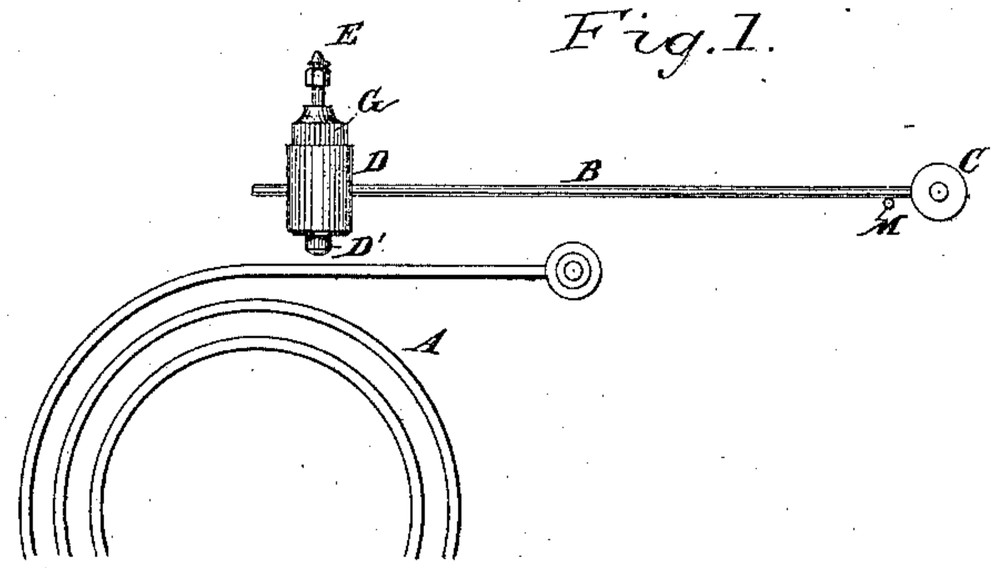
(No Model.)

# C. H. NORTON.

## CLOCK BELL HAMMER.

No. 313,016. Patented Feb. 24, 1885.

Fig. 1.



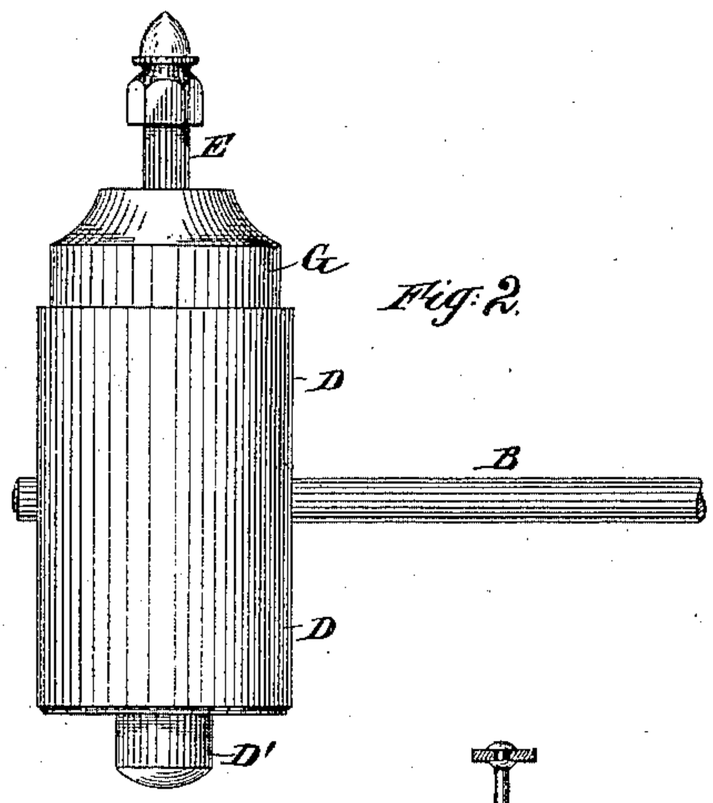




Fig. 2.

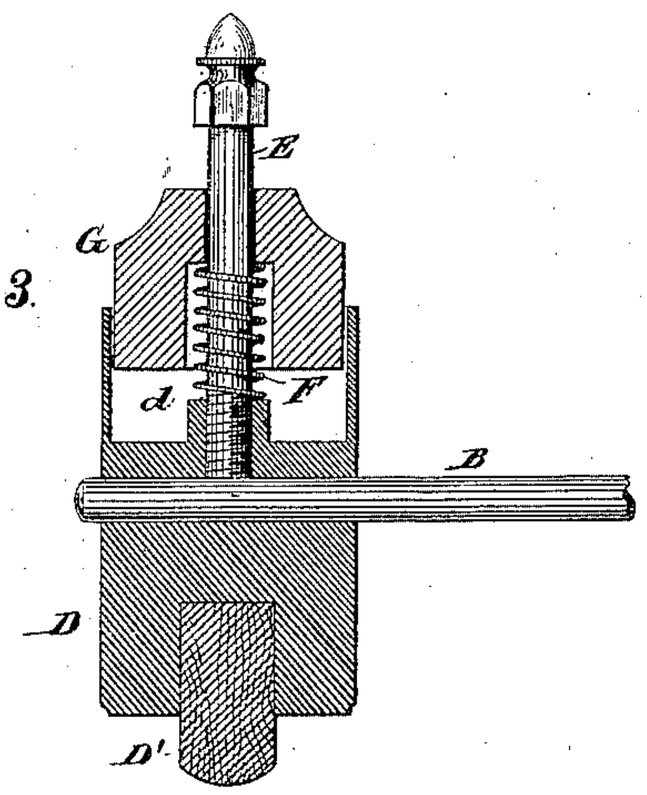



Fig. 3.

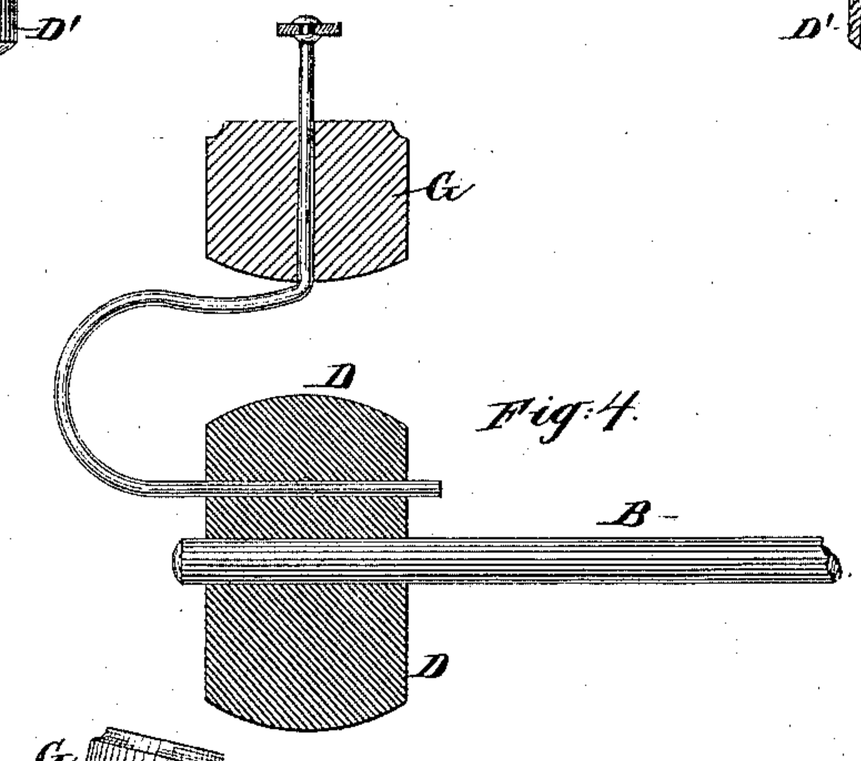



Fig. 4.

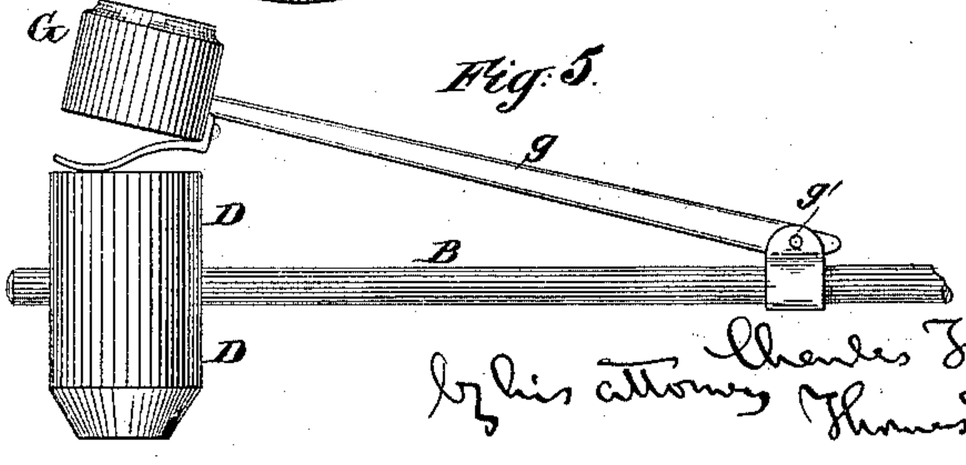



Fig. 5.

Witnesses:
Charles R. Searle,
H. A. Johnstone.

Inventor:
Charles H. Norton
by his attorneys Thomas Drew Stetson

# UNITED STATES PATENT OFFICE.

CHARLES H. NORTON, OF THOMASTON, CONNECTICUT, ASSIGNOR TO THE SETH THOMAS CLOCK COMPANY, OF NEW YORK, N. Y.

## CLOCK-BELL HAMMER.

SPECIFICATION forming part of Letters Patent No. 313,016, dated February 24, 1885.

Application filed October 28, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES H. NORTON, of Thomaston, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in Clock-Hammers, of which the following is a specification.

One of the difficulties in clock-striking mechanism is to so operate the hammer that it shall give its full effective blow, or a large proportion thereof, upon the bell, and then immediately retreat so as to allow the bell to vibrate freely. The retreat is usually effected by interposing a spring to be struck by the handle or lever of the hammer, and compressed in order to allow the hammer to reach the bell. Such spring will, by its elastic rebound, hold the hammer away from the bell after the blow. In large clocks such spring is usually obtained by what is called a "buffer," introduced under a relatively rigid lever. In small clocks the elasticity is obtained by the spring of the lever itself. A simple metal pin is introduced to be struck by the lever before the hammer-head strikes the bell. Whatever may be the manner in which the elasticity is introduced, it is found that under ordinary conditions the hammer under the influence of such spring makes a series of quick vibratory movements after each blow, which, unless the spring is adjusted to hold the hammer at a considerable distance from the bell, makes a confused chattering sound, instead of leaving the bell free to give its proper clear tone as the effect of each blow. Any spring capable of holding the hammer back a considerable distance consumes much of the force of the blow in compressing it. I have devised an improvement in the hammer by which its tendency to make the series of quick vibrations referred to is effectually suppressed, so that only a slight amount of elastic force sufficient to hold the hammer away an almost inappreciable distance from the bell will suffice to avoid the chattering sound. I have in my experiments attained this by mounting on, or rather in the back of the hammer an additional weight, which is allowed to move to a limited extent toward and from the hammer. It is held away from the hammer by a gentle spring. I have used the weight of a cylindrical form, and inclosed it in a loosely-fitting cylindrical case mounted on the back of the hammer. During the downward stroke of the hammer the additional weight tends to be left behind, and rises relatively to the hammer, so that the spring beneath it is extended and a large quantity of air is received in the loosely-fitting cylinder below it. When the hammer is suddenly arrested by striking the bell, the loose weight, actuated by momentum and gravity, continues its downward movement, compressing the spring, and also cushioning the air, and causing it to gush out with difficulty through the contracted space between the weight and the inclosing-cylinder. The loose weight is by these two forces arrested gradually and prolongs its force, acting against the back of the hammer for so long a period that it resists the tendency of the hammer to rebound too far. The hammer, with my invention, will, so soon as the blow is struck, retreat to a slight distance, and there remain without vibration until it is again lifted by the mechanism of the clock to repeat the blow. This dead action of the hammer does not, so far as I can observe, subtract from the force of the blow. The arrangement produces a full and effective blow without being diminished to any appreciable extent by being compelled to overcome the force of the ordinary strong spring required to hold the hammer away from the bell.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a general side elevation showing the hammer with its handle, stop-spring, and bell. The bell in this figure is the favorite volute steel wire; but this may be varied. Figs. 2 and 3 show the hammer-head and its immediate attachments on a larger scale. Fig. 2 is a side elevation, and Fig. 3 a central vertical section. The remaining figures represent modifications, and will only be referred to as such. The main body of the description refers to Figs. 1, 2, and 3. Fig. 4 is a modification in which the loose weight is attached to the hammer-head by a C-shaped spring. The elasticity is in the connection

itself. Fig. 5 is a modification in which the loose weight is attached by a lever, a separate spring being mounted between the loose weight and the hammer-head.

In the principal forms, Figs. 1, 2, and 3, which are referred to by letters, and also both the modifications shown, the weight is free to rise a little distance farther than it is lifted by the spring.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

Referring to Figs. 1, 2, and 3, A is the bell; B the lever or handle of the hammer turning on a center, C; D, the hammer-head, and *d* a cylindrical cavity formed in its back.

G is a cylindrical weight adapted to play up and down in the cavity *d*, making a loose fit with the sides thereof.

E is a screw-bolt loosely embraced in a hole in the axial line of the weight G, and tapped into the hammer-head D, as shown.

F is a spiral spring exerting a force to lift the weight G. The head of the bolt E prevents the weight from ever rising beyond a certain range.

M is a spring which receives the handle B, and tends to hold the hammer D with its face only a little way from the surface of the bell A.

D′ is a soft face of wood applied in the ordinary manner to just sufficiently soften the blow when the bell is of a character to require it.

I find by experiment that the loose weight G should have a mass equal to about half that of the hammer-head D. Thus proportioned, and with a gentle spring, F, and a just sufficiently-loose fit of the loose weight in the cylinder *d*, the blows of the hammer are utilized in producing the required vibrations in the bell without appreciable reduction by the slight influence of the spring M, and no chattering sound is heard. The loose weight should be sufficient to absorb the rebound the instant the hammer strikes. The spring must be weak enough to allow the weight to remain in motion until the reaction of the hammer is all absorbed. The air-cushion gives the best results. In it the resistance of the air is as strong at the beginning as at the end of the stroke, owing to the escape of air being equal at all parts. The spring serves in practice as a convenient medium through which to correct the imperfections of the air-cushion.

Modifications can be made in the forms within wide limits. Parts of the invention may be used without the whole.

I can obtain a good portion of the useful effect of the invention by dispensing with the hollow cylinder *d* and allowing the loose weight to play without being cushioned by the air.

Fig. 4 represents a modification which may, I believe, be used with success. In this figure the loose weight G is attached to the hammer-head by a spring of gentle force, and the loose weight is resisted in its motion toward the hammer-head only by the elastic force of the spring. It is free to move away from the hammer-head D by sliding on a straight guide formed on the end of the spring, as will be readily understood from the figure.

Fig. 5 represents another modification, which will serve well in either large or small clocks. In this figure the loose weight G is attached by a light handle, *g*, to a center, *g′*, carried on the main hammer or handle B. A spring between the weight G and the hammer-head serves the same function as the spring F, before described. This construction, like the others, allows the loose weight G to rise relatively to the body of the hammer or to fall behind at each descent of the hammer-head to an extent greater than it is lifted by the force of the spring. The looseness thus attained is important in consuming time after the hammer-head has struck the bell, and the loose weight commences to act to prevent the chattering. My theory of the action may not be important. I have described fully the proper means of realizing the advantages. I believe that the loose weight G, by reason of the fact that it is loose and falls considerably behind the hammer-head, gives its blow or pressure on the hammer-head not at the same time as the blow of the hammer against the bell, but at a period sufficiently later to meet the recoil of the hammer and deaden it. If I am correct, it may be sufficient, to realize the principal advantages, to simply mount the weight loosely on the back of the hammer without either spring or air-cushion. My first experiment was thus made and gave favorable results; but I prefer the whole used together.

I claim as my invention—

1. The clock-hammer described, having a loose weight, G, in combination with the head D, arranged substantially as described, so that when the blow is struck the loose weight will, by its continued motion, meet and contribute to arrest the return motion of the hammer, and thus prevent chattering on the bell, as herein specified.

2. In a clock-hammer, the spring F, in combination with the loose weight G, loose holding and guiding bolt E, and hammer-head D, as herein specified.

3. In a clock-hammer, the loose weight G, in combination with a hammer-head, D, having a cavity, *d*, arranged to allow the cushioning of air under the loose weight at each blow, so as to aid in preventing the chattering motion of the hammer, as herein specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

C. H. NORTON.

Witnesses:
A. S. HOTCHKISS,
CHARLES R. SEARLE.