

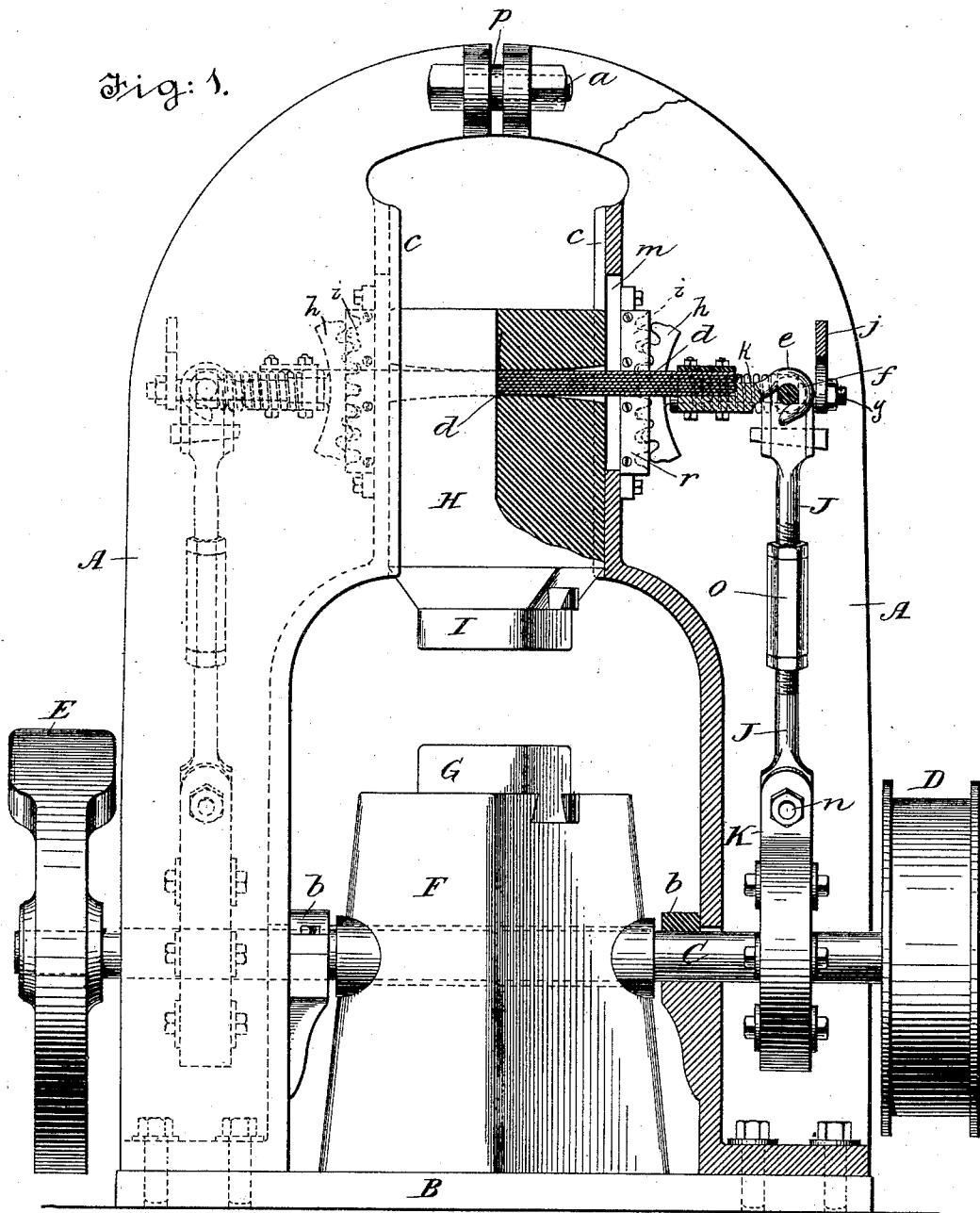
(No Model.)

4 Sheets—Sheet 1.

A. BEAUDRY.
POWER HAMMER.

No. 461,917.

Patented Oct. 27, 1891.



INVENTOR:

WITNESSES:

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(No Model.)

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Fig: 2.

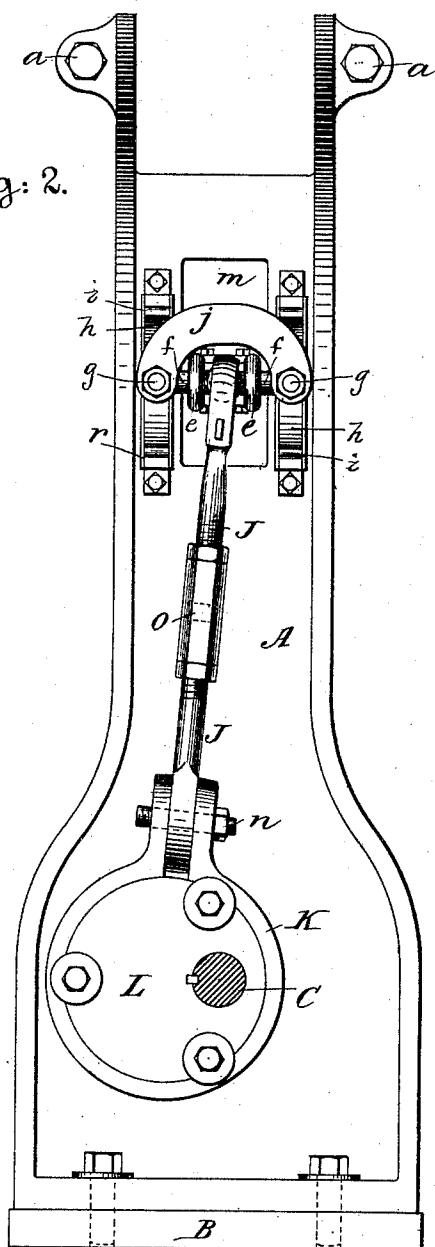


Fig: 3.

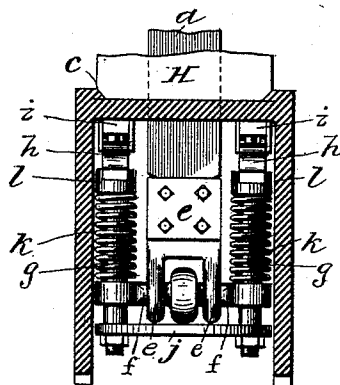
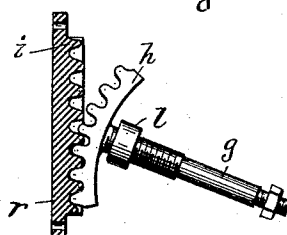


Fig: 3^a.



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Fig: 4.

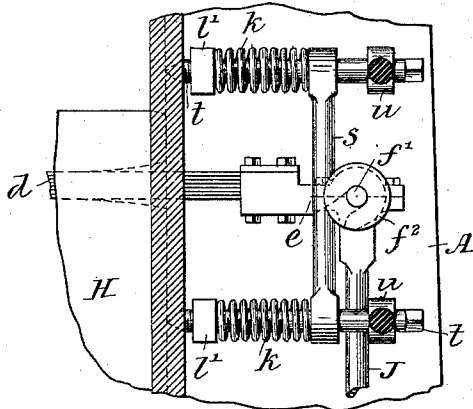


Fig: 6.

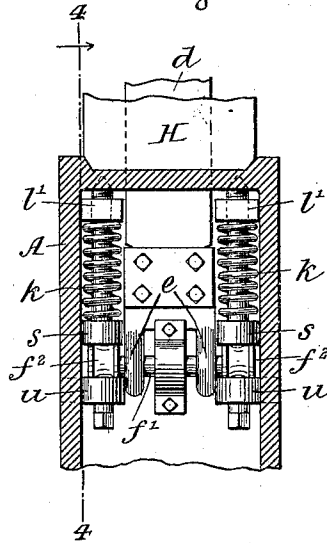
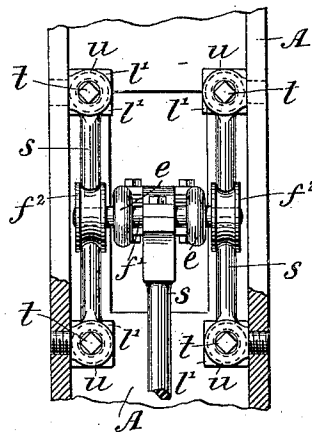


Fig: 5.



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Fig: 7.

Fig: 8.

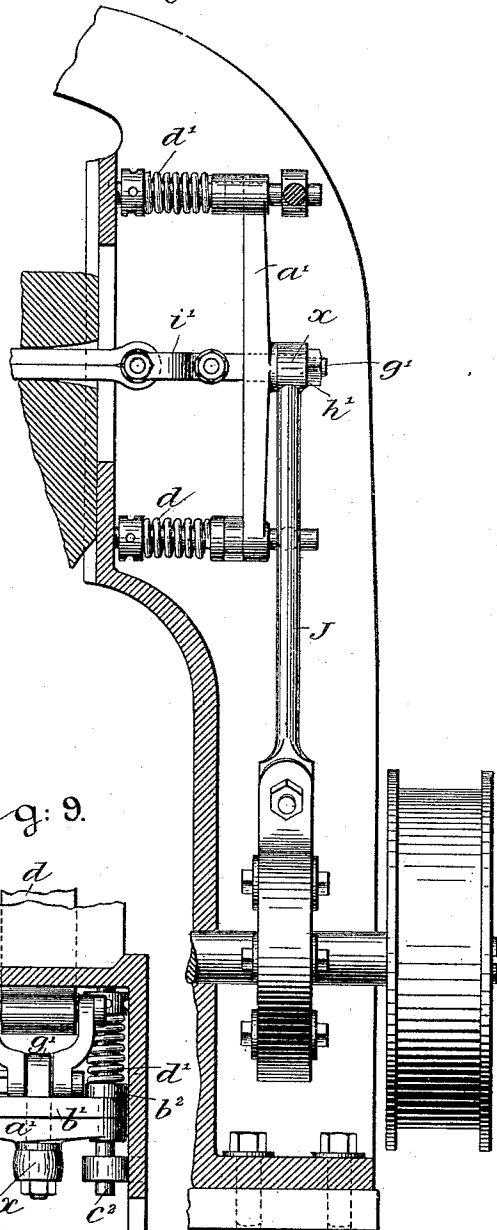
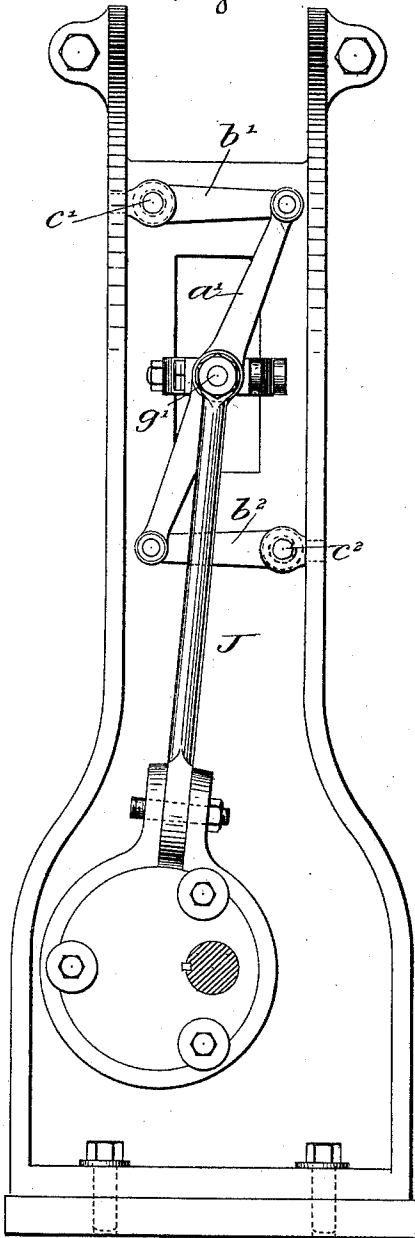
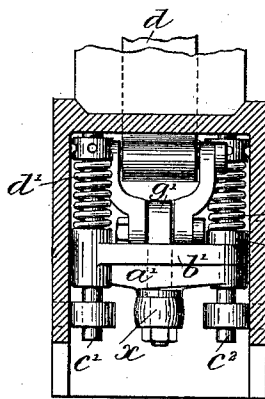


Fig: 9.



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UNITED STATES PATENT OFFICE.

ALEXANDER BEAUDRY, OF BOSTON, MASSACHUSETTS.

POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 461,917, dated October 27, 1891.

Application filed April 5, 1890. Renewed April 13, 1891. Serial No. 388,648. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER BEAUDRY, a citizen of the United States, residing at Boston, Suffolk county, Massachusetts, have invented certain Improvements in Power-Hammers, of which the following is a specification.

My invention relates to improvements in power-hammers; and the object of my invention is to produce a cheap and efficient hammer that will occupy a limited space and be easy to regulate and keep in order.

My invention will be fully described hereinafter and its novel features carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a sectional front elevation of a hammer embodying my improvements, the right side of the figure representing parts of the hammer in section and a part of the frame broken away. Fig. 2 is a side elevation with the fly-wheel removed and the main shaft in section. Fig. 3 is a sectional plan, the plane of the section being indicated by the line 3 3 in Figs. 1 and 2. Fig. 3^a is a detail view, which will be hereinafter described. Figs. 4, 5, 6, 7, 8, and 9 illustrate other embodiments of my invention, that will be hereinafter described.

A represents the frame of the hammer, which I prefer to construct of two like sections or halves of cast-iron, which are united at their tops by bolts *a* and secured at their bases to a bed-plate B by bolts. C is the main or driving shaft mounted in bearings *b* in the frame A. On one end of this shaft is the driving-pulley D and on the other end is the fly-wheel E. This shaft passes through an opening formed in the anvil-bed F, which is mounted on the base B. In this bed is set the anvil or lower die G.

Mounted in vertical guideways or keepers *c*, formed in the inner faces of the two sections of the frame A, is the hammer-head H, which carries the removable die or former I. The head H is inserted in its guides from the top of the frame A, which is left open to permit it to enter freely, and said head is adapted to play up and down in its guideways *c*.

I will now describe the means for imparting a vertical reciprocating movement to the hammer-head in its guideways.

The hammer-head H is suspended on a stout

strap *d*, preferably composed of several strips of rawhide superposed. This strap is passed through an eye in the head and has secured to its respective ends hooks *e*. Each hook engages a yoke or cross-head *f*, to which is coupled a connecting-rod J, said rod being coupled at its lower end to the strap K of an eccentric L, fixed on the shaft C. As the mechanism at one side of the frame A is an exact duplicate of that at the other side, a minute description of that at one side will suffice. In Fig. 1 the mechanism at the left side of the frame is represented in dotted lines, as it is concealed from view by the side plate of the frame, but that at the right side is exposed to view by the breaking away of the frame. The cross-head *f* has eyes in its ends and is slipped onto the respective stems *g* of two like curved racks *h*, which gear, respectively, with two like straight racks *i*, secured to the outer face of the frame A. The stems of the two curved racks are connected by a tie *j*, and on said stems are cushion-springs *k*, which abut at their inner ends against set or screw collars *l* on the respective stems. The cross-head *f* bears on or against the outer ends of said springs.

In Fig. 3^a a curved rack *h* and a straight rack *i* are seen detached, the latter being represented in section. It will be seen by inspection that the pairs of cushion-springs *k* on opposite sides of the frame A, which will be under considerable tension, tend to strain the strap *d* taut, and thus enable it to support the hammer-head without sagging. When the shaft C is set in motion, the eccentrics L, acting through the connecting-rods J, impart a vertical reciprocating motion to the cross-heads *f*, and these latter, moving up and down in unison, impart an up-and-down motion to the hammer-head H through the medium of the strap *d*. In its vertical movement the strap *d* plays in apertures *m* in the frame A. As the cross-heads *f* move up and down, the curved racks *h* rock on the straight racks *i*, and thus cause the cross-heads *f* to move in substantially parallel planes. This prevents any appreciable slacking of the endwise strain on the strap *d*. However, as in this class of hammers the normal movement of travel of the hammer-head (due to the throw of the eccentrics in this case) is

exceeded when the hammer-head is in rapid movement, owing to the acquired momentum of said head, the strap will be flexed at the end of the downstroke (and to a less extent at the end of the upstroke) and the cross-heads f will be drawn inward, the springs k yielding to allow for this flexure. This inward movement of the cross-heads f will draw the connecting-rods J inward at their upper ends to a slight extent, and to allow for this I couple these rods to their respective eccentric-straps by coupling pins or bolts n , the axes of which are at right angles to the axis of the eccentric-shaft C . In order to allow for the swinging movement of the connecting-rod forward and back as the eccentric rotates, I make the bearing on this cross-head f where it receives the upper end of the rod of a spherical form. The connecting-rods may be provided with coupling-sleeves o , whereby they can be lengthened and shortened within limits for accurate adjustment of their length.

When the guideways in the frame and the sides of the hammer-head shall have become worn to such an extent that the latter plays too loosely, the two sections of frame A may be brought nearer together by inserting a thinner washer p at their upper ends and screwing up the bolts a thereat, and the bolts which secure the bases of the frame-sections to the bed-plate B may be loosened and the said sections set nearer together at the base. The bolt-holes in the frame will be slotted for this purpose. In order to keep the curved racks h in engagement with the straight racks i , or to insure against the former slipping laterally off the latter, I prefer to provide the racks i with side plates r , as shown.

I employ the curved racks h and straight racks i as a means of preserving the parallelism of the cross-heads f in their reciprocating movements; but other means or parallel mechanisms may be employed for this purpose. In Figs. 4, 5, and 6 I have shown such a substitute mechanism, and this I will describe, premising that I have deemed it sufficient in these views to show only such parts of the hammer as are necessary to clearly illustrate the operation of said substitute mechanism, the other parts (not shown) being the same as those already described.

Fig. 4 is a sectional elevation taken in the plane of the line 4-4 in Fig. 6. Fig. 5 is a side view similar to Fig. 2, and Fig. 6 is a plan view similar to Fig. 3. In these views the cross-head f' is coupled to the connecting-rod J in the same manner as the cross-head f , before described, and bears on its extremities grooved sheaves f'' , which roll on track-bars s . These bars have eyes in their extremities and slide on stems t , mounted in the frame A . The track-bars s bear on cushion-springs k on the stems t , on which are square screw-collars l' , against which the said springs abut. The hooks e engage the cross-head in the same manner as described with reference to Figs.

1, 2, 3, and 3^a. In order to regulate the tension of the springs k , I screw the collars l' along their respective stems, and to do this I mount said stems rotatively, their conical tips having bearings in the main frame A and their bodies in studs u in the said frame. The square nut-like collars l' are so close to the respective side plates of the frame that they cannot turn, and the screw-threaded stems t may be rotated with a wrench, as will be readily understood.

In Figs. 7, 8, and 9 I have illustrated another embodiment of my invention, which differs from that illustrated in Figs. 1 to 3^a only in the parallel motion or mechanism, whereby the upper ends of the connecting-rods J are made to move in parallel planes.

Fig. 7 is a side view corresponding to Fig. 2. Fig. 8 is a front view corresponding to Fig. 1, and Fig. 9 is a sectional plan view corresponding to Fig. 3. In Fig. 8 I have only shown one side of the hammer, as the other side will be a duplicate thereof. In this embodiment of the invention the connecting-rod J is coupled at its upper end to a wrist x on a diagonally-arranged link a' , which is coupled at its respective ends to the free ends of two rocker-arms b' and b'' . These arms are alike, but reversed as to position, and are respectively mounted to turn about and slide on cylindrical fixed screw-threaded rods c' and c'' , being cushioned, respectively, on springs d' and d'' on said rods. These springs abut against tension-regulating nuts e' and e'' on the respective rods. The wrist x , to which the rod J is coupled, is tubular and through it passes an eyebolt g' , a nut h' on said bolt serving to hold it and the connecting-rod in place. To the end of this eyebolt is coupled a yoke l' , to which is connected the end of strap d . The axes of the wrists x on the opposite sides of the hammer-frame are compelled to move up and down in parallel planes by reason of the Z-shaped parallel motion, consisting of the diagonal link a' and rocker-arms b' and b'' , which latter will be of uniform length. The cushion-springs d' and d'' perform the same functions as the springs k of the other constructions described. It will be obvious that a parallel motion may be employed in all respects similar to that described, except that the plane of the Z formed by the link a' and arms b' and b'' will be at right angles to that seen in Fig. 7.

Having thus described my invention, I claim—

1. In an upright power-hammer, the combination, with a frame and a hammer-head mounted to play in vertical guides in the same, of a shaft C , mounted in the lower part of said frame, two eccentrics L on said shaft, the eccentric-straps K , the connecting-rods J , the strap d , which carries the hammer-head, and cushioned parallel motions, substantially as described, coupled to the respective ends of said connecting-rods, the said strap d being also coupled at its respect-

ive ends to the said parallel motions, substantially as set forth.

2. In an upright power-hammer, the combination of the base-plate B, the two sections
5 A A of the frame mounted adjustably thereon and provided with securing-bolts a at the top, and guides $c c$ for the hammer-head, the said hammer-head, and means, substantially as described, for imparting a reciprocating move-
10 ment to said hammer-head in its guides, as set forth.

3. The combination, with a frame, a hammer-head mounted in guides therein, a suspending-strap d , which supports said head, the
15 shaft C, the eccentrics thereon, the eccentric-straps and connecting-rods, and the two like-cushioned parallel movements, to which the strap d is attached at its respective extremities, said movements each comprising a diag-
20 onal link a' , to which the strap d is coupled, the two rocker-arms b' and b^2 , to the free ends of which the respective ends of the link a' are

coupled, the rods c' and c^2 , on which said arms are mounted, and the cushion-springs on said rods between the arms and the frame, 25 substantially as set forth.

4. In a vertical power-hammer, the combination, with a frame provided with guides for the hammer-head, the said hammer-head mounted therein, the supporting-strap d , the
30 cross-shaft C in said frame, the eccentrics on said shaft, the straps on said eccentrics, the connecting-rods coupled at one end to said straps and connected at the other end to the
35 respective ends of the strap d , and guides for the said rods, substantially as set forth.

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

ALEXANDER BEAUDRY.

Witnesses:

GEO. E. SMITH,
GEORGE A. TREADWELL.