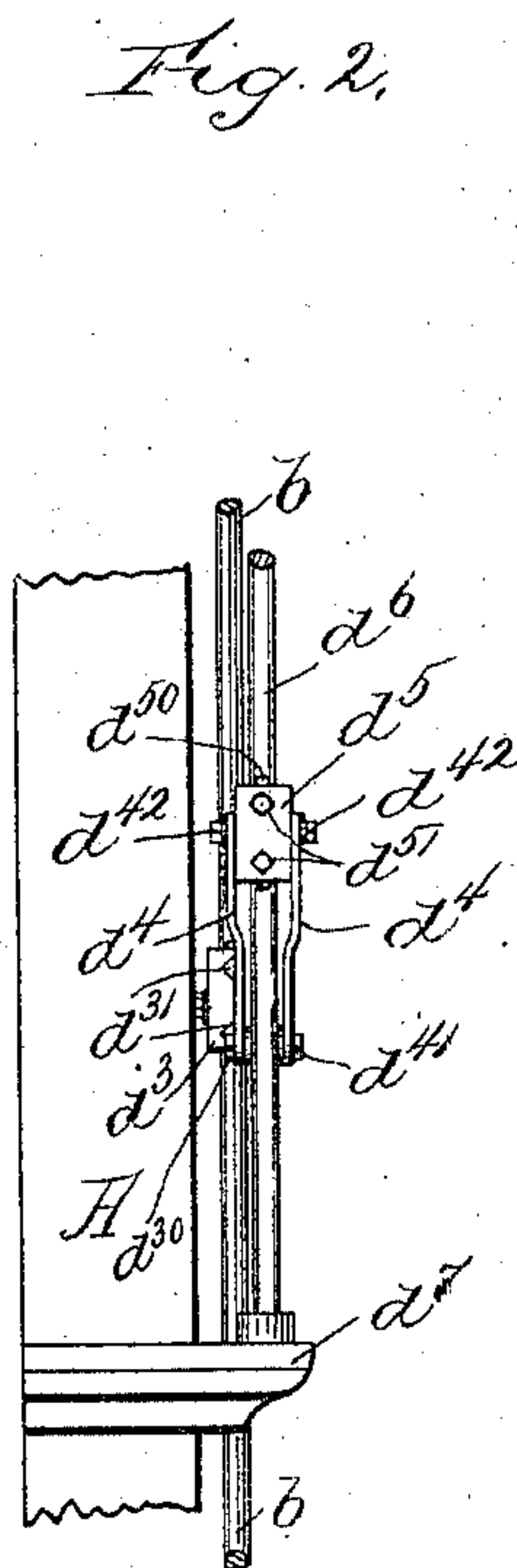
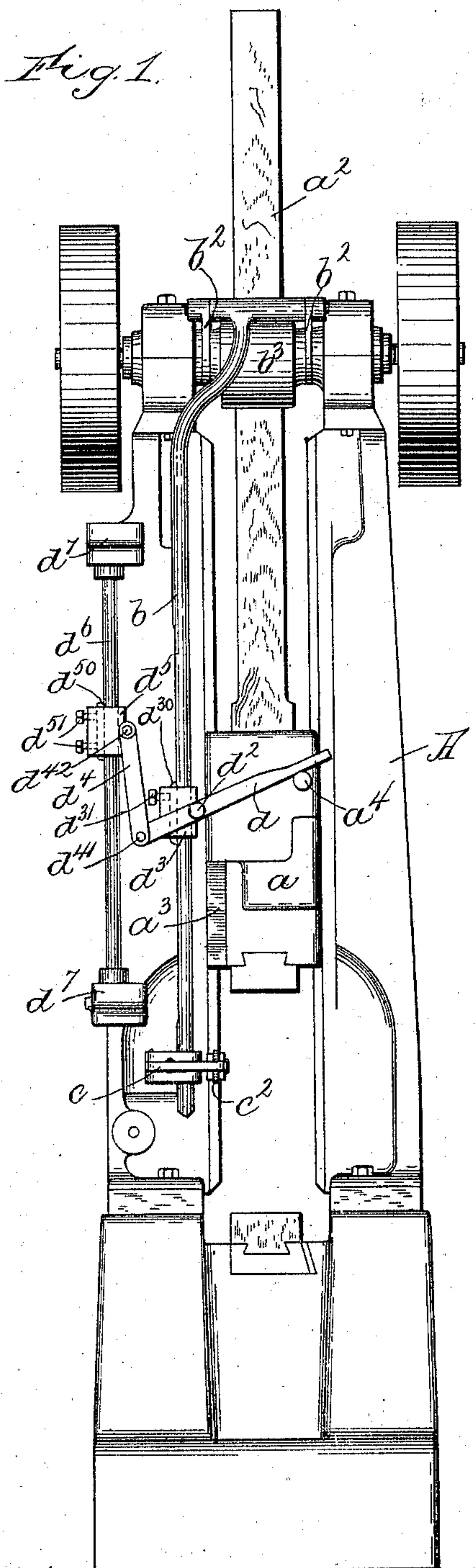


(No Model.)

C. T. FLETCHER.
DROP HAMMER.

No. 575,472.

Patented Jan. 19, 1897.



Witnesses,
Jas. J. Maloney,
H. Livermore

Inventor,
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by J. P. Livermore
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES T. FLETCHER, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO
JOHN C. SPEIRS, OF SAME PLACE.

DROP-HAMMER.

SPECIFICATION forming part of Letters Patent No. 575,472, dated January 19, 1897.

Application filed May 25, 1896. Serial No. 593,005. (No model.)

To all whom it may concern:

Be it known that I, CHARLES T. FLETCHER, of Worcester, county of Worcester, and State of Massachusetts, have invented an Improvement in Drop-Hammers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a drop-hammer, and is embodied in an improved automatic releasing device intended to be used with a hammer having a lifting-board adapted to be engaged between oppositely-rotating friction-rollers, the said rollers being pressed against the said lifting-board, as by a weight, which is adapted to be lifted by said releasing device, which is operated by the hammer as it rises to separate the rollers and allow the hammer to drop.

The device embodying the present invention is intended especially for use with a hammer constructed substantially as shown in Patent No. 545,188, granted August 27, 1895, to F. C. Billings and F. Lombard, and is herein shown as applied to such a hammer, and will be described in connection therewith, it being obvious, however, that the same device might be arranged to cooperate with other hammers operating on the same general principle.

It is essential in hammers which are lifted by friction-rolls and released by the separation of said rolls, so that they cease to act upon the lifting-board, that the separation of the rolls to release the hammer should be produced by a slow and gradual movement thereof, in order to prevent the release of the hammer from being too sudden, in which case the momentum of the hammer when operated at different speeds might cause it to rise higher in some instances than in others, producing an irregular operation thereof, which is objectionable both on account of the nature of the work to be done and on account of its tendency to break or strain the machine. To provide for such relatively slow movement of the rolls, the hammer is arranged to cooperate with a suitable shifting device by means of a compensating connection consisting of a le-

ver, the long arm of which is engaged by the hammer, while the short arm engages and produces the movement of the said shifting device, which preferably consists of a weighted rod, the weight of which when it is not lifted or supported acts on the rolls to press them against the lifting-board of the hammer.

In the device shown in the Billings and Lombard patent the lever is pivotally connected to the shifting rod and is supported upon a fulcrum-pivot connected with the frame of the machine, the opposite end of said lever being adapted to be engaged by a projecting portion of the hammer as the said hammer rises. Since the shifting rod is connected to the lever between the fulcrum and the point of engagement with the hammer, it is obvious that the hammer operates upon the long arm of the lever, so that a considerable movement thereof is required to produce a relatively small movement of the shifting rod. This arrangement affords a certain amount of compensation and produces, as is desired, a relatively slow movement of the shifting rod, the said movement, however, being substantially uniform in its relation to that of the hammer throughout its entire extent.

The present invention aims to provide a still further compensation whereby the speed of movement of the shifting rod is not only less than that of the hammer, but decreases in speed with relation to that of the hammer as the latter approaches its limit. By this device it is found that better results are obtained, since the movement of the rolls away from the lifting-board is most pronounced at the beginning thereof, or when the hammer is rising at practically maximum speed, and becomes relatively less as the speed of the hammer is reduced, the final disengagement being very gradual, so that the uniformity of operation is thereby enhanced. This is accomplished by providing the lever with a movable fulcrum whereby the short arm thereof is maintained of a constant length, the long arm increasing as the hammer rises, owing to the fact that the lever moves on the arc of a circle, while the hammer moves in a straight line, so that the point of engagement

between the hammer and the lever is shifted away from the fulcrum as the hammer and lever rise.

The releasing device constructed and arranged in accordance with the present invention, moreover, is more durable and produces less vibration and wear than those heretofore constructed, as will be hereinafter described.

Figure 1 is a front elevation of a hammer embodying the invention; and Fig. 2 is a detail in side elevation, showing the device which forms the essential feature of the invention.

The hammer a is vertically movable between two guide-supports A and is provided with the lifting-board a^2 , which coöperates with continuously-rotating rollers, one of which is shiftable toward the other, substantially as shown and described in the Billings and Lombard patent above referred to, and requiring no further detailed description in connection with the present application. The shiftable roller is moved toward its mate and held against the side of the lifting-board a^2 by means of a weight, herein shown as a weighted rod b , hereinafter referred to as the shifting rod, which is connected by arms b^2 to an eccentrically-supported bearing box or journal b^3 for the roller, so that when the said shifting rod is lifted the roller is carried away from its mate, being normally, however, held against the side of the lifting-board by the weight of said rod b . When, therefore, the said rod is not supported, the weight thereof will cause the rollers to coöperate with the lifting-board a^2 to raise the hammer, means being provided whereby the said shifting rod b is lifted when the hammer has reached a predetermined height, thus shifting the rolls and releasing the lifting-board.

After the rod b has been lifted by the hammer it is essential that it should be supported until the hammer has dropped, after which the said rod must again be allowed to drop in order to shift the rolls and produce another upward movement of the hammer. For this purpose a catch or latch c is provided adapted to coöperate with the rod, the said catch being provided with a spring whereby it is caused to enter a notch or recess in the said rod when the rod is raised, so that said notch comes in line with the catch. The said catch is moved out of engagement with the rod after the hammer has fallen, this being preferably accomplished, as shown, by means of the cam-surface a^3 on the side of the hammer, which engages with a cam-roll c^2 upon the catch c , the construction herein shown being substantially similar to that shown in the Billings and Lombard patent, so that it requires no further description.

It is obviously essential for the best operation of the device that the rod should be lifted with a comparatively slow movement relative to the speed of movement of the hammer in order to gradually relieve the friction on the

lifting-board a^2 and insure a uniformity of movement of the hammer at each operation thereof.

The present invention relates mainly to the automatic releasing device or means for lifting the rod b , and the said releasing device consists of a lever d , pivoted at d^2 to an adjustable slide or clamping-piece d^3 , secured to the rod b , the said lever d having a movable fulcrum provided, as shown herein, by means of a link or links d^4 , pivoted at one end to an adjustable slide d^5 , secured, as by set-screws d^{51} , to a supporting rod or guide d^6 , which may be secured to the frame of a machine in any suitable way, as by brackets d^7 , at the top and bottom of the rod. Coöperating with the said lever d is a stud or projection a^4 from the hammer adapted to engage the under side of said lever d as the hammer rises, the said lever then moving on its fulcrum, herein shown as the pivotal connection d^{41} , at the end of the links d^4 , thus lifting the rod b . It is obvious that as the hammer rises, since the pin a^4 moves in a vertical direction while the lever d travels on an arc, the point of application of the force tending to lift the said lever is shifted away from the fulcrum of the lever as the hammer rises, thus increasing the length of the long arm of the lever with relation to the length of the short arm, which remains constant, being always the distance between the pivot d^2 and the pivot d^{41} . It is obvious, therefore, that the hammer has to travel a considerable distance to produce a relatively small distance traveled by the rod b , the relative distance traveled by the hammer, moreover, increasing as the said hammer reaches the end of its stroke, which results in a very gradual and easy disengagement of the lifting means, thus insuring a substantially perfect uniformity in operation.

The maximum height to which the hammer is intended to travel may be varied by adjusting the slides d^3 and d^5 upon the lifting and supporting rods b and d^6 , so that the lever d may be engaged by the projection a^4 from the hammer a after the latter has reached any desired height. Furthermore, the relation of movement between the hammer and the lifting-rod may be varied by independently adjusting the said slides d^3 and d^5 to change the normal angle of the lever, which results in shifting the point of initial engagement by the hammer or the lever, thus practically varying the length of the long arm of said lever with relation to that of the short arm, which, as has been stated, remains constant throughout all adjustments, since the distance between the pivotal connection d^2 of the said lever with the rod b and the movable fulcrum d^{41} is fixed and remains the same.

As shown in Fig. 2, two links d^4 are preferably provided and mounted on projections from the sides of the slide d^5 and secured, as by nuts d^{42} , the lever d being mounted on a

pivotal pin extending across between the ends of said links, as shown.

The sliding blocks d^3 and d^5 may be secured to the rods in any suitable or usual way, the surfaces of said rods being herein shown as flattened on one side and engaged by a shoe, as d^{30} d^{50} , acted upon by the set-screws d^{31} d^{51} .

It is to be noted that there is a slight lateral movement of the shifting rod, owing to its connection with the eccentrically-mounted journal-box b^3 , thus causing a corresponding lateral movement of the releasing device or lever, which results when the lever is directly pivoted to the stationary frame of the machine, as shown in the Billings and Lombard patent, in constant wear on the pivot-support, it being necessary, moreover, to provide for the movement of the lever longitudinally along its pivot. By the construction embodying the present invention these bad results are obviated, the lateral as well as the longitudinal movements of the lever being taken care of by the links d^4 , with so small a movement on the pivots to which they are connected that it is practically immaterial, the wear being very slight, and the device as a whole operating smoothly and having greater durability than those heretofore used.

I claim—

1. In a drop-hammer provided with a lifting-board and a pair of shiftable lifting-rolls adapted to cooperate therewith, and a weighted rod adapted by its movement to shift said rolls, the herein-described releasing device comprising a lever pivoted to said rod, a movable fulcrum for said lever, and an en-

gaging portion of the hammer adapted to cooperate with said lever, substantially as described.

2. The combination with the hammer, the lifting-board and its rolls and the shifting rod b adapted to cooperate with said rolls, of the lever d pivotally connected to said lifting-rod, and extending into the path of the hammer or an extension therefrom, and the links d^4 pivotally connected at one end to a portion of the frame, and at the other end to the said lever, substantially as described.

3. The combination with the hammer, the lifting-board, the rolls cooperating therewith, and the shifting rod b for the said rolls, of the lever d having a pivotal connection with said shifting rod, the links d^4 pivotally connected to one end of said lever, and the adjustable support for said links, substantially as described.

4. The combination with the hammer provided with a lifting-board, friction-rolls and a shifting rod cooperating with said rolls, of the lever d pivotally connected to a slide adjustable along said shifting rod, the links d^4 connected to said lever, and the support for said links adjustably secured to the frame of the machine, substantially as described.

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

CHARLES T. FLETCHER.

Witnesses:

WILLIAM C. MELLISH,
CHARLES A. MERRILL.