

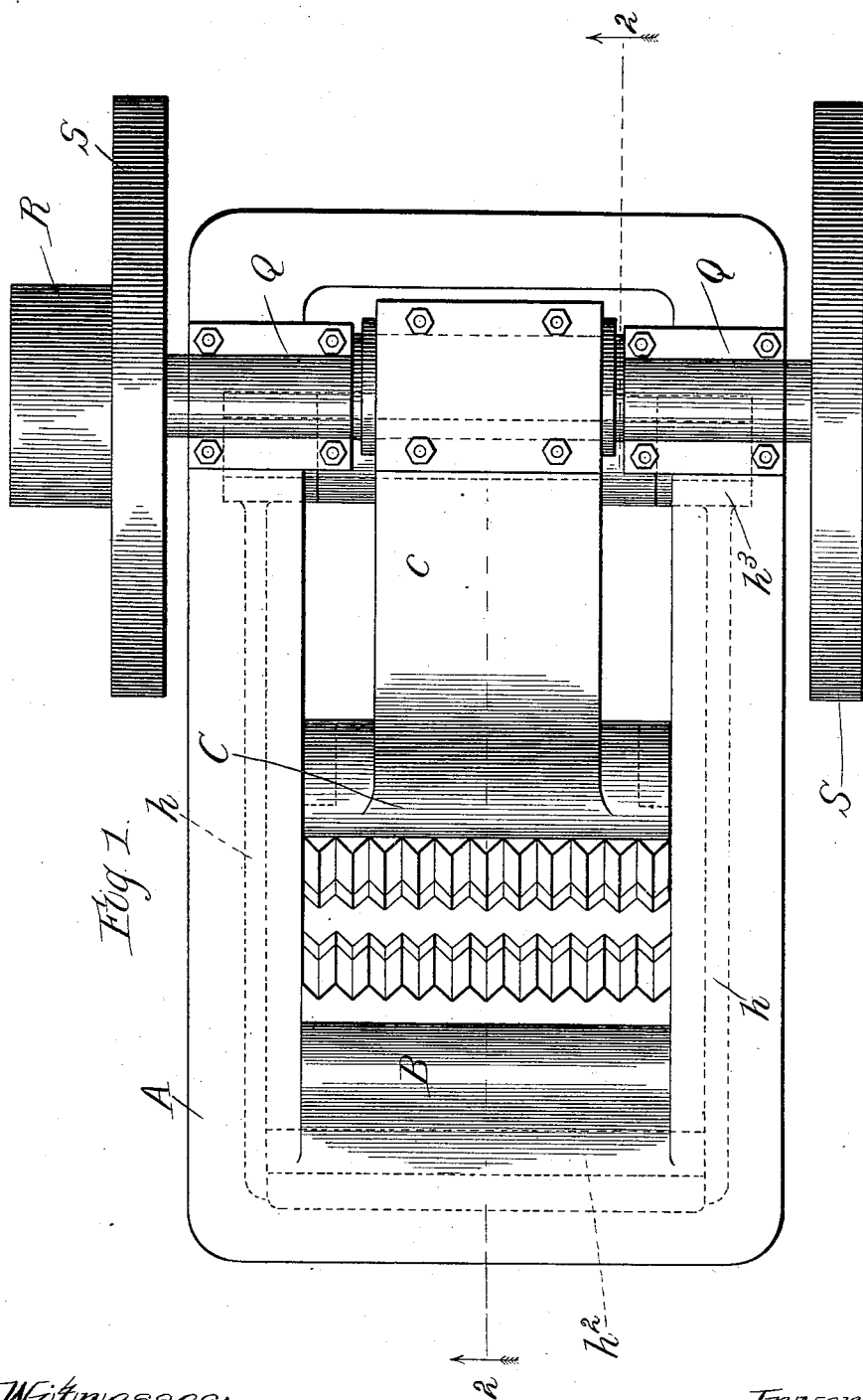
(No Model.)

3 Sheets—Sheet 1.

M. J. EICHHORN.
CRUSHING MACHINE.

No. 585,190.

Patented June 29, 1897.



Witnesses:
A. F. Durand.
Reta M. Wagner.

Inventor:
Melker J. Eichhorn
by Page & Beffield,
Attorneys.

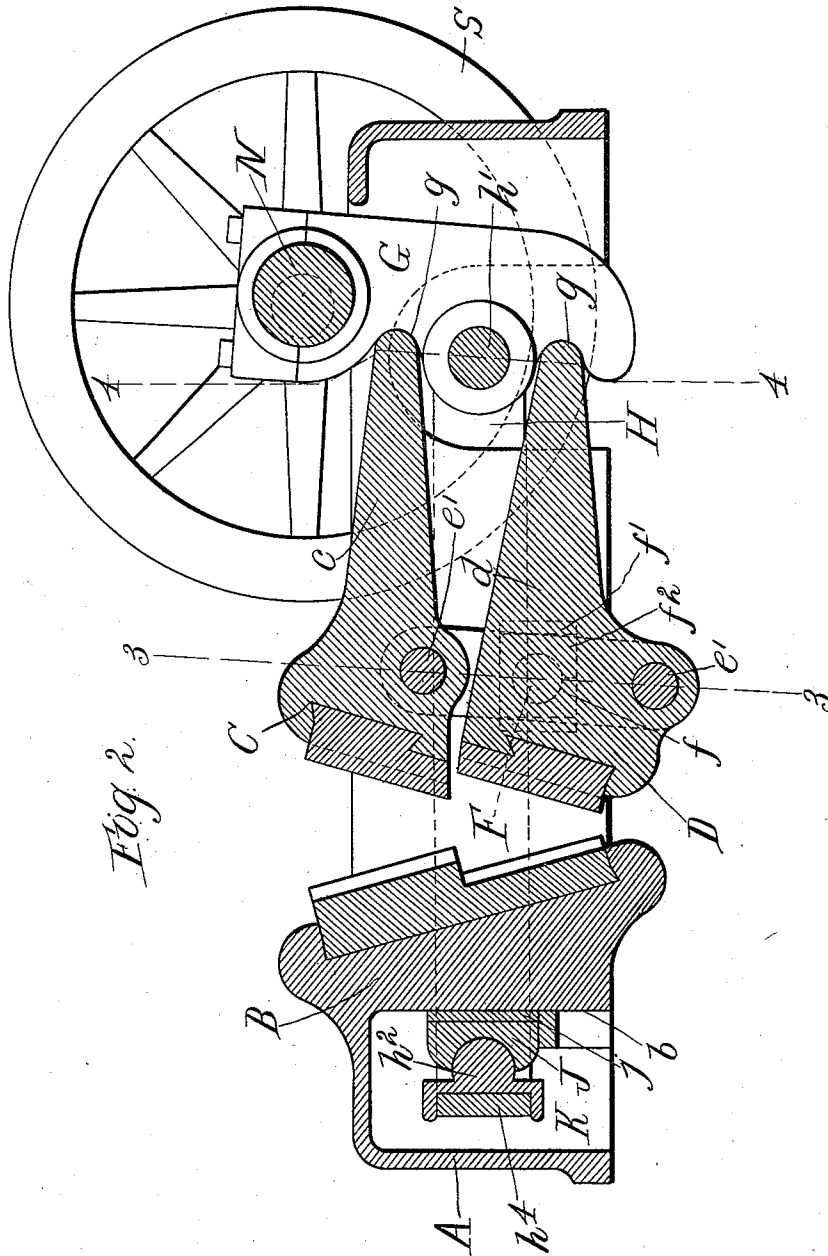
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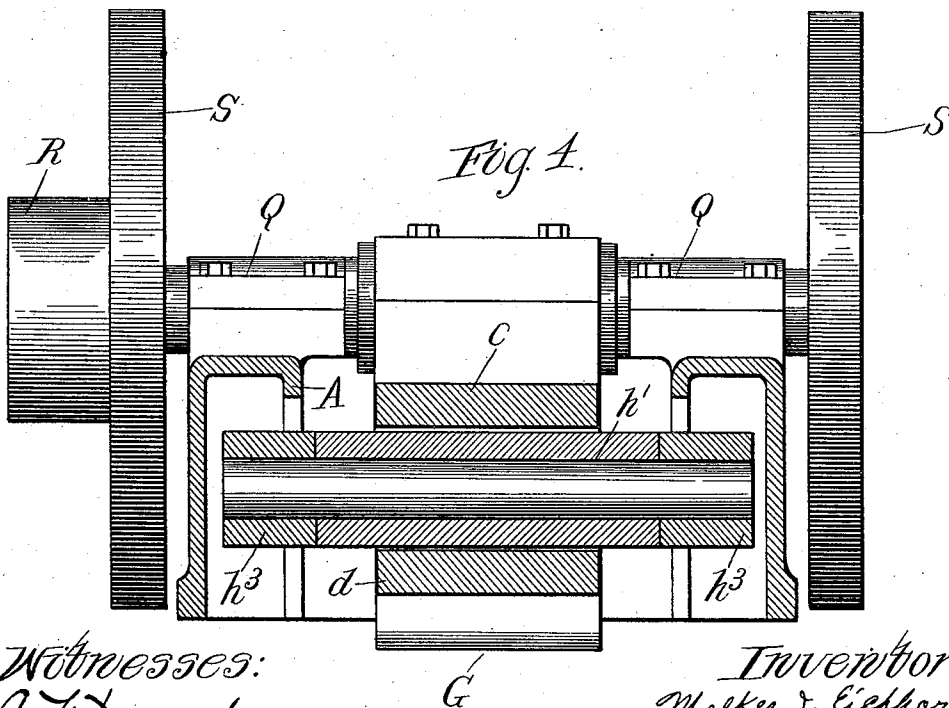
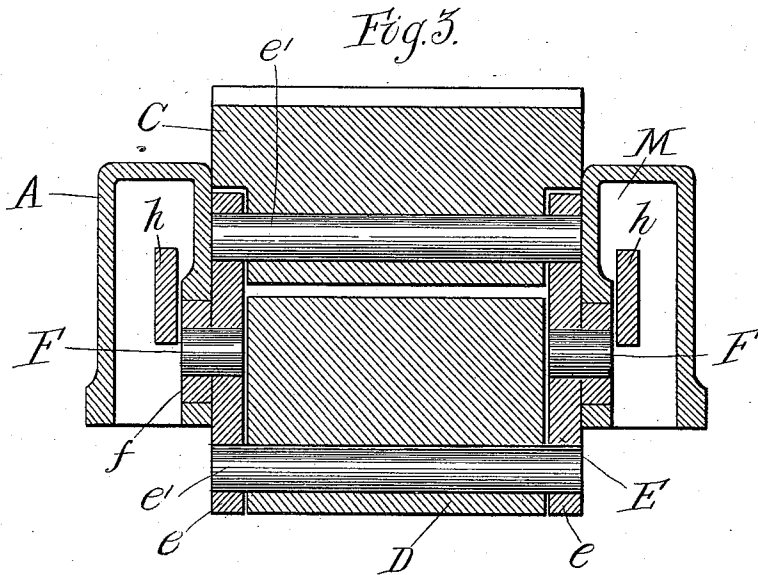
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UNITED STATES PATENT OFFICE.

MELKER J. EICHHORN, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF SAME PLACE.

CRUSHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 585,190, dated June 29, 1897.

Application filed June 27, 1896. Serial No. 597,105. (No model.)

To all whom it may concern:

Be it known that I, MELKER J. EICHHORN, a subject of the King of Sweden and Norway, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Crushing-Machines, of which the following is a specification.

My invention relates to crushers of the kind in which upper and lower jaws are arranged in the crushing-hopper, usually opposite to a single fixed or stationary jaw, and are thrust forward in alternation, so that the material is crushed first by the upper jaw and then by the lower one. By saying that the crushing-jaws are "thrust" forward during their crushing-stroke I mean that they are pushed or driven forward in contradistinction to being drawn or pulled forward. The result of the forward thrust in such crushers is that a reactionary force is created which tends to wrench or rupture the frame or bed of the machine.

The principal object of my invention is to obviate this objectionable feature and at the same time to apply this reactionary force where it will tend to neutralize the oppositely-directed force of the opposing crushing member or jaw.

To such end my invention contemplates arranging a connector between the mechanism which thrusts the jaws forward in alternation and the forward portion of the frame of the machine and applying one end of such connector to said mechanism, so as to form an abutment in opposition to the forward thrust of the jaws, and connecting the other end to such portion of the frame of the machine, so that the connector shall receive the reactionary force of the jaws as a tensile strain. The connector can be of any suitable construction and can be applied to the operating mechanism and connected to the bed or frame of the machine in any well-known or preferred manner.

In the machine more particularly described hereinafter the jaws are supported by a pivotally-connected swinging link and are thrust forward by a pitman operated by an eccentric, and the pitman is connected to the frame of the machine by a tension-link which has one end pivotally connected to the pitman,

while the other end is connected with the machine forward of the opposing crushing member. By such arrangement the pitman forms a lever for reciprocating the jaws in alternation, having for its fulcrum the pivotal connection with the tension-link, and this tension-link provides a connector which receives the entire strain incident to the crushing operation, and thus relieves the frame or bed of the machine of the same.

In the accompanying drawings, Figure 1 is a top plan of a machine embodying my invention. Fig. 2 is a vertical section taken on line 2 2 in Fig. 1. Fig. 3 is a transverse section taken on line 3 3 in Fig. 2, and Fig. 4 is a transverse section taken on line 4 4 in Fig. 2.

The crushing-machine illustrated is provided with the bed or frame A and the fixed or stationary crushing-jaw B, which is formed integral with the bed A. The movable jaws C and D are pivotally connected with the swinging link E, which is composed of the side bars *e* and the end rods *e'*, the latter being passed through corresponding transverse circular holes in the jaws, as shown in Figs. 2 and 3, to form the pivotal connection.

The link E is pivotally connected with the bearings *f*, which are adjustably supported in the frame, the connection between the link and bearings herein shown consisting of the pivots or studs F, which engage corresponding holes in the bars *e*.

The plates *f*, which form the bearings for the pivots F, are made adjustable by placing them in guideways or slots *f'* in the frame, (shown in dotted lines, Fig. 2,) in which they may be moved longitudinally to increase or decrease the opening at the bottom of the crushing-hopper.

For the adjustment of the bearings *f* a number of plates or shims *f*² are provided, some of which are inserted in the slots *f'* on either side of the bearings. By shifting these plates or shims from one side of the bearing to the other the desired adjustment is effected. One of the plates or shims for each bearing is desirably made of rubber or like elastic material to permit a slight play on the part of the points of connection of the link E.

The movable jaws C and D are also provided with the rear extensions *c* and *d*, which

latter have jointed connections with the pitman G. In arrangement the ends of the extensions *c* and *d* are rounded and corresponding indentations *g* in the pitman. Connected to this pitman G is the link II, which is composed of the side bars *h* and the end rods *h'* and *h''*. The rod *h'* is made cylindrical and when passed through a corresponding hole in the pitman G, as in Fig. 4, forms a serviceable and satisfactory pivotal connection. The rod *h''* is provided with a semicircular bearing which fits a corresponding journal J at the forward end of the crusher. The rod or end piece *h'* may be held by sockets *h''*, formed in the ends of the side bars *h*, (shown in dotted lines in Fig. 1,) and the end piece *h''* be held by a strap *h''*, formed integral with the side bars, which fits into a channel on the outside of said end piece. This link II is supported forward of the stationary jaw B, and to such end a recess K, Fig. 2, may be formed in the bed A and the box or journal J supported therein. The journal J is also made adjustable, as by changing the number of blocks or plates *j* between it and the face *b*, against which it presses, the adjustment of the journal obviously effecting a corresponding adjustment of the point of support of the swinging link E. The sides of the frame or bed A are also provided with a longitudinal recess M, Figs. 3 and 4, in which the side bars *h* may work. Such a construction of frame permits the free movement of the link II and at the same time protects it from injury from external sources.

The pitman G is operated by the eccentric shaft N, which is supported on the bed A in the boxes Q. A belt-pulley R and the fly-wheels S are also mounted on the eccentric shaft N.

The action of the machine will become evident by referring to Fig. 2. The rotation of the eccentric shaft N imparts to the pitman a bodily up-and-down motion and at the same time swings the upper end of the latter backward and forward about its point of connection with the link II. The bodily up-and-down motion of the pitman will vibrate the jaws C and D about their points of connection with the link E. Such vibration, while it will be very slight, will evidently move the crushing-faces of the jaws upward and downward, and thereby feed the material through the crushing-hopper. The forward-and-backward movement imparted to the upper end of the pitman causes it to act as a lever, the connection with the link II forming a movable fulcrum. This connection of the pitman and link II being between the points of connection of the jaws and the pitman, the former are thrust forward in alternation. The forward movement of one jaw results in the backward movement of the other jaw, for the reason that both are connected to the swinging link E, and both receive a slight bodily up-and-down swinging movement about the point of support of the swinging

link as center. Although I have described these movements singly and separately, it will be understood that they occur simultaneously and conjointly and that the movement of the jaws is a compound movement resulting from the combined action of all. For instance, the forward thrust of the upper jaw is accompanied by a very slight downward movement of its crushing-face, due to the excess of vibratory motion over the upward swinging movement caused by the link E, while during the return stroke the crushing-face has a slight upward movement, due to the same causes. At the end of the return stroke, however, the vibratory movement of the jaw becomes very pronounced and occurs in a direction to move the upper portion of the jaw-face forward and its lower portion backward. This gives a very efficient downward feeding action. The action of the lower jaw is substantially the same. The movements of the two jaws, however, occur in opposition—that is to say, while the upper jaw is moving forward the lower one is moving backward, and vice versa.

The link E has the dual function of causing the return stroke of the jaws and of imparting to them a slight swinging motion. In this capacity it is preferable to a construction of crusher involving guideways for controlling the reciprocation of the jaws and separate springs or the like for enforcing the return strokes of the same.

What I claim as my invention is—

1. A crusher having a crushing-hopper comprising upper and lower reciprocating jaws; mechanism for thrusting the jaws forward in alternation; and a connector having one end applied to said mechanism so as to form an abutment in opposition to the forward strokes of the jaws, and having the other end connected with the frame of the machine forward of the point of application thereof to said mechanism, as set forth.

2. A crusher having a crushing-hopper comprising upper and lower movable jaws supported both for vibratory, and for bodily reciprocating movement; a vibratory lever having a jointed connection with said jaws so as to thrust the same forward in alternation by its vibratory motion; and a swinging tension-link having one end pivotally connected to the lever between the points of connection of the jaws therewith, and having the other end connected with the frame of the machine forward of the opposing crushing member, as set forth.

3. A crushing-machine having a crushing-hopper comprising upper and lower reciprocating jaws; a swinging link to which the jaws are pivotally connected at opposite sides of its point of support; and a lever having a jointed connection with each of said jaws, and provided with a reciprocating fulcrum with which the lever has a fixed connection between the points of connection of the jaws therewith, whereby the swinging of the lever

about its relatively stationary fulcrum during reciprocation causes the bodily reciprocation of the jaws in opposite direction, as set forth.

4. A crushing-machine comprising a crushing-hopper having upper and lower reciprocating jaws; a swinging link to which the jaws are connected, at opposite sides of its point of support; a pitman having a jointed connection with each of said jaws; and a tension-link pivotally connected with the pitman, and supported forward of such point of connection, substantially as described.

5. In a crusher the combination of the upper and lower reciprocating jaws; a pivotally-supported swinging link pivotally connected

with said jaws on opposite sides of its point of support; bearings for said link provided on each side with shims, whereof at least one is elastic; a pitman having a jointed connection with said jaws; an eccentric for operating the pitman and a tension-link pivotally connected with the pitman and connected with the frame of the machine forward of the opposing crushing member, substantially as described.

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Witnesses:

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