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**G. C. WILHIDE**

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## PORTABLE HAMMER

Filed Jan. 9, 1941

2 Sheets-Sheet 1

Forster H. + Hunt.

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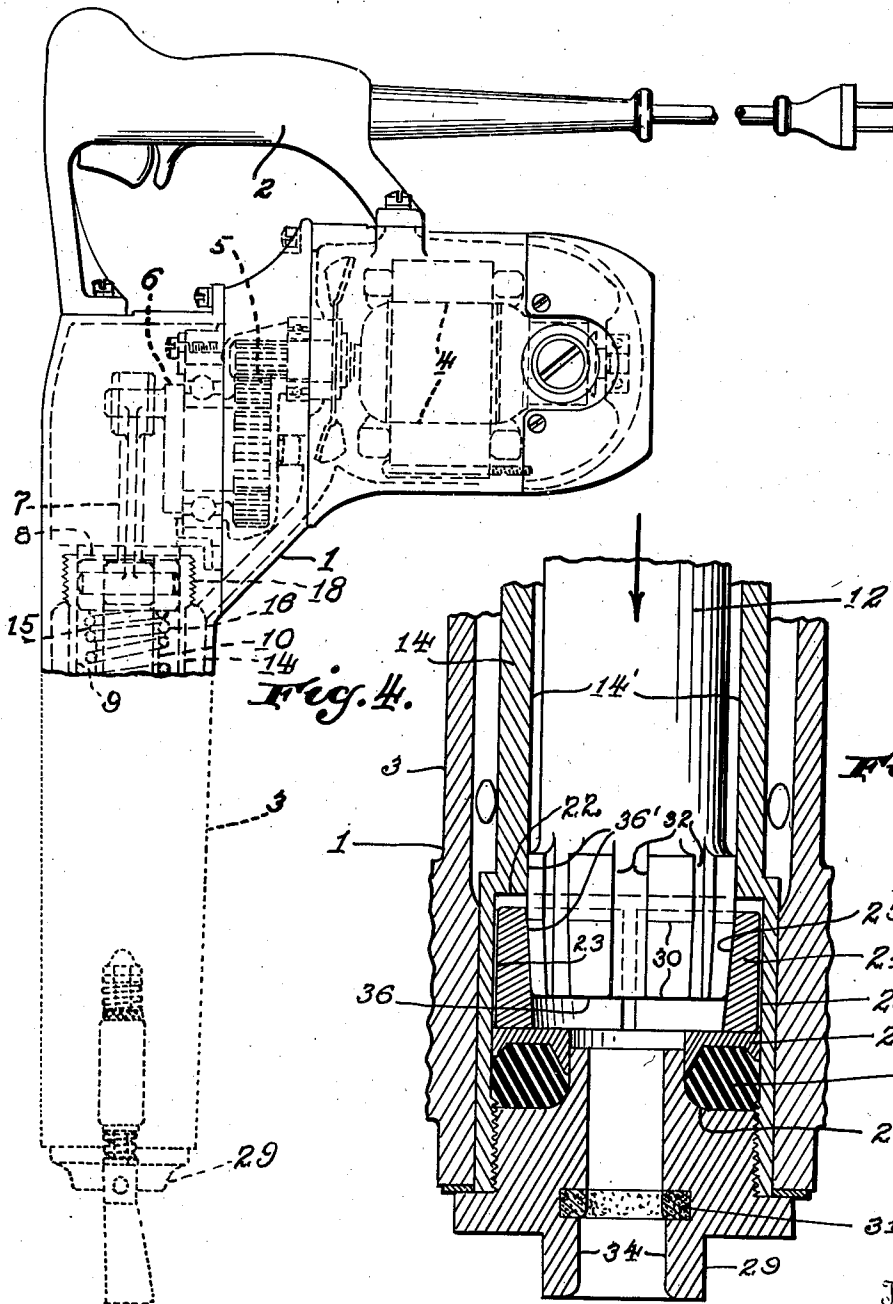
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## UNITED STATES PATENT OFFICE

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## PORTABLE HAMMER

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8 Claims. (Cl. 125—33)

The invention relates to power operated hammers and more particularly to the type of hammer which is adapted to be hand supported and directed, being electrically driven.

In such hammers there is a reciprocating cross head and a ram connected to the cross head by resilient means which usually includes a cylinder and piston and a spring which tends to advance the ram which is mounted for reciprocation in a guide or sleeve at the lower or remote end of which the bit is mounted in a suitable nose piece according to the usual practice the upper end of the bit projecting into the path of the ram.

While the path of the ram is normally limited by the transfer of its momentum to the bit whereby it is transmitted to the work, it not infrequently happens through inadvertence or through accidental release of the bit or for other reasons that the hammer is operated in the absence of a bit, or idled.

Under these circumstances the period of vibration of the ram and resilient means, being in accordance with the preferred design of these tools, equal to the normal period of the stroke of the crosshead and thus synchronized therewith, to increase the impact of the blow, there is no definite limit to the stroke and in the absence of a bit the ram descends beyond its normal stroke or path and tends to strike the nose. Under these circumstances, particularly with the larger hammers which are of relatively high power, there is a tendency to break the barrel and nose due to the impact of the hammer against the nose.

Some expedients for checking the vibrations and destructive hammering of the ram in idling have been tried but none of them have been fully effective with the larger size high power hammers to which reference has been made. With such hammers idling, which is regarded as unavoidable in ordinary use is extremely destructive so that there has been a tendency to limit the size of these hammers on this account as an excess sales resistance in the larger sizes was encountered.

In the improved construction which is found to present a satisfactory solution of this important problem, means is provided for holding or locking the ram at the lower end of its elongated stroke which results in idling in the absence of a bit, so that the destruction incident to hammering under these circumstances is prevented. In the more highly developed form of the device which may be referred to as the preferred form,

this locking device which receives the full blow of the ram is provided with a resilient support or cushion whereby the shock of the blow is absorbed. In the operation of the preferred form of the invention it is also notable that the first elongated stroke which occurs in any idling period results in locking and holding the ram throughout the idling operation and this idling operation is thus rendered harmless.

In accordance with the preferred construction as illustrated, the same being subject to variation, the ram locking or holding member is in the form of a heavy split ring having a slight taper. This ring is supported just below or near the lower end of the normal stroke of the ram and in its path and the lower end of the ram is formed with a correspondingly slight taper so that while the ram is adapted to engage in the locking ring or other locking member and to be clamped thereby so that the ram is held against recoil, it is readily dislodged by the forcing of the bit into the nose in working position, it being understood that locking takes place only when the hammer idles or starts to idle in the absence of a bit. While the cushion may be regarded as mainly to prevent injury by the shock of the idling stroke, it also tends to prevent too strong and permanent engagement of the locking elements.

In order to limit the contact between the nose and the ring and to prevent sticking, the tapered portion of the ram has been shown as slotted in the direction of the axis.

The locking device including various cooperating parts has come to be known as an idler.

In the accompanying drawings, I have illustrated so much of a portable electric hammer equipped with the idler of the invention as is regarded as necessary for a full understanding of the construction and operation of the device.

In the drawings:

Fig. 1 is a section on the axis of the hammer barrel showing the lower end of the barrel and guide of a hammer of the type referred to, including the ram and locking member or ring in the preferred form, the ring being shown in section.

Fig. 2 is a similar section through the upper end of the sleeve and barrel, the contained parts including the crosshead and spring being in elevation.

Fig. 3 is a transverse section looking downwardly in the direction of the nose, the same being taken on the line 3—3 in Fig. 1.

Fig. 4 is a side elevation of a complete hammer

of this type some of the concealed parts not otherwise illustrated being shown in broken lines.

Fig. 5 is a section similar to Fig. 1 with the idler or locking device engaged, the ram being locked in a position below its normal stroke.

Referring to the drawing by numerals each of which is used to indicate the same or similar parts in the different figures, the hammer as shown in Fig. 4 includes a casing 1 having a grip 2 and a barrel 3. The casing encloses the usual motor 4 connected by reducing gears 5 to the crank 6 which operates a connecting rod 7.

This connecting rod is connected at its lower end to a cross head 8, Fig. 2, which operates in a crosshead guide 9.

This crosshead 8 is shown as provided with a hollow piston 10 which projects downwardly into a corresponding and cooperating cylinder 11 formed in the ram 12, inversion or other rearrangement being contemplated.

The ram 12 is mounted to reciprocate in a ram guide or sleeve 14 mounted in the barrel in a manner to be further described.

The piston 10 in the form of the invention shown is formed at its upper end with a helical spring seat 15 which is grooved to receive the upper end of a coiled spring 16 and this spring is coiled in frictional engagement about the piston 10 for its entire length below the spring seat 15 bearing at its lower end at 17 against the upper end of the ram 12, and preferably at a single point or practically so whereby it is eccentrically loaded.

In accordance with the usual practice the piston 10 enters a cylinder 13 formed in the ram, reversal of the cylinders or other telescoping arrangement being contemplated.

In the form of the invention shown, the upper end of the sleeve 14 is threaded at 18 into a corresponding threaded seat or opening in the inside of the barrel at its upper end and the sleeve or guide 14 is surrounded by the usual cooling jacket 19 between the sleeve and the barrel 3, most of which features and details are known.

In the form of construction shown, the sleeve or guide 14 is enlarged at its lower end as at 20 and extends downwardly inside a similarly shaped seat or guide 21 formed for the same in the lower end of the barrel. This enlargement provides an internal downwardly disposed shoulder 22 on the inside of the sleeve 14.

The locking member shown in the form of a heavy split ring 24 is seated in the enlarged annular chamber 23 in the sleeve or guide 14, the upper end of said chamber being the downwardly disposed shoulder 22. This ring has its internal surface 25 tapered downwardly from the internal surface 14' of the sleeve 14. The taper is of downwardly reducing tendency and comparatively slight. The angle of taper in the form shown is about four degrees, all of which minute description is for the purpose of complete disclosure of a construction which is found to be satisfactory and not for purposes of limitation. Variation of the ram locking feature is also contemplated.

The ring 24 is seated on a washer 26 which has a free sliding fit in said chamber 23 and in turn rests on a resilient cushion shown in the form of a resilient ring or cushion 27 which may be of rubber like material being preferably of an oil resisting product as Neoprene or the like. This ring in the form shown is seated in a peripheral groove 28 encircling the top of the nose

piece 29 and open at the top. This nose piece is, in the form of the invention shown, threaded into or otherwise secured in the lower chambered end of the guide or sleeve 14 and the cushion ring 27 is enclosed and supported in said chamber 23.

In order to co-operate with the locking ring 24, the lower end of the ram at 30 is formed with a reducing taper which is preferably of the same angle as in the internal taper of the ring but in the form shown is of less extent in the direction of the stroke of the ram. In the tool shown the length of the taper on the ram is a little over one half the length of the taper of the inside of the ring.

In the construction from which the drawings were made, the taper of the ring has a length of a little less than one inch and the taper of the ram has a length of a little over one half inch, the figures being informative as to a satisfactory construction and not for purposes of limitation. This also applies to the details of construction.

It is also noted that the lower end of the ram 12 including the tapered portion is grooved in the direction of the stroke at 32 to reduce the contact of the tapered portion of the ram with the internally tapered surface of the ring whereby the gripping action of the ring in connection with the ram is reduced. The construction shown in Fig. 1 also includes a packing ring or the like at 31.

The operation of this type of hammer has been pretty well explained. The normal relation of the parts at the lower end of the barrel is best illustrated in Fig. 1. In this instance, the upper end of the shank of the bit 33 is in normal position, the bit being engaged in the usual manner with the aperture 34 in the nose piece 29.

With the bit in this position, the hammer being in operation, the cutting end of the bit is essentially in engagement with the work or other sufficiently hard object. Under these circumstances the momentum of the ram is transferred to the bit by the contact of the ram with the upper end 35 of the bit and the ram stops at or immediately adjacent the position indicated by said upper end of the bit in Fig. 1.

In Fig. 5, however, the bit has been removed and the stroke of the resiliently mounted ram, being longer than that of the cross head due to the resilient connection between the ram and cross head, which may be embodied in spring 16 and cylinder and piston 10 and 11 and the synchronization of the periods of vibration of the cross head and ram carries the lower end of the ram downwardly below its normal stroke and beyond the position of the upper end of the bit at 35 in Fig. 1.

The extreme lower end of the ram at 36 being of less diameter than the corresponding upper portion 36' of the ring cavity, the lower end of the ram enters well into the ring as illustrated in Fig. 5. The ram having the taper described or a taper similar to that of the ring and similarly proportioned, the ram becomes locked in the ring and the idling operation ceases after the initial idling stroke. Under these circumstances the motion of the cross head relative to the ram is taken up by the resilient connection including piston 10 and cylinder 11 and the spring 16. The spring 16 however, in the present instance, exerts pressure, i. e., thrust instead of tension and has no effect when the ram is locked,

It is also of importance that with the larger hammers this initial idling stroke might be destructive of various parts including principally the ram guide and its connection to the barrel and to the nose, except for the action of the resilient support of the locking ring 24 by means of the cushion 27, which may be of any suitable resilient nature or material. This resilient member which, in the form shown, is protected from direct contact with the locking ring 24 by washer 26 yields downwardly permitting a corresponding downward motion of the ring 24. This yielding not only prevents destruction of the parts including the barrel, the sleeve and the locking ring and possibly other parts but it tends to prevent too close and permanent engagement of the lower end of the ram with said ring 24.

It is of particular importance that when the locking ring and the lower end of the ram are engaged as described and as occurs in the normal operation of the tool, the ram can be instantaneously and conveniently disengaged and returned to normal operation by the insertion of bit 33 as shown in Fig. 1.

It should also be noted that the illustration Fig. 5 shows the ram at the instant of impact at the end of the first elongated or idling stroke, the resiliency of the cushion being sufficient normally to return the ring 24 to the position shown in Fig. 1, in which it bears upwardly against shoulder 22. In Fig. 5 the tapered end of the ram at 39 is in locked position in the ring 24 but both the ring and the ram are in the position of impact, slightly below the normal locked position in which the ring 24 bears upwardly against shoulder 22. This position they will instantly assume due to the action of cushion 27. This position is held until the ram is released as by insertion of the bit.

While the lighter hammers of the low power variety require protection resulting from the locking device of the invention, it is particularly noted, as pointed out in the preamble, that the heavier and more powerful hammers are even more quickly and seriously affected by idling in the absence of such protection. The injury takes form of breakage and deterioration of parts due to excess vibrations and hammering of the ram on the nose in the absence of a bit. The locking device herein described which instantaneously checks and holds the hammer at the lower end of its path on the first idling stroke retaining it until the bit is inserted, completely protects even the most powerful hammers from such deterioration making it possible to use with reasonable economy and satisfactory results hammers of the portable electric type of the highest power that can be constructed within the limit set by the requirement for portability.

I have thus described a single embodiment of the invention, the description being specific and in detail in order that the manner of constructing, applying, operating and using the invention may be fully understood, however, the construction shown is capable of considerable variation, the specific terms herein being used descriptively rather than in a limited sense and the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. A portable power hammer having a reciprocating cross head, a ram, guiding means therefor and resilient means between the ram and cross head transmitting motion from the ram to the

cross head and permitting vibration of the ram relatively to the cross head, means for supporting a bit in the path of the ram, means for checking and holding the ram when it descends below the path of the normal working stroke as in the absence of a bit to prevent destructive hammering and vibration in idling, said locking means comprising an internally tapered ring encircling the path of the ram, the ram being correspondingly tapered to enter said ring, the guide having an annular chamber containing the ring and longer than the axial extent of the ring and yielding means supporting the ring.

2. A portable power hammer having a reciprocating cross head, a ram, guiding means therefor and resilient means between the ram and the cross head transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, means for supporting a bit in the path of the ram, means for checking and holding the ram at the bottom of the first idling stroke to prevent destructive hammering and vibration in idling, the same comprising an internally tapered ring encircling the path of the ram at its lower end, the lower end of the ram being correspondingly tapered to enter said ring, and the tapered end of the ram being grooved to reduce the surface which contacts the ring.

3. A portable power hammer having a reciprocating cross head, a ram, guiding means therefor and resilient means between the ram and cross head transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, means for supporting a bit in the path of the ram, means for checking and holding the ram at the bottom of its first idling stroke, said means being adapted to hold the ram when and only when it descends below its normal working stroke, said means comprising an internally tapered ring encircling the path of the ram at its lower end, the lower end of the ram being correspondingly tapered to enter said ring and a resilient support for said ring to reduce the shock of the ram in engaging the ring and to limit the intensity of the locking engagement between the ring and the ram.

4. In a portable hammer having a reciprocating cross head, a ram and guiding means therefor, and resilient means between the ram and cross head transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, and means for locking the ram on its initial idling stroke when it descends below its path, incident to the working stroke, said locking means comprising a heavy split ring in the path of the ram near the lower end of its normal stroke and encircling said path said ring having a slight internal downward taper and the lower end of the ram being adapted to enter the ring and having a similar taper, both said tapers being of approximately four degrees, the ring being mounted to move in the direction of the stroke and a resilient support for the ring.

5. In a portable power hammer having a cross head and a ram, means for reciprocating the cross head and resilient means between the cross head to the ram transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, means for locking the ram at the lower end of its first idling stroke, said locking means comprising friction means in the path of the ram and having a slight taper in the direction of the stroke, the ram having a cooperating tapered friction means,

said friction means being timed to engage when the ram descends below the path of its working stroke in the absence of a bit, and a resilient support for one said friction means whereby it is free to yield in response to the impact of the ram and means for limiting the upward motion of said first friction means whereby the ram is locked in substantially its lowest position, said locking means being adapted for release by the insertion of a bit.

6. In a portable power hammer having a cross head and a ram, means for reciprocating the cross head and yielding means between the cross head to the ram transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, locking means on the ram and cooperating locking means in the path of the ram for locking the ram to prevent harmful vibration of the ram in idling said locking means being timed to operate when the ram descends below its normal working stroke as in the absence of a bit, one said locking means having a resilient support to reduce the impact incident to the engagement of the locking means.

7. In a portable power hammer having a cross head and a ram, means for reciprocating the cross head and yielding means between the ram to the

cross head transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, locking means in the path of the ram and cooperating locking means on the ram, said locking means being normally inoperative, engageable with said locking means when and only when the ram descends below its normal path in idling, said locking means being mounted for movement in the direction of the stroke, and having a yielding support to reduce the impact of the ram in locking and a stop to limit the movement of the locking means upward from said support.

8. In a portable power hammer having a cross head and a ram, means for reciprocating the cross head and yielding means between the cross head to the ram transmitting motion from the ram to the cross head and permitting vibration of the ram relatively to the cross head, locking means on the ram and cooperating locking means in the path of the ram for locking the ram to prevent harmful vibration of the ram in idling said locking means being timed to operate when the ram descends below its normal working stroke in the absence of a bit.

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