Feb. 3, 1942. F. J. PFEIFFER ET AL 2,271,803

ATTACHMENT TOOL FOR RECIPROCATING HAMMERS

Filed May 26, 1939 2 Sheets-Sheet 1

Fig. 1

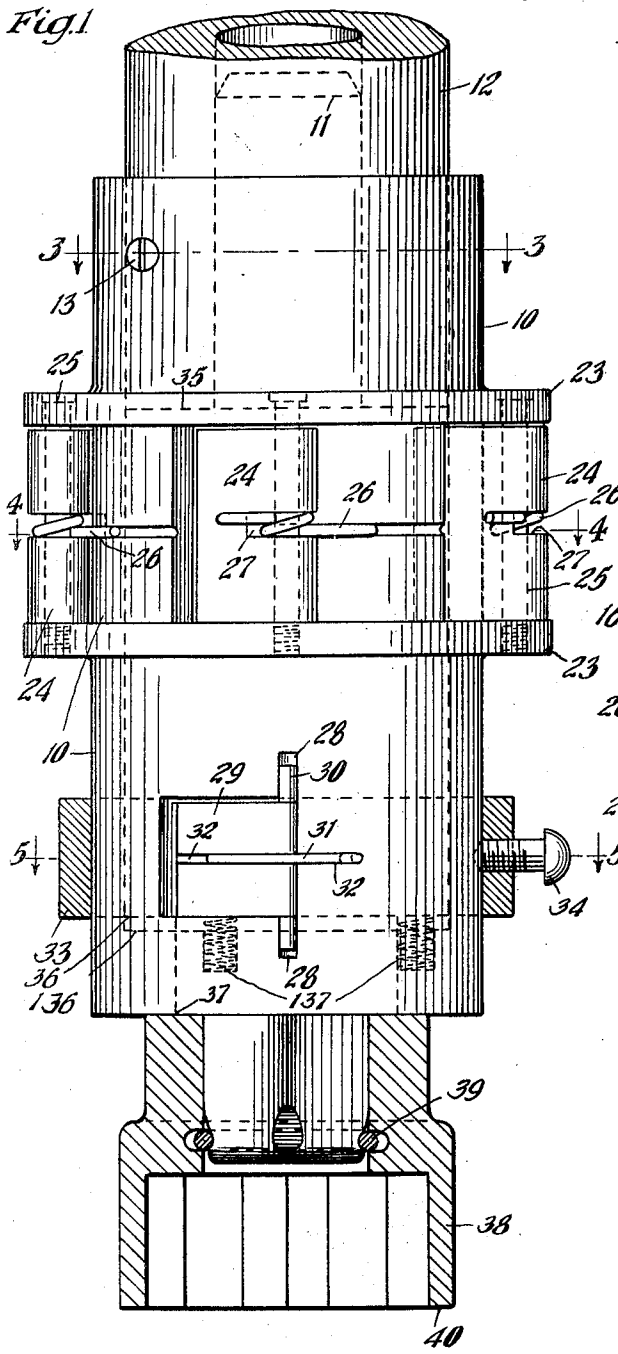
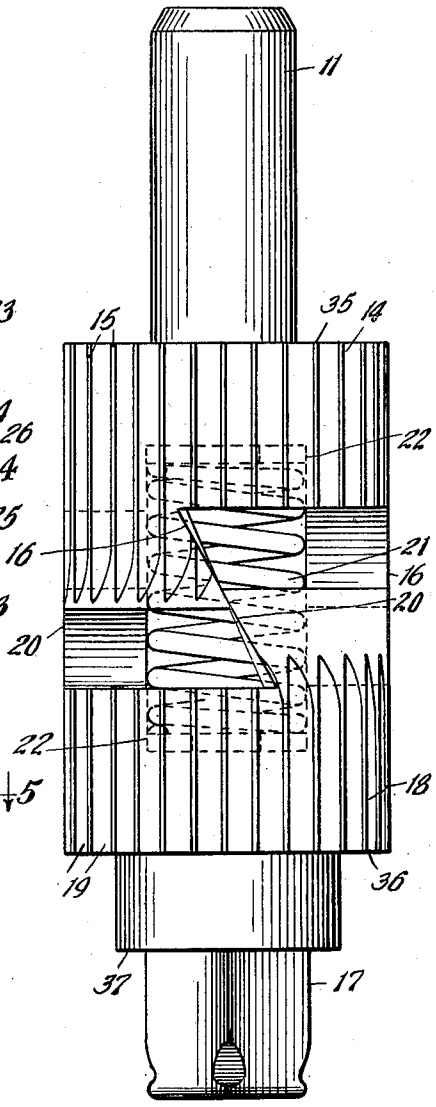


Fig. 2



Inventors
John Q. Kuhn
Fred J. Pfeiffer
By George J. Haight Atty.

Feb. 3, 1942. F. J. PFEIFFER ET AL 2,271,803

ATTACHMENT TOOL FOR RECIPROCATING HAMMERS

Filed May 26, 1939 2 Sheets-Sheet 2

Fig. 3

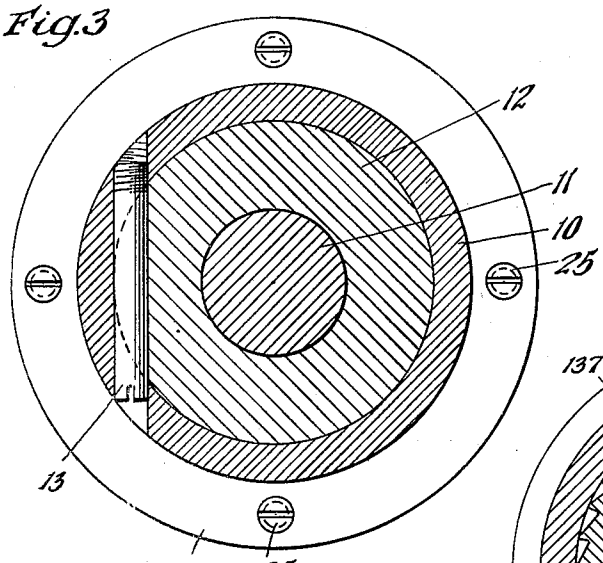


Fig. 5

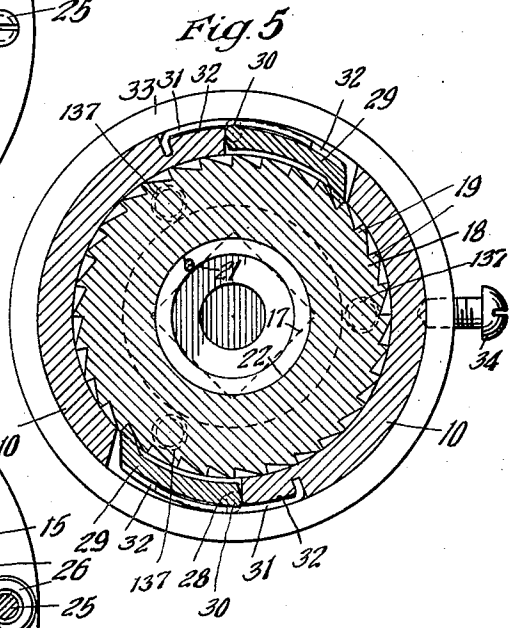


Fig. 4

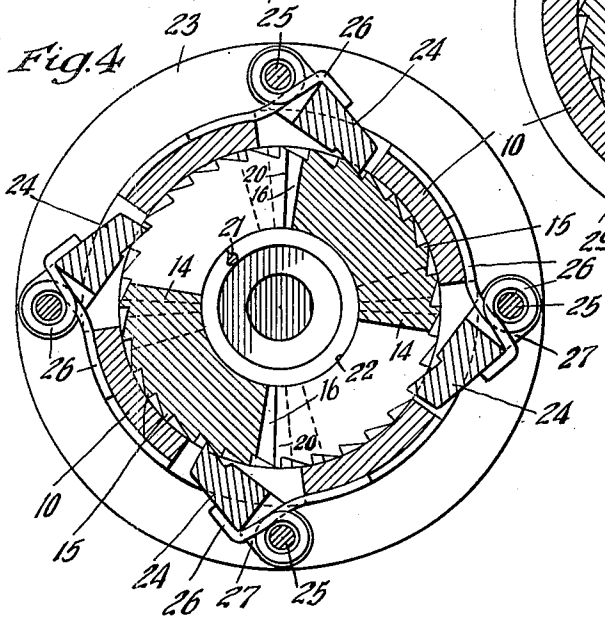
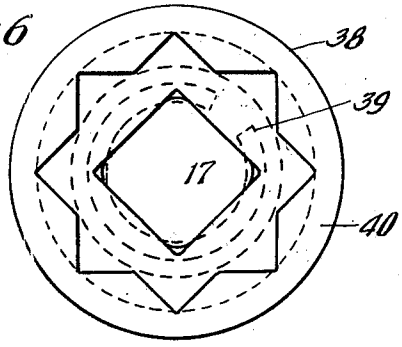


Fig. 6



Inventors
John Q. Kuhn
Fred J. Pfeiffer
By George J. Haight Atty.

Patented Feb. 3, 1942 2,271,803

UNITED STATES PATENT OFFICE

2,271,803

ATTACHMENT TOOL FOR RECIPROCATING HAMMERS

Fred J. Pfeiffer, Mount Prospect, Ill., and
John Q. Kuhn, Newman, Kans.

Application May 26, 1939, Serial No. 275,810

10 Claims. (Cl. 81—54)

This invention relates to a tool for attachment to a pneumatic hammer or riveter and has for its most general object the provision of means to translate the reciprocating motion of the plunger of the hammer into a step by step rotation. A specific application which we have in mind, although it is not our intent to be bound by this particularity, is the use of the attachment tool in combination wih a pneumatic rivet gun to tighten nuts on the bolts used to temporarily secure the parts together in the erection of steel structural works.

A principal object of our invention is to provide an attachment for an ordinary pneumatic hammer, the combination of the two providing an impact wrench.

A second object is to extend and enlarge the usefulness of the ordinary pneumatic hammer or rivet gun.

A still further object is to obviate the necessity of separate air lines for a pneumatic hammer and for an impact wrench respectively.

A still further object is to provide a light weight inexpensive impact wrench.

Another object is to provide an attachment of the kind disclosed herein which will act not only to turn the nut, but which will deliver an impact blow at the location of the bolt to the members being secured together.

Other objects and purposes will be apparent from an examination of this specification.

In structural steel erection, plates and other members are temporarily secured in position by bolts and nuts. At present the tightening of the nuts is done either by a hand wrench, the plates being driven into close contact by hammer blows, or by an impact wrench operated other than by hand. These operations are followed by riveting, ordinarily done by a pneumatic hammer, commonly called a rivet gun. A reciprocating plunger in the gun strikes the required blows to clinch the rivet. We propose to provide an attachment for the ordinary rivet gun to translate a portion of the force of its blows into a twisting or turning force. This will permit the riveting crew to do the temporary bolting without the use of additional tools or air lines.

In the drawings,

Fig. 1 represents a side elevational view, but with the wrench socket, a portion of the rivet gun, and a retaining collar shown in cross-section.

Fig. 2 shows a side elevation of the cam and ratcheting mechanism employed.

Fig. 3 is a cross-section on line 3—3 of Fig. 1. It shows primarily a suggested method of attachment to a conventional rivet gun.

Figs. 4 and 5 are respectively cross-sections on lines 4—4 and 5—5 of Fig. 1.

Fig. 6 is a bottom plan view of the wrench socket.

In our attachment tool a casing 10 provides a frame. Protruding from the top of the casing is a plunger 11 designed to be actuated by the plunger or reciprocating hammer of, for instance, an air driven rivet gun. The casing 10 fits as a sleeve or collar over the end 12 of a conventional rivet gun, with the plunger 11 fitting into said gun socket to receive the blows of the gun hammer, not shown. A pin 13 is inserted through the casing 10 and in part through the stock of the gun end to secure the attachment to the gun, and to prevent the rotation of the attachment tool with respect to the gun. We do not expect to be limited to the particular method here shown of attachment of the tool to the gun. Various mechanical expedients can be employed so long as the attachment of the accessory tool is secure and its rotation in respect to the rivet gun prevented. Thus the rivet gun can be held in the hands of an operator in the manner usually employed.

The opposite end of the plunger 11 to that inserted in the rivet gun is provided with an enlarged ratchet gear 14, the teeth 15 of which are so cut that a dog will ride over them in one direction but not in the opposite direction. A pair of driving shoulder cams 16 of substantial depth is angularly and integrally made in the ratchet gear head 14 of the plunger 11. A greater plurality of cams could be used if desired.

Shank 17 is provided at its upper end with an enlarged ratchet gear 18 with its teeth shaped as those of teeth 15 on the ratchet 14. Shoulder cams 20 are provided on ratchet gear 18 to cooperate with and to be actuated by the cams 16 on plunger 11.

The ratchet heads and enlarged ends of plunger 11 and shank 17 are held in spaced relationship by spring 21 resting on bearing washers, in a central socket 22 provided in the members 14 and 18.

When the rivet hammer delivers a blow upon the end of plunger 11, it will be seen that the cooperation of cam pairs 16 and 20 will cause a slight rotation of shank 17. Upon the reciprocating of the hammer blow, the pressure exerted by spring 21 separates and places the parts in position for the next blow. The plunger 11 and shank 17 are prevented from reverse rota-

tion by the ratchets 14 and 18 and their associated parts.

Collars 23 integrally made with casing 10 secure dogs 24 which cooperate with the teeth 15 of ratchet 14. These dogs are mounted on pins 25 secured within collars 23 and through suitable openings in casing 10 are pressed against teeth 15 by springs 26. These springs are secured in position by being wound once around pins 25 through suitable slots 27 cut within the dogs. One leg of each spring is confined within an annular groove cut within casing 10.

The dogs 24, of which we have provided four, are so spaced as to be in staggered or vernier relationship to teeth 15, as best shown in Fig. 4. Thus if a single blow of the hammer upon plunger 11 and its associated ratchet 14 does not turn the plunger and ratchet the full face of a tooth 15 there nevertheless will be at least one dog 24 to prevent any reverse rotation.

Two dogs 29, mounted on trunnions 30, and lying in grooves 28 within casing 10, cooperate with teeth 19 on ratchet 18 to prevent counter-rotation of shank 17. These dogs 29 are held in engagement with teeth 19 by springs 31 lying within grooves 32 provided in casing 10 and in the dogs 29. Dogs 29 and springs 31 are secured in place by a retaining collar 33, which in turn is secured removably in place by screw 34.

The blows of the hammer of a pneumatic riveter are very rapid. Hence the rotation of shank 17 proceeds step by step with considerable rapidity even though each step may be only the distance represented by the face of one ratchet tooth.

The longitudinal movement apart of plunger 11 and shank 17 with their respectively associated ratchets 14 and 18, caused by the action of the spring 21, is limited by shoulders 35 and 36 formed by the enlarged diameters of the ratchets. Shoulder 35 on shank 11 abuts against the end of the rivet gun when plunger 11 is telescoped into the gun socket. Shoulder 36 on shank 17 is supported by springs 137 resting in part within sockets provided within shoulder 136 within casing 10 and integral therewith. Thus a blow of the rivet gun upon plunger 11 is transmitted to shank 17 save for that part of the blow which is absorbed by springs 137 and spring 21. Shoulder 136 is so spaced in relation to shoulder 36 that the blow of the rivet gun is not delivered to shoulder 136.

A reduction in diameter from ratchet 18 forms shoulder 37 on shank 17. On the squared end of shank 17 and abutting against shoulder 37 a conventional wrench socket 38 is removably placed, and held in position by the usual spring snaps 39. It is obvious that the wrench socket can be changed to accommodate nuts of various sizes.

The blows given to plunger 11 from the pneumatic hammer not only are converted into a step by step rotation of shank 17, as described, but the impact of the blow is delivered by shoulder 37 to the wrench socket 38. The face 40 of this socket in turn transmits the impact to the plates or members being secured together precisely at the area where such impact is most desired.

It will be observed that since both principal parts of our attachment tool, namely the driving plunger 11 and the driven shank 17 are each free to rotate and to reciprocate within the casing 10, the tool, when attached to a rivet gun, functions as a part thereof and does not have to be held against either motion. In addition the impact of the gun is delivered to the parts being secured together in the area of the bolt used for that purpose.

Our attachment tool may easily be carried by a riveter or other workman as part of his equipment. It is relatively light in weight and economical as compared with impact wrenches upon the market. Furthermore, with our attachment, it is unnecessary to have an air line other than that which supplies the power for the rivet gun or hammer.

We claim:

1. The combination with a tool having a reciprocating hammer and a cylindrical barrel, of an attachment therefor comprising a shell non-rotatably secured to said barrel, a rotary reciprocating plunger having a portion thereof extending outwardly from one end of the shell and adapted to telescope within said barrel, a second rotary reciprocatory member having a portion thereof extending outwardly from the opposite end of the shell and adapted to receive a wrench socket, means at the adjacent ends of the plunger and said second member for rotating and reciprocating the plunger and said member upon successive blows of the hammer, means to prevent rotation in one direction of said plunger and said second member in respect to the shell and means to transmit the blows of the hammer to the material being worked upon.

2. An attachment tool for use in connection with a mechanically operated reciprocating hammer for the purpose of converting the hammer to uses such as tightening bolts, said attachment tool comprising a hollow casing, a driving plunger slidably mounted in said casing, means on the casing to prevent rotation of said plunger in one direction relative to the casing, a driven plunger slidably mounted in said casing in alinement with the driving plunger, means on the casing to prevent rotation of said driven plunger in one direction relative to the casing, means on said driven plunger to receive a wrench socket and to transmit blows thereto, means at the adjacent ends of the driving and driven plungers and co-acting with each other to cause rotation of said plungers, and means fitted between said plungers to hold them normally in partially spaced relationship.

3. An impact wrench for attachment to a tool having a reciprocating hammer, said wrench comprising a shell, a driving member fitted within the shell but with one end protruding therefrom to receive the blows of the reciprocating hammer of the tool, an angular shoulder cam upon the opposite end of the driving member, a driven member fitted within the shell in alinement with the driving member but with one end protruding therefrom and adapted to receive a wrench socket, an angular shoulder cam upon the opposite end of the driven member adapted to co-act with the shoulder cam on the driving member upon successive blows of the reciprocating hammer of the tool, means to reciprocate the driving and driven members relative to the casing after each successive blow, ratchet teeth on the driving and driven members, dogs cooperating with said teeth and riding over them in one direction of rotation, means to limit the reciprocation apart of the driving and driven members, and means on the driven member to transmit the blow of the driving member to a wrench socket.

4. An attachment for connection with a tool having a reciprocating hammer, said attachment comprising a hollow shell, means to non-rotat-

ably secure said attachment to said tool, a driving plunger slidably mounted in said shell, an extending end on said driving plunger adapted to be actuated by the reciprocating hammer, an enlarged head carrying ratchet teeth on said driving plunger, dogs cooperating with said ratchet teeth to prevent rotation in one direction of said driving plunger, a driven plunger slidably mounted in said shell in alinement with the driving plunger, an extending shank on said driven plunger adapted to receive a wrench socket, an enlarged head carrying ratchet teeth on said driven plunger, dogs cooperating with said ratchet teeth to prevent rotation in one direction of said driven plunger, co-acting cam and shoulder means on the heads of the driving and driven plunger to transmit blows from the one to the other and to cause rotation of the plungers, means interposed between the driving and driven plungers to cause reciprocating movement apart thereof, a shoulder on the inside of said shell to retain the head of the driven plunger therein, yieldable supporting means between said head and said shoulder, and a shoulder on the shank of the driven plunger to cooperate with a wrench socket.

5. For a tool having a reciprocating hammer, an attachment for tightening nuts and the like comprising a cylindrical shell, a first reciprocating member in said shell actuated by the blows of said hammer, a cam and shoulder on the end of said reciprocating member remote from said hammer, a ratchet on said reciprocating member to prevent counter-rotation thereof, a second reciprocating member in said shell, a cam and shoulder on said second reciprocating member cooperating with the first mentioned cam and shoulder, a spring compressed between the reciprocating members to separate them after a hammer blow, and means for attaching a wrench socket to said second reciprocating member adjacent a blow-transmitting shoulder thereof.

6. An attachment for a tool having a reciprocating hammer, said attachment comprising a casing, a driving member mounted therein to receive blows at one end from said hammer, a shoulder and a cam on the remote end of said driving member, a driven member mounted in said casing, a shoulder and a cam on said driven member cooperating with the shoulder and cam on the driving member to receive and to transmit straightline blows of said hammer and to cause rotation of said driven member, means between said driving and driven members to cause them to reciprocate with respect to each other, ratchet means to prevent counter rotation of the driving member, and means on the driven member for attachment of a tool designed to rotate.

7. A device for tightening nuts and the like comprising a hollow casing, reciprocating and rotating members mounted therein in longitudinal relationship to each other, a shoulder on the adjacent ends of said members to transmit blows of a reciprocating hammer, cooperating cams on said shoulders to impart rotation to said members, means to return said members to normal longitudinal position after each successive blow, a ratchet to prevent counter-rotation, and a shoulder on one of said members to impart the hammer blows to a tool.

8. In a device for attachment to a reciprocating hammer tool, a casing, a member to receive blows from said hammer, an enlarged remote end on said member within the casing and provided with a blow transmitting shoulder, a cam, and a ratchet cooperating with the casing, a second member provided with a shoulder and a cam to cooperate with said first mentioned shoulder and cam to transmit the hammer blows and to rotate said second member, means between the two members to hold the shoulders of each out of engagement, and means to attach a tool-holding socket to the second member.

9. An attachment device for a tool with a reciprocating hammer, comprising a driving member mounted within a casing, a plunger on one end of said driving member to receive blows from said hammer, shoulder cams on the opposite end of said driving member, a ratchet gear on said driving member cooperating with the casing, a driven member, shoulder cams on said driven member cooperating with the shoulder cams on the driving member, compressible means between the driving and driven members normally holding said members in spaced relationship, and a shank on the driven member adapted to be fitted with a tool-holding socket and impart hammer blows thereto.

10. A device of the character described, comprising a casing, a rotary reciprocating driving member, mounted within the casing, a rotary reciprocating driven member mounted within the casing in alinement with the driving member, means at the adjacent ends of said members and cooperating with each other to cause step by step rotation of said members in respect to the casing, and means to transmit blows of the driving member to a shoulder on the driven member adapted to receive a working tool.

FRED J. PFEIFFER.
JOHN Q. KUHN.