Jan. 30, 1968 E. F. BLICHARSKI 3,366,302

POWER HAMMER

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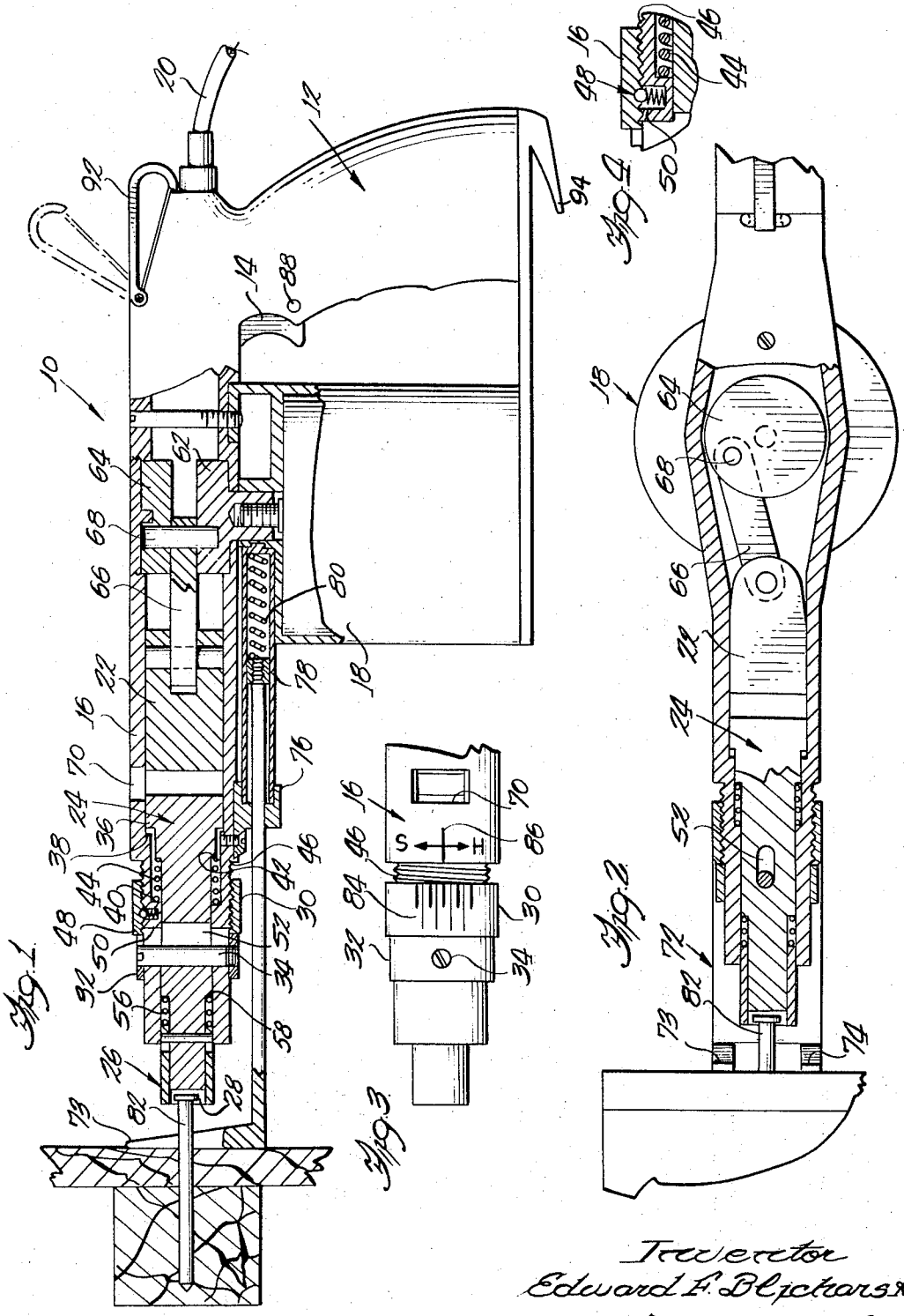


Fig. 1

Fig. 3

Fig. 4

Fig. 2

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POWER HAMMER

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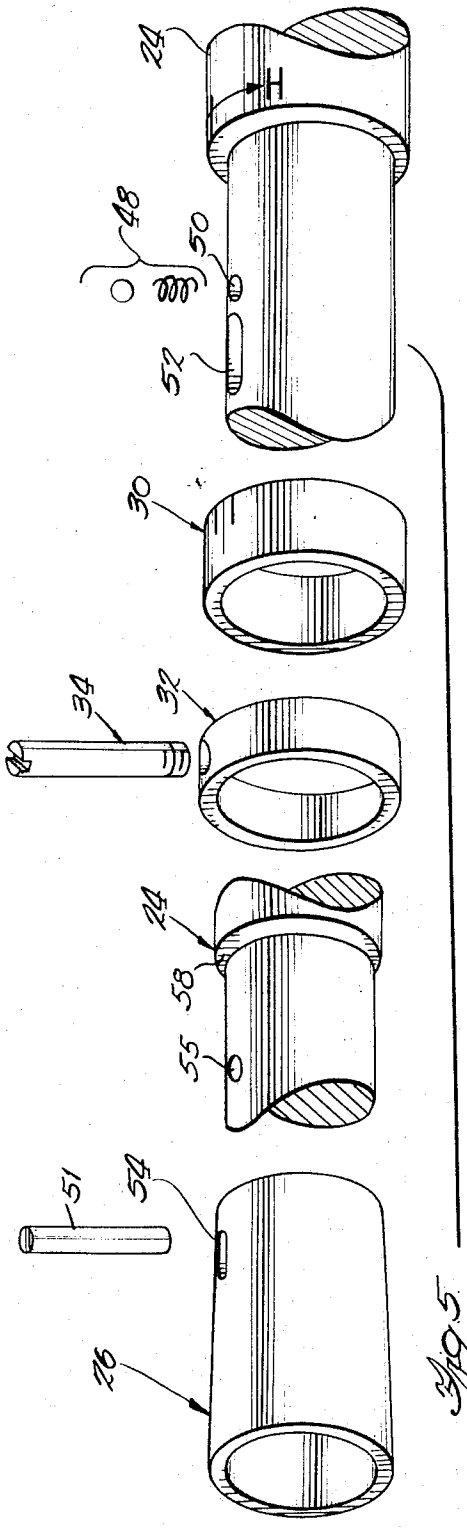


Fig. 5

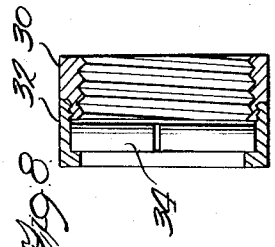


Fig. 8

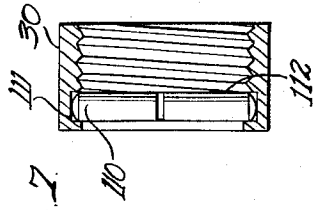


Fig. 7

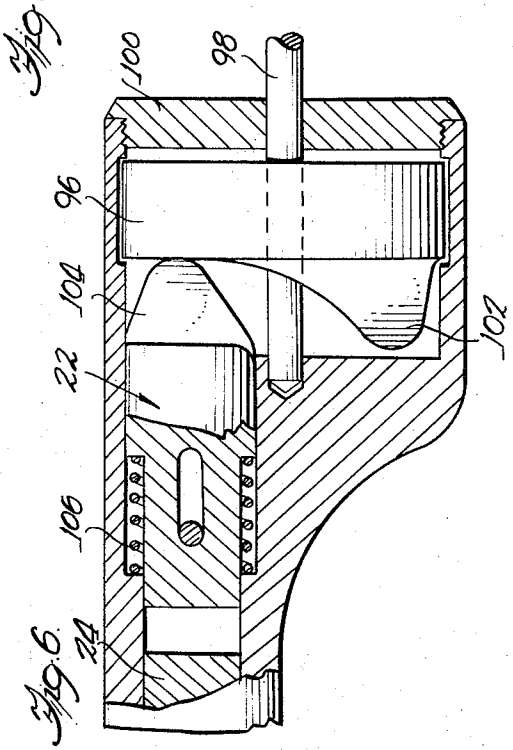


Fig. 6

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POWER HAMMER

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ABSTRACT OF THE DISCLOSURE

A power hammer having a head piece which is adjustable so as to move only a preset distance, as required for different work. An electric motor provides the driving and actuating force of the head piece. By positionably adjusting the head piece, a fine control is provided for, for example, driving and setting a nail or the like. A retractable nail guide which holds the hammer on a nail without slipping off is also provided.

This invention relates to power hammers and more particularly to power hammers adapted to do the work normally done with conventional hammers, by using power to do the impact work quicker, better and easier.

Power hammers are generally known, however, those presently available are not intended or applicable for driving and setting nails or other hammering work of a similar nature. The power hammer of the present invention is specifically intended for this type of application.

Accordingly, it is an object of the present invention to provide improved power hammers. In this respect, it is a more particular object to provide improved power hammers which are particularly adapted to do the work normally done with conventional hammers, by using power to do the impact work quicker, better and easier.

It is another object of the present invention to provide improved power hammers having improved means for adjustably varying the impact delivered by it.

It is another object of the present invention to provide improved power hammers having a retractable nail guide.

It is still another object of the present invention to provide improved power hammers which are light in weight so as to be portable and which are rugged in construction so as to be as maintenance free as possible.

It is still another object of the present invention to provide improved power hammers which can be actuated by means of an electric motor, a solenoid, air or other similar means. In this respect, it is further contemplated that a variable speed control can be provided for the motor to vary the impact and that a rechargeable power pack can be provided to give it complete portability.

It is still another object of the present invention to provide improved power hammers which are adjustable to deliver varying impact blows, as required for different work.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The above objectives are accomplished with a power hammer which according to a preferred embodiment of the invention comprises a head piece which is adjustable so as to move only a preset distance, as required for different work. An electric motor provides the driving and actuating force for the head piece. By positionably adjusting the head piece, a fine control is provided for, for example, driving and setting a nail or the like. A retractable nail guide which holds the hammer on a nail without slipping off is also provided.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side view partially sectionalized, for a power hammer exemplary of the present invention;

FIGURE 2 is a top view, partially sectionalized, of the power hammer of FIG. 1;

FIGURE 3 is a view illustrating the adjustable head piece of the power hammer of FIG. 1;

FIGURE 4 is an enlarged section illustrating the mechanism of the adjustable head piece;

FIGURE 5 is an exploded perspective view of the adjustable head piece;

FIGURE 6 is a partial sectional view of a driving and actuating mechanism, in accordance with a second embodiment of the invention; and

FIGURES 7 and 8 are views illustrating a second and a third construction for the adjustable head piece.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings, in FIGS. 1 and 2 there is shown a power hammer **10** which is generally pistol-shaped having a grip **12**, a trigger **14** for actuating the power hammer in the manner described below and a barrel portion **16**. Mounted below the barrel portion **16** is an electric motor **18** which is electrically powered, by means of the conductor **20** extending from the grip **12**. The end of the conductor **20** has a plug (not shown) for connecting the power hammer to the 110 volt source normally found in the home or office.

Within the barrel portion **16** is a piston **22** which is driven, by means of the electric motor **18**, against a hammer head shaft **24**. A nail guide **26** is retained about the end of the hammer head shaft **24** and is extended beyond its end so as to provide a recessed nail head cavity **28**. The head piece comprising the hammer head shaft **24** and the nail guide **26** is adjustable by means of a setting ring **30**, an impact control lug carrier ring **32** and an impact control lug **34** to adjust the impact provided by the power hammer **10**, in a manner described below.

More specifically, the interior of the barrel portion **16** of the power hammer **10** is step shaped and adapted to slidably retain the hammer head shaft **24** therein. The hammer head shaft **24** is also step-shaped and has an end portion **36** which engages a first step **38** of the barrel portion **16**. Between a second step **40** of the barrel portion **16** and a step **42** of the hammer head shaft **24** is a spring **44** which functions to forcibly urge the hammer head shaft **24** toward the grip end of the power hammer. The outer periphery of the barrel portion **16** has a thread portion **46**, for threadably receiving the variable setting ring **30** which is fixedly held in place by means of a ball and spring detent **48** retained within a cavity **50** formed in the wall of the barrel portion **16** (best seen in FIG. 4).

The impact control lug **34** is passed through an elongated aperture **52** (best seen in FIG. 2) formed in the hammer head shaft **24** and is threadably received and retained by the impact control lug carrier ring **32**. The front edge of the elongated aperture **52** is normally engaged with the impact control lug **34**, by the action of the spring **44**. It can be seen that by rotating the setting ring **30** to thread it forward or backward on the threaded portion **46** of the barrel portion **16** the position of the carrier ring **32** and the impact control lug **34**, and hence the hammer head shaft **24**, can be varied to alter the spacing between the impact surface of the hammer head shaft **24** and the piston **22**. In this fashion, the impact provided by the power hammer **10** can be varied, by controlling the length of the impact stroke of the piston **22**. In the

illustrated embodiment, the impact stroke can be adjustably varied up to approximately ½ inch.

The nail guide **26** is tubular in shape and is retained about the end of the hammer head shaft **24** by means of a pin **51** passed through an aperture **55** formed in the hammer head shaft **24** and an elongated aperture **54** in the nail guide **26**. A spring **56** is retained between the end of the nail guide **26** and a step **58** formed in the hammer head shaft **24**, for bracing the nail guide outwardly from the end of the hammer head shaft and to provide the nail cavity **28**.

The output shaft **60** of the electric motor **18** is threadably fixed to and rotates a flywheel **62**. A second flywheel **64** is positioned above the flywheel **62**. A piston arm **66** is secured between the flywheels **62** and **64** by means of a pin **68** which is passed through apertures formed in each, off-center so as to provide a reciprocating action to the piston arm **66**, and hence the piston **22** to which it is connected, as the flywheels **62** and **64** are rotated. A vacuum slit **70** is provided in the barrel portion **16**, adjacent the end of the piston **22** to prevent a vacuum from being created within the barrel as the piston **22** is reciprocated.

A fork rest **72** having a pair of spaced apart tongs **73** and **74** is secured beneath the barrel portion **16** by means of a bracket **76**. The end of the fork rest **72** opposite the tongs **73** and **74** is retained within a tubular spring retainer **78**. A spring **80** within the spring retainer **78** bears against the end of the fork rest **72** and biases it outwardly away from the end of the power hammer **10**.

To use the power hammer **10** to, for example, drive and set a nail, the fork rest **72** is positioned so that the tongs **73** and **74** on its end are on opposite sides of the nail, as for example, the nail **82** shown in FIGS. 1 and 2, and the head of the nail is within the cavity **28** formed by the nail guide **26**. The setting ring **30** is adjusted by rotating it, to deliver a soft or a hard impact. A series of graduations **84** and an index **86** can be advantageously provided to indicate the direction in which to rotate the setting ring **30**, to deliver a softer or a harder impact blow.

The trigger **14** is operated to energize the electric motor **18**. A trigger lock **88** can be provided to lock the trigger **14** in its operated position. When the electric motor **18** is energized, the flywheels **62** and **64** are rotated, and the piston arm **66** being secured to them in an eccentric position and to the piston **22**, reciprocably operates the piston **22** to strike the end of the hammer head shaft **24**. It can be seen that the spacing between the end of the piston **22** and the hammer head shaft **24** will determine the impact blow delivered by the hammer head shaft to the nail. If the setting ring **30** is adjusted so that the spacing is large, a soft impact will be provided since the hammer head shaft **24** will only be moved a short distance by the impact of the piston **22**. Correspondingly, if the setting ring **30** is adjusted so as to provide a small spacing, a larger impact will be delivered. It will also be noted that the hammer head shaft **24** will tend to vibrate between impact blows from the piston, due to the action of the spring **44**. A variable speed control for motor **18** can also be provided, if desired, to slow the speed of the motor to, in turn, adjust the provided impact.

When the end of the nail guide **26** engages the surface of the material into which the nail is being driven and set, the setting ring **30** can be continuously adjusted to provide impacts which decrease in strength so that the surface of the material will not be marred. A nail or other like object can therefore be driven and set rapidly and easily, and in a fashion such that the material is not marred or damaged. As the nail is being driven, pressure exerted on the grip of the power hammer **10** forces the end of the fork rest **72** into the spring retainer **78**. The cavity **28** in the nail guide **26** assists in captivating the end of the nail so that the power hammer is easily held in contact with the nail.

A pivotal spring carrying clip **92** can be provided on the upper surface of the grip **12** and a nail extractor **94** can be provided along its lower surface. The nail extractor **94** may be extended below the electric motor **18**, to provide additional support for it.

In FIG. 6 there is shown a driving and actuating mechanism for the piston **22**, constructed in accordance with a second embodiment of the invention. A flywheel **96** is fixed to a shaft **98** which is journalled in the casing of the power hammer and in a back wall **100** and has a cam surface **102** thereon. The piston **22** has a cam surface **104** formed on its end which is engaged by the cam surface **102** to cause the piston **22** to be reciprocally operated, in the manner described above. In this case, a spring **106** is provided to bias the piston **22** toward the flywheel **96**, to provide the reciprocal action. It can be seen that as the flywheel **96** is rotated, its cam surface **102** strikes the cam surface **104** on the end of the piston **22** to move it forward, against the hammer head shaft **24**.

The shaft **98** of FIG. 6 can be the output shaft of an electric motor or it can be merely an exposed shaft and the drill bit of an electric drill affixed to it to provide the rotating force for the flywheel **96**. With this construction, a source of power therefore need not be an integral part of the power hammer, and it can be operated by motivating means, such as an electric drill or the like.

In FIGS. 7 and 8 there are shown alternative constructions for adjustably positioning the hammer head shaft **24**. In FIG. 7, a pin **110** which may be a spring loaded two-piece pin is fixedly retained within a groove **111** formed in the setting ring **30** and is passed through an elongated aperture **112** formed in the hammer head piece **24**. With this construction, the impact control lug carrier ring **32** is eliminated and the pin **110** functions as the control lug, in the manner described above. That is, as the setting ring **30** is adjustably positioned, the pin **110** rides in the groove **111** and bears against the front edge of the elongated aperture **112** to position the hammer head shaft **24**.

In FIG. 8, the carrier ring **32** is threadedly fixed to the setting ring **30** and is rotated along with it, rather than being merely engaged by the setting ring, as in the first described embodiment. In this case also, the control lug **34** rides within a groove formed in the carrier ring, as it is rotated. In this case also, the control lug may be a two-piece spring loaded lug.

It may be noted that unlike presently available power hammers, the hammer head shaft and the piston for operating it are two separate elements and not a single element. This feature contributes substantially to the ability of providing repeated impacts of varying strengths. Accordingly, an operable power hammer can be provided by eliminating the adjustable setting ring **30** and relying upon the action of the separate hammer head shaft and piston to provide repeated impacts.

In this respect, variable impacts can be provided in a structure of the latter type by providing a variable speed control for the motor **18**. By slowing the speed down, lighter impacts can be provided. Correspondingly, by speeding up the motor, stronger impacts can be provided.

The power hammer **10** can be used to hammer any item, for example, in setting and aligning studs and the like. In such a case, the nail guide **26** merely retracts to an inoperative position, or it can be eliminated.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific

features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described, what is claimed as new and desired to be secured by Letters Patent is:

1. A power hammer comprising, in combination: a barrel having a grip end and a nail driving end; a hammer head shaft slidably retained within said barrel and normally biased toward said grip end of said barrel; means for securing said hammer head shaft within said barrel; a piston within said grip end of said barrel adapted to engage said hammer head shaft; and means for driving said piston in a reciprocal manner to engage and drive said hammer head shaft toward said nail driving end.

2. A power hammer comprising, in combination: a barrel having a grip end and a nail driving end; a hammer head shaft slidably retained within said barrel and normally biased toward said grip end of said barrel; a piston within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel and connected to said hammer head shaft whereby as said setting ring is rotated said hammer head shaft is positionably adjusted within said barrel with respect to said piston; and means for driving said piston in a reciprocal manner to engage and drive said hammer head toward said nail driving end.

3. A power hammer comprising, in combination: a barrel; a hammer head shaft slidably retained within said barrel and normally biased toward one end of said barrel; a tubular nail guide slidably retained about the end of said hammer head shaft and normally biased to extend outwardly from the end of said hammer head shaft so as to provide a nail head cavity; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; means operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; a piston within said barrel; and means for driving said piston in a reciprocal manner to engage said hammer head shaft.

4. A power hammer comprising, in combination: a barrel; a hammer head shaft having a first and a second elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft means extending through said first elongated aperture and operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said first elongated aperture against said shaft means; a piston within said barrel adapted to engage said hammer head shaft in a reciprocal manner; means for driving said piston in a reciprocal manner; a nail guide slidably retained about the end of said hammer head shaft by means of a pin extended through said second elongated aperture and retained by said nail guide; and biasing means for forcibly urging an end of said nail guide outwardly from the end of said hammer head shaft so as to provide a nail head cavity.

5. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft means extending through said elongated aperture; shaft retaining means for retaining said shaft means within said elongated aperture, said shaft retaining means being slidably retained about said barrel and operated by said setting ring as it is rotated to move said shaft means to positionably adjust said hammer head shaft within said barrel; a piston within said barrel adapted to engage said hammer head shaft in a reciprocal manner; and means for driving said piston in a reciprocal manner.

6. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring having an annular groove formed therein threadedly retained on said threaded portion of said barrel; shaft means extending through said elongated aperture and engaged within said annular groove, said shaft means being operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said elongated aperture against said shaft means; a piston within said barrel; and means for driving said piston in a reciprocal manner to engage said hammer head shaft.

7. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft retaining means having an annular groove formed therein slidably retained about said barrel and secured to said setting ring; shaft means extending through said elongated aperture and retained within said annular groove, said shaft means being operated as said setting ring is rotated to positionably adjust said hammer head shaft within said barrel; a piston within said barrel; and means for driving said piston in a reciprocal manner to engage said hammer head shaft.

8. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft means extending through said elongated aperture and operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said elongated aperture against said shaft means; a piston within said barrel; means for driving said piston in a reciprocal manner to engage said hammer head shaft; and a fork rest fixedly secured to said barrel and adapted to be resiliently retracted and expanded.

9. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft means extending through said elongated aperture and operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said elongated aperture against said shaft means; a piston within said barrel; motor means having an output shaft; fly wheel means rotated by said output shaft; a piston arm eccentrically secured to said fly wheel means and secured to said piston, whereby said piston is driven in a reciprocal manner to engage said hammer head shaft.

10. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft means extending through said elongated aperture and operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said elongated aperture against said shaft means; a piston having a cam thereon slidably retained within said barrel; a fly wheel having a cam thereon positioned within said power hammer so that said cam engages the cam on said piston as said fly wheel is rotated; a shaft for supporting and for driving said fly wheel; and means secured to said shaft for rotating said shaft, whereby said piston is driven in a reciprocal manner to engage said hammer head shaft.

11. A power hammer comprising, in combination: a barrel; a hammer head shaft having a first and a second

elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft retaining means slidably retained about said barrel; shaft means extending through said first elongated aperture and retained therein by said shaft retaining means; said shaft retaining means being operated by said setting ring as it is rotated to move said shaft means to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said first elongated aperture against said shaft means; a piston within said barrel adapted to engage said hammer head shaft; means for driving said piston in a reciprocal manner; a nail guide slidably retained about the end of said hammer head shaft by means of a pin extended through said second elongated aperture and retained by said nail guide; biasing means for forcibly urging an end of said nail guide outwardly from the end of said hammer head shaft so as to provide a nail head cavity; and a fork rest fixedly secured to said barrel and adapted to be resiliently extended and retracted.

12. A power hammer comprising, in combination: a barrel; a hammer head shaft slidably retained within said barrel and normally biased toward one end of said barrel; a tubular nail guide slidably retained about the end of said hammer head shaft and normally biased to extend outwardly from the end of said hammer head shaft so as to provide a nail head cavity; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; means operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; a piston within said barrel; means for driving said piston in a reciprocal manner to engage said hammer head shaft; and a fork rest fixedly secured to said barrel and adapted to be resiliently retracted and extended.

13. A power hammer comprising, in combination: a barrel; a hammer head shaft having an elongated aperture formed therein slidably retained within said barrel; a threaded portion on said barrel; a setting ring threadedly retained on said threaded portion of said barrel; shaft means extending through said elongated aperture and operated by said setting ring as it is rotated to positionably adjust said hammer head shaft within said barrel; biasing means for forcibly urging an end of said elongated aperture against said shaft means; a piston within said barrel adapted to engage said hammer head shaft in a reciprocal manner; and means for driving said piston in a reciprocal manner.

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