(No Model.)

J. C. BUTTERFIELD.

POWER HAMMER.

No. 285,387. Patented Sept. 25, 1883.

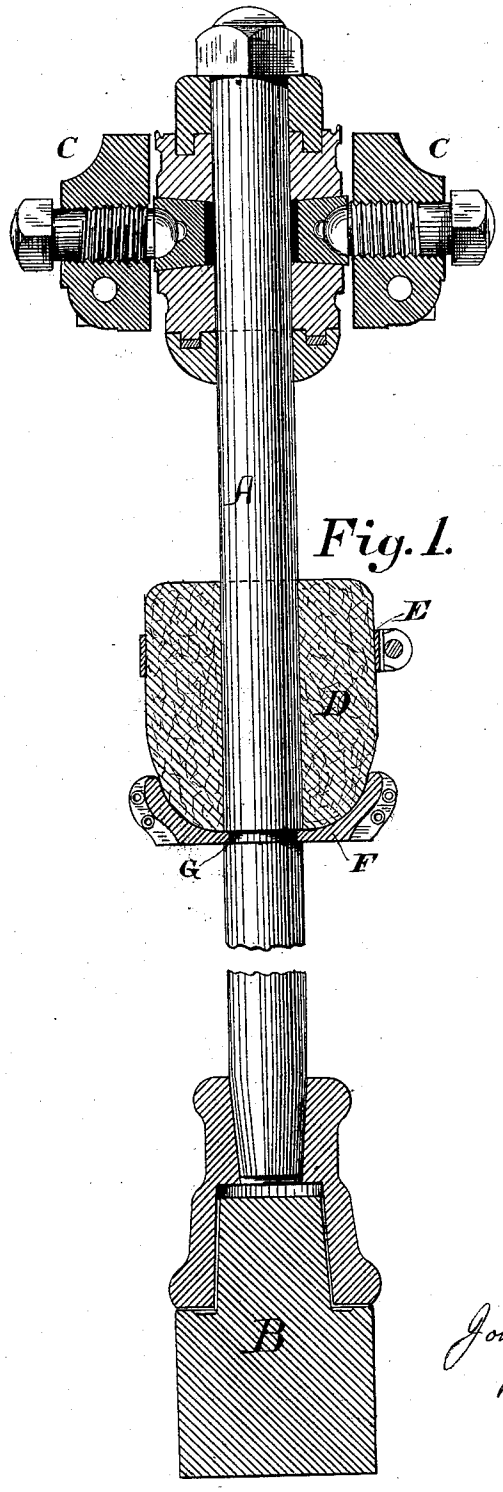

Fig. 1.

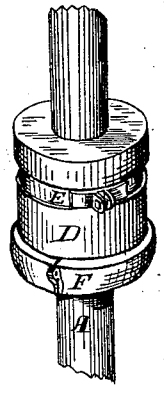

Fig. 2.

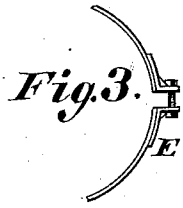

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN C. BUTTERFIELD, OF CHICAGO, ILLINOIS.

POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 285,387, dated September 25, 1883.

Application filed May 1, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BUTTERFIELD, of Chicago, Cook county, in the State of Illinois, have invented a new and useful device for absorbing vibrations in structures liable to repeated concussions; and I do hereby declare that the following is a full and accurate description of the same.

It is a well-known fact that when iron is submitted to concussions often repeated at short intervals the consequent vibration of its particles finally results in the production of molecular rearrangement ordinarily termed "crystallization," and a material weakening of the metal. This effect in car-axles, hammer-rods, &c., is well known. When the condition productive of concussions are present in machines of many parts, a minor result is the loosening of joints and fastening, and a consequent liability to sudden breakdown.

In patents heretofore granted to me I have described a way of preventing the transmission of vibration due to the concussion of a hammer falling upon an anvil beyond the hammer-rod. That way consists in the interposition of a mass of india-rubber between the hammer-rod and the adjacent parts of the structure, so that said rod was cut off from contact with said adjacent structure, and the vibrations caused by the blow of the hammer were absorbed in and by the mass of india-rubber. It is evident, however, that the method which requires a special organization of the machine is not of general application.

In my experiments as to the property of india-rubber to absorb vibrations, I have discovered that the vibrations in a bar of iron or steel, when struck, will be taken up and absorbed by a mass of india-rubber in close contact with said bar, and that it is not necessary to envelop the entire surface of such bar with the india-rubber to produce the effect desired.

My invention therefore consists in the application to a part liable to receive concussions of a mass of material capable of absorbing and neutralizing such vibrations, whereby the vibrations may be taken up and absorbed.

I am aware that the vibrating strings of a musical instrument have been rendered silent by the application of a damper, and that a similar application will modify the sound of a bell which has been struck; but these cases do not meet my present invention, because they impede the transmission of sounds, but do not destroy the intermolecular vibrations of the bodies themselves. Sounds are the product of lateral extra molecular or bodily movements of the substance emitting them, and in metallic sound-producers the blow is always struck from a lateral direction, so that the thing struck is moved bodily aside. This sort of vibration is known to produce crystallization, which is the product of a vibration more deeply seated and involving less of bodily movement and more of intermolecular motion, and accompanied by but a small measure of sound in proportion to the forces implicated. While the effect of dampers upon sound-producers has been known for a very long time, they have never been known to absorb or neutralize molecular vibrations, and have never been applied to mechanical structures with any such purpose or effect.

Having now described the nature of my invention, the law requires me to show and explain the best way known to me for giving the invention a character useful to the public. It will appear manifest, however, that the best way of applying my invention to use is quite independent of the special machine to which it may be applied. Therefore while for convenience I represent my invention applied to the hammer-rod of a power-hammer, I do not design to limit myself to machines of that character, the essential feature being confined to a mass of absorbent material in intimate contact with the substance in which the objectionable vibrations have or may be originated.

That others may fully understand my invention, I will fully explain the way in which I apply it, having reference to the accompanying drawings, wherein—

Figure 1 is an elevation of the hammer-rod of a power-hammer. Fig. 2 is a perspective of a hammer-rod with my absorber applied. Fig. 3 is a plan of the compressing-strap coupling.

A is the hammer-rod. B is the hammer, and C is the lever whereby the hammer is lifted after the delivery of its blow. The structure of these parts may be after any approved plan, and is immaterial as to this case. The hammer B may be employed for any of the purposes of forcing, breaking, or stamping mate-

rials, &c., for which such a structure is applicable.

D is a mass of india-rubber or other suitable substance, closely and firmly secured to the rod A by means of one or more suitable ligatures or clamps, represented in this instance by the band E. India-rubber is the best known absorbent of vibrations; but other elastic substances, natural or artificial, may be employed in cases where the vibrations are not strong, or when india-rubber is not procurable. The mass of india-rubber D rests in a cup, F, which is rigidly secured to the hammer-rod, so that the reciprocations and blows delivered cannot displace it; but such a cup would not be required, if it were not for the violent reciprocations of the hammer-rod in a longitudinal direction, which would tend constantly to displace the mass D.

To prevent the cup F from changing its position on the hammer-rod under the force of its blows, I turn a groove or channel, G, in the rod, and fit the base of the cup therein, as shown. To accomplish this readily the cup is made in two parts, which are united by bolts and fitted to engage in said groove. By these means I am enabled to connect the working parts of my machine with close-fitting joints, such as shown, instead of joints having flexible elastic bodies interposed to cut off the transmission of vibration, as in my prior patents, and yet have no retraction even in the hammer-rod itself.

Having described my invention, what I claim as new is—

1. A lever, C, or its equivalent, jointed to the hammer-rod A, jointed to said lever by a close working joint, as shown, combined with a mass, D, of india-rubber or other material capable of absorbing vibrations, applied to the surface of said rod and in intimate contact therewith, independent of and separate from the parts constituting said close working joint.

2. The hammer-rod A, provided with the cup F or its equivalent, combined with the mass of india-rubber, D, sustained therein, and the clamping-band E, substantially as set forth.

3. A hammer-rod, A, combined with a mass of india-rubber, D, or its equivalent, applied to the exterior surface of said rod and pressed tightly thereon, as and for the purpose set forth.

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