dies are mounted removably on the carrier. When the arm 27 is swung around to the position seen in full lines in plan in Fig. 5, a stop-flange 28^x (see Figs. 1 and 6) on the carrier 28 strikes the die or face 26 on the anvil, and thus stops the dies 29 in position directly under the hammer-head. After using the dies 29 the arm 27 may be swung back again out of the way.

In the construction shown in Fig. 7 the connecting block or piece 12 is dispensed with and in lieu thereof the two arms 12^f are formed in one piece, being connected at their upper ends by a tubular sleeve or tie-piece 14, adapted to receive the extremity of the crank-rod 11, which is split, as seen at 11^a. The sleeve 14 is provided with a pointed screw 14^a, so set that when screwed home its pointed tip enters the split in the crank-rod 11 and expands the same into the bore of sleeve 14. This construction permits the sleeve to be adjusted along the crank-rod 11, as desired. In order to vary the elasticity of the spring-arms 12^f, I have shown a screw 14^b passing through one of the arms and bearing at its tip against the other arm 12^f. Such a screw may also be employed in the construction shown in Fig. 1, if desired.

In the construction shown in Fig. 8 both the connecting block or piece 12 and the spring-arms 12^f are dispensed with, and in lieu thereof a tubular or hollow head 16, having a split upper portion, is clamped adjustably to the lower end of the crank-rod 11. The hollow of this head 16 is of a T form, the lower end 16^a thereof being widened or expanded laterally to provide sufficient width for the transverse bore, in the opposite branches of which are arranged the sliding bearing-blocks 16^b, carrying the rollers 13, as clearly seen. The bearing-blocks 16^b have beveled inner faces engaged by a wedge 16^c, mounted movably in the vertical portion of the hollow of the head 16 and backed by a spring 16^d, as clearly seen. Thus it will be seen that the spring 16^d acts to keep the blocks 16^b normally pressed out in opposite directions with their rollers 13 in contact at all times with the track 15.

In the constructions above described the rollers 13 press outward laterally against the curved tracks; but they may be arranged to press inwardly on similar tracks. This construction is illustrated in Fig. 9, which is a face view showing only the parts appertaining to this modified construction. In this construction the crank-rod 11 is omitted, and the spring-arms 12^f are connected at their upper end by a tie 14^x, coupled directly to the pin of the crank, and the arms 12^f, carrying the rollers 13, press the latter inwardly against tracks on a centrally-arranged track-piece 6^a. This track-piece is secured to the hammer-head 6, and preferably with a slotted connection, so that it may be adjusted up or down on the hammer-head to a limited extent. A screw 6^b in the spring-arm is provided for the purpose of increasing the pressure of the rollers on the tracks.

Fig. 10 illustrates another variation wherein the crank-rod 11 is made vertically movable,

being provided with a bearing 3^a at its upper end. In this construction the connecting-piece 12 and arms 12^f are dispensed with, the lower end of the crank-rod being forked or split and provided with rockers 13^a, having curved faces which bear on straight tracks 15^a on the hammer-head. The rockers 13^a have a ball-and-socket connection with the forks of the crank-rod 11, as will be readily understood. The crank-pin carries a block 11^x, which plays in a transverse slot 11^{xx} in the crank-rod 11, as clearly shown.

In these several constructions the rockers 13^a and rollers 13 form shoes which bear on the tracks on the head with elastic or spring pressure. In the construction of Fig. 1 the rollers might be substituted by studs which do not rotate; but I prefer the rollers. In this construction of Fig. 1 the tracks are curved and converge, while in Fig. 10 the tracks are straight and the rockers are curved on their faces, whereby when they rock in either direction the tension of the branches of the crank-rod is increased in the same way that the converging tracks increase such tension.

Having thus described my invention, I claim—

1. In a power hammer, the combination with a frame, a crank-shaft and a crank in the frame, and a guided, reciprocating hammer-head in the frame provided with tracks extending longitudinally thereof, of a crank-rod coupled at one end to the crank and carrying at its other end shoes which bear on the respective tracks on the hammer-head, the said shoes, and means for pressing said shoes elastically against the respective tracks, substantially as and for the purposes set forth.

2. In a power hammer, the combination with a frame, a crank-shaft and crank in the frame, and a guided, reciprocating hammer-head in the frame and provided with curved tracks, as set forth, of a crank-rod coupled at one end to the crank and carrying at its other end shoes which bear laterally on the respective curved tracks on the hammer-head, the said shoes, and means for pressing the said shoes elastically up to the respective tracks, substantially as set forth.

3. In a power hammer, the combination with a frame, a crank-shaft and crank in the frame, and a guided, reciprocating hammer-head in the frame and provided with curved tracks, which converge at their ends, of the crank-rod coupled at one end to the crank and carrying at its other end two shoes which bear outwardly on the respective curved tracks, the said shoes, and springs carried by the connecting-rod which press the said shoes up elastically to their respective tracks, substantially as set forth.

4. In a power hammer, the combination with a frame, a crank-shaft and crank in the frame, and a guided, reciprocating hammer-head in the frame and provided with curved tracks, as set forth, of a crank-rod connected at its upper end to said crank and provided at its lower end with shoes which bear on the respective curved tracks on the hammer-head, springs for pressing said shoes elastically up to the respective tracks and means for adjusting the tension of said springs, substantially as set forth.

5. In a power hammer, the combination with a crank-shaft and crank and a guided reciprocating hammer-head, of a crank-rod connected at its upper end to the crank, and spring-arms mounted on said crank-rod and provided with shoes which bear respectively with elastic pressure laterally on tracks on the hammer-head, whereby a grip is provided, substantially as and for the purposes set forth.

6. In a power hammer, the combination with a crank-shaft and crank and a guided reciprocating hammer-head provided with curved tracks, as set forth, of the crank-rod connected at its upper end to the crank, said rod having like spring-arms provided with shoes which bear with elastic pressure laterally on the respective tracks on the hammer-head, substantially as set forth.

7. In a power hammer, the combination with a crank-shaft and crank and a guided reciprocating hammer-head provided with curved tracks which converge at their ends, of a crank-rod, connected at its upper end to the crank, two spring-arms mounted on said crank-rod and each carrying a shoe which bears on one of said tracks, the elasticity of the branch serving to press the shoe laterally outward into firm contact with the track, as set forth.

8. In a power hammer, the combination with a crank-shaft and crank and a guided reciprocating hammer-head provided with curved tracks 15, of a crank-rod coupled to the crank, two spring-arms adjustably mounted on said crank-rod and provided with shoes which bear on the respective tracks on the hammer-head, and means for varying the tension of the spring-arms, substantially as set forth.

9. In a power hammer, the combination with a crank-shaft and crank and a reciprocating hammer-head provided with curved, converging tracks, of the crank-rod connected to the crank, said rod having two longitudinally adjustable spring-arms each carrying a roller which bears on one of said tracks, and a tension screw for spreading the spring-arms and increasing the tension of the same, substantially as set forth.

10. In a power hammer, the combination of the crank-shaft, crank and a reciprocating hammer-head provided with curved converging tracks, a crank-rod coupled to the crank, a connecting-block adjustably mounted on said crank-rod, spring-arms, carried by said connecting-block and rollers mounted on said spring-arms and adapted to engage the tracks in the hammer-head, substantially as set forth.

11. In a power hammer, the combination of a crank-shaft, crank and a reciprocating hammer-head provided with curved converging

tracks, a crank-rod coupled to the crank, a connecting-block having a central bore to receive said crank-rod and having channels on opposite sides of said central bore, means for securing said connecting-block to the crank-rod, spring-arms each arranged with one end in one of the channels in the connecting-block, and having at its other end a roller arranged to engage the track in the hammer-head, and wedges arranged in said channels and adapted to hold said spring-arms in place, substantially as set forth.

12. In a power hammer, the combination of a crank-shaft and a reciprocating hammer-head provided with curved, converging tracks, a connecting-block having a central bore to receive said crank-rod and having channels on opposite sides of said central bore, the walls of said channels being provided with recesses, means for securing said connecting-block to the crank-rod spring-arms each arranged with one end in one of the channels and having a projection to engage the recess in the wall thereof, wedges arranged in said channels and adapted to hold said spring-arms with their projections in engagement with the recesses in the walls of the channels, and rollers mounted on said spring-arms in position to engage the tracks in the hammer-head, substantially as set forth.

13. In a power hammer, the combination with the frame, the anvil and the guided, reciprocating hammer-head in the frame, of the arm 27, pivoted on the frame and adapted to swing horizontally, the die-carrier 28, borne by said arm, and the dies mounted on said carrier, the relative proportions of the parts being such that the dies are brought over the anvil by swinging said arm.

14. In a power hammer, the combination of a frame, an anvil, a reciprocating hammer-head guided in the frame, an arm pivoted to the frame and adapted to swing horizontally, a die-carrier mounted on said arm and adapted to be brought into position over the anvil when said arm is actuated, and a stop mounted on said die-carrier in position to engage said anvil, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

AUGUSTIN BEAUDRY.

Witnesses:
HENRY BEAUDRY,
C. B. MOORE.