July 29, 1952 J. W. KAHLEN 2,604,914

HAMMER HEAD HAVING REBOUND-PREVENTING MEANS

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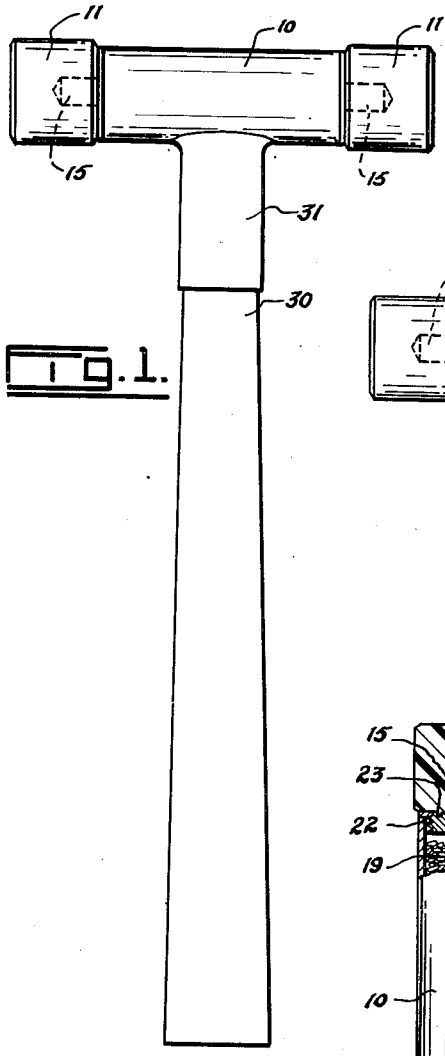


Fig. 1.

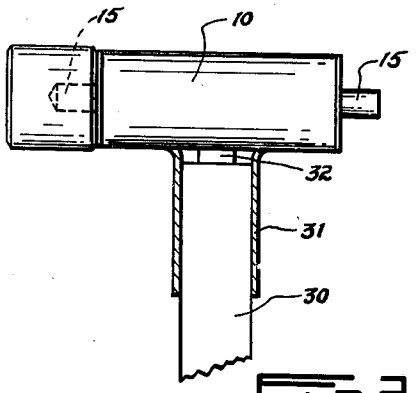


Fig. 2.

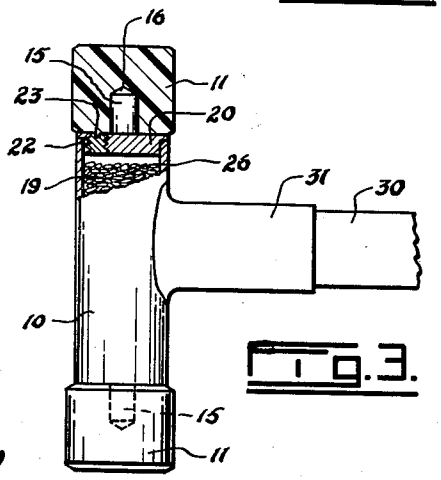


Fig. 3.

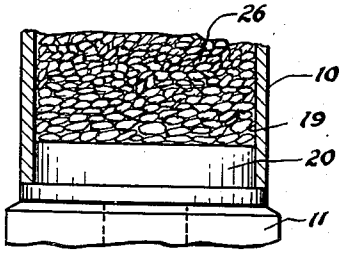


Fig. 4.

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HAMMER HEAD HAVING REBOUND-PREVENTING MEANS

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4 Claims. (Cl. 145—36)

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This invention relates to improvements in striking articles, and particularly in hammers.

This application is a continuation in part of the applicant's application Serial Number 592,336, filed May 7, 1945, now abandoned, as to subject matter common thereto.

When a hammer is moved to strike an object, part of the kinetic energy developed is utilized in doing work on the object, part is dissipated in the form of heat, and part is converted into potential energy in the form of distortion in the striking surface of the hammer. The distortion of the striking surface has potential energy much the same as a compressed spring, and this causes the hammer to recoil. If a force is applied to the hammer at the time that the recoil would normally take place which is equal and opposite to this potential energy, the two forces are cancelled out and the energy is converted to heat. Attempts have been made to apply to force to prevent recoil in hammers and other striking articles. Three known methods of doing this is to place a slug, a charge of round shot, or a charge of powdered material in a chamber immediately behind the striking face, but these have not been very successful in preventing recoil.

A hammer formed with a chamber immediately behind its striking face and having a solid slug slidably mounted therein is not very successful, because the slug delivers on the end of the chamber one or more impact blows of extremely short duration. The slug tends to stop the recoil of the hammer head, but the slug itself then recoils and must have its own kinetic energy absorbed by friction on the walls of the chamber. Thus, the slug creates undesirable vibration or oscillation in the hammer.

Powdered material has been used in the same manner as a solid slug. It has been found that this material tends to pack and it then becomes the equivalent of a solid body and acts in practically the same manner as the slug, or as a solid hammer.

A charge of round shot in a chamber behind the striking face of a hammer is not very helpful since there is relatively little friction owing to their shape; some of the shot strikes directly on top of other shot and tends to oscillate; other shot strikes between preceding shot and directs kinetic energy at an angle to the direction of movement of the hammer, tending to reduce striking power; and the required size of chamber and hammer must be out of proportion for a particular weight of hammer.

It has been found that a "no-bounce" hammer

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may be produced by utilizing a charge of irregularly shaped, hard, heavy particles in a chamber immediately behind its striking head. It is desirable to have the particles shaped as irregularly as possible, although reasonably good results may be obtained by almost any shape other than round, and it is to be understood that the term "irregular" is intended to cover all these shapes. These irregularly shaped particles prevent recoil, eliminate vibration or oscillation, produce a prolonged blow on the object being struck instead of a quick sharp blow, and they permit a lighter hammer to be used for a certain job than would otherwise be possible.

In operation, the irregularly shaped particles deliver on the end of the hammer chamber a blow which is not a single impact, but a rapid succession of overlapping impacts whose resultant is an impulse of much longer duration than the single impact of a solid slug or of the equivalent thereof. By having the chamber filled with a proper amount of these particles, the prolonged impulse begins while the hammer head is still in contact with the object being struck, so that the hammer delivers an initial sharp blow immediately followed by an impulse of appreciable duration. Each of the overlapping impacts tends to deaden any recoil of the preceding impact. The friction and interfitting of the irregularly shaped particles prevents them from separating as they travel towards the chamber end sufficiently to disperse their striking power to a point where it is useless and yet after impact they cannot rebound as a unit because of the individual particles and they deaden any rebound.

Another important factor in this invention is the size or coarseness of the irregular particles and the amount of unfilled space to be left in the hammer chamber. In order to determine this, the size of the hammer, the weight of its empty head, and the recoil quality of its striking surface must be taken into consideration. Furthermore, it is always desirable to make a hammer as compact as possible to do the work for which it is intended. When the recoil is about to begin after the blow has been struck, the load of loose particles in the hammer chamber must be loose enough to expend its total energy in the direction of the blow substantially in successive impacts and they must be close enough to the end of the chamber to come into contact therewith instantly after the blow has struck in order to prevent the creation of a second blow. Furthermore, there should not be enough movement to be felt by the person using the hammer.

If the striking head of the hammer has low recoil qualities, the total weight of the irregular particles may be less than when the striking head has high recoil qualities. Furthermore, the amount of empty space in the chamber in the former may be less than in the latter. For example, if the striking head of the hammer is steel, the total weight of the particles may be approximately equal to the weight of the empty hammer head, whereas if the striking head is formed of plastic, the total weight of the particles must be materially increased in relation to the weight of the empty hammer head.

The coarseness of the particles depends upon the weight of the material forming them. It is desirable to keep these particles as coarse as possible while keeping the hammer as small as possible. However, the particles must not be so coarse that they tend to act as individual slugs. Care must be taken that the particles are not so small that they act as a powder and therefore pack and tend to produce the same results as a solid hammer or a solid slug in a hammer.

The specific gravity of the irregularly shaped particles must be as high as possible, and they must be very hard in order that they will not pulverize as a result of a great deal of use of the hammer. For example, steel, brass or hard lead alloys may be used.

Good results have been obtained by using a mixture of comparatively large and small irregularly shaped particles. The object of this is to get as much weight into a given space as possible. The small particles tend to fill the spaces between the larger particles, while the latter prevent the former from packing.

An example of this invention is illustrated in the accompanying drawings, in which,

Figure 1 is a side elevation of a hammer,

Figure 2 is a side elevation of a hammer with one of its striking heads removed,

Figure 3 is a side elevation, partly in section, of a hammer, and

Figure 4 is an enlarged and exaggerated sectional view showing the particles in the hammer.

The drawings illustrate a hammer of the type having two striking heads, but it is to be understood that it may have only one such head and it may be any desired shape.

The illustrated hammer consists of a body **10** which is usually formed of a suitable metal, although it may be any other material which will stand up under use. A striking head **11** is positioned at each end of the body **10**. Each head may be formed integrally with the body or, as shown, it may be made separate and secured to the body in any convenient manner. For example, the head may be formed of steel in order to stand up to heavy work, or it may be formed of suitable plastic material which may be used to hammer materials without marking them.

In this example, the body **10** is provided with a pin **15** projecting outwardly from each end thereof, and each head **11**, which is formed of a suitable plastic material, has a hole **16** drilled therein corresponding in shape to the pin. The head is fitted to the end of a hammer body with the pin fitting into the hole **16**, and a suitable adhesive is used to keep them together.

A chamber **19** is formed in the hammer body immediately behind the striking heads **11**. For the sake of convenience in manufacture, the hammer body may be in the form of a tube having a plug **20** closing each end thereof. One of the plugs has a tapped hole **22** extending therethrough in which a screw **23** is threaded. This screw has no head so that it can be turned into the hole until its outer end is flush with the outer end of the plug **20**.

A charge of irregularly shaped particles **26** almost fills the chamber **19**, see Figure 3. There should be only enough empty space in the chamber to allow the particles to expand slightly immediately before and after a blow is struck with the hammer. The total weight of the particles in the chamber and the amount of unfilled space therein depends upon the recoil quality of the striking head of the hammer, the size of the hammer and the weight of the empty body. The greater the recoil quality of a striking head, the heavier should the particles be and the greater the unfilled space in the chamber. However, it is to be understood that the amount of clearance is very small in any case.

A handle **30** is connected to the body **10** in any convenient manner. For example, a ferrule **31** is connected to the hammer body substantially midway between its opposite ends and projects outwardly therefrom at right angles to the length thereof. A wedge **32** is inserted part way into a slot in the end of the handle, see Figure 2, and when this end is inserted in the ferrule, the handle is hammered into the ferrule until the wedge, striking the hammer body, firmly retains the handle in position.

When a blow is struck with the hammer, the particles **26** move towards the end of the chamber **19** immediately behind the head **11** which contacts the object being struck. This loosens the particles up so that they deliver a rapid succession of overlapping impacts on the chamber end whose resultant is an impulse of comparatively long duration. At this time the particles come together into a compact body and each successive impact prevents the particles ahead of it from rebounding. Thus, the particles prevent the hammer from rebounding. Immediately after this action, the particles tend to disperse or loosen up so that they themselves do not cause any vibration or oscillation in the hammer.

Figure 4 diagrammatically illustrates the irregularly shaped particles in the chamber. It will be seen that they overlap and interfit with each other so that they cannot move towards the impact end of the hammer in a stream, but must more or less move as a loose body. Furthermore, it is practically impossible for a particle striking particles ahead of it to force them in a lateral direction. It is this fact, along with the fact that the particles deliver a rapid succession of overlapping impacts, which enables this hammer to deliver a much harder blow than is possible with any other hammer of a similar size and weight.

The irregularly shaped particles prevent any recoil in the hammer and they eliminate any vibration. This is very desirable since it prevents the stinging in the hand of the person holding the hammer which is apparent when a blow is struck against a hard object with any known type of hammer. A prolonged blow greatly increases the effect of the hammer and it allows the hammer to be made as compact as possible.

What I claim as my invention is:

1. A hammer comprising a body, a striking head at one end of the body, a chamber formed in the body immediately behind the head, a charge of irregularly shaped hard, heavy particles almost filling the chamber, and a handle connected to the body.

2. A hammer comprising an elongated body, a

striking head at one end of the body, a chamber formed in the body immediately behind the head, a charge of irregularly shaped hard, heavy particles almost filling the chamber, and a handle connected to the body and projecting outwardly substantially at right angles to the length thereof.

3. A hammer comprising a body, a striking head at one end of the body, a chamber formed in the body immediately behind the head, a charge of coarse irregularly shaped hard, heavy particles almost filling the chamber, and a handle connected to the body.

4. A hammer comprising a body, a striking head at one end of the body, a chamber formed in the body immediately behind the head, and a charge of irregularly shaped hard, heavy particles almost filling the chamber.

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