

Sept. 1, 1925.

1,551,989

L. E. GOLLY

VACUUM POWER HAMMER

Filed Oct. 18, 1921

2 Sheets-Sheet 1

Fig. 1

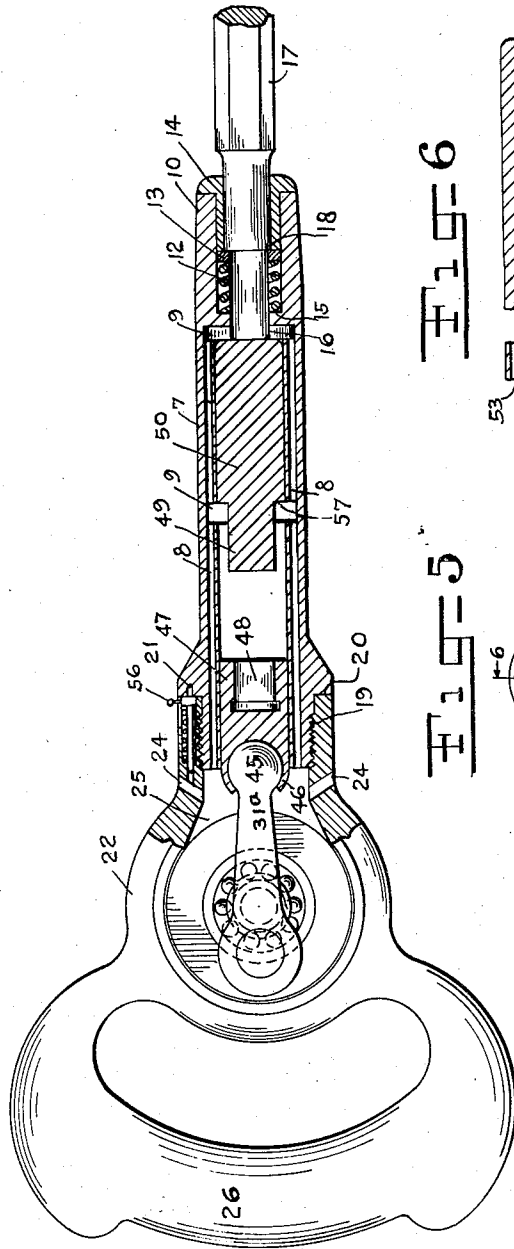


Fig. 6

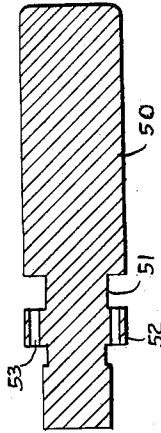
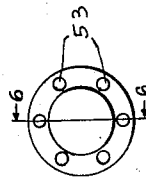


Fig. 5



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By the Attorney

Clarence G. Campbell

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2 Sheets-Sheet 2

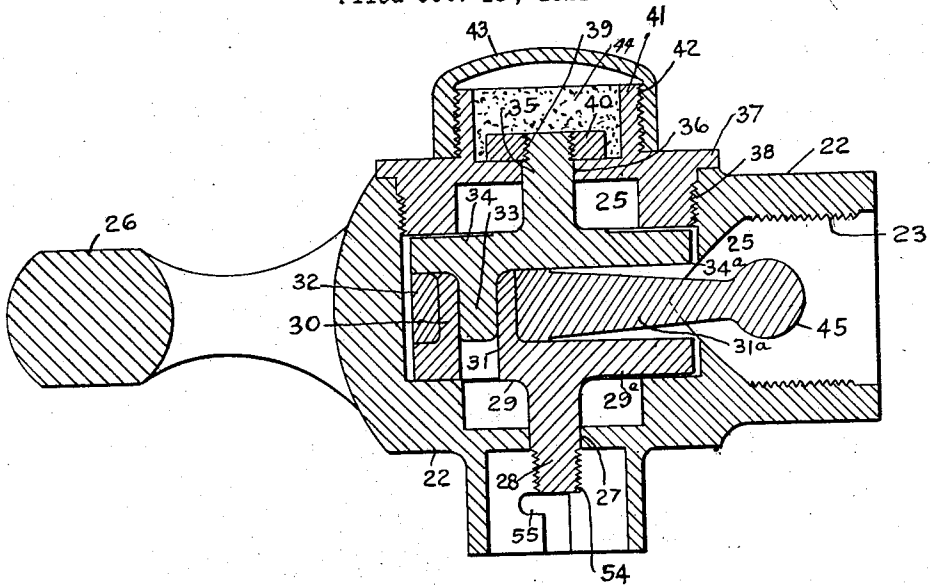


Fig 2

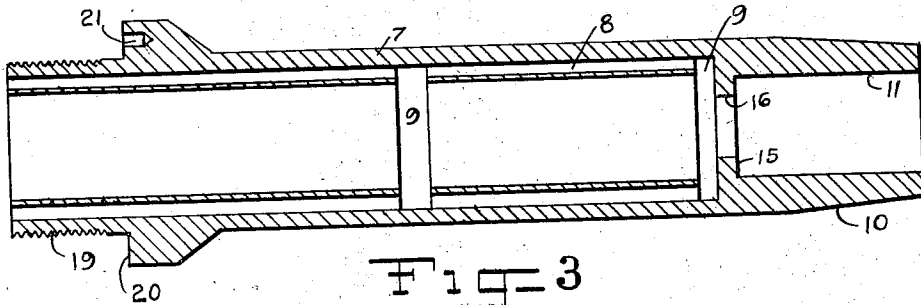


Fig-3

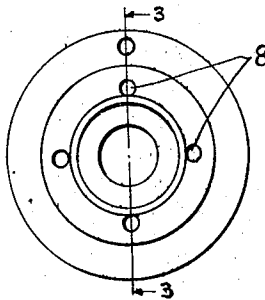


Fig-4

Inventor
Louis E. Golly
By his Attorney
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UNITED STATES PATENT OFFICE.

LOUIS E. GOLLY, OF BROOKLYN, NEW YORK, ASSIGNOR TO JAMES C. CAMPBELL, OF NEW YORK, N. Y.

VACUUM-POWER HAMMER.

Application filed October 18, 1921. Serial No. 508,535.

To all whom it may concern:

Be it known that I, LOUIS E. GOLLY, a citizen of the United States, residing at the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Vacuum-Power Hammers, of which the following is a specification.

This invention relates to vacuum power hammers, and the novelty consists in the adaptation and arrangement of the parts, as will be more fully hereinafter pointed out.

Heretofore vacuum power hammers have been so constructed that there was an unusual number of parts which has made it possible for a large number of these different parts, which were adapted to co-act, to get out of order, thereby causing many interruptions and delays in the use of such vacuum power hammers.

My invention has so simplified the number of parts and the co-acting of said parts that most all interruptions and delays due to the failure of the various co-acting parts to properly function have been eliminated. In short my device furnishes a vacuum power hammer which is at all times reliable and which will give uninterrupted service over long periods of time without repair or adjustment for a long time.

Referring to the drawings Figure 1 is a top plan view of my device with the central portion in horizontal section, and with part of the driving mechanism removed; Figure 2 is a vertical section through the driving mechanism and housing; Figure 3 is a longitudinal vertical section of the cylinder on the line 3—3 of Figure 4; Figure 4 is an end view of the cylinder looking in at the left end of Fig. 3; Figure 5 is a top plan view of the hammer; and Figure 6 is a longitudinal vertical section of the hammer on the line 6—6 of Figure 5.

In the drawings 7 is a cylinder having longitudinal borings 8 and circular cut-outs 9 which connect said borings 8 with the inside of the cylinder. The lower end of the cylinder 7 terminates in a tool holder 10 which has a cylindrical boring 11, in which is mounted a spring 12 and a flange ring 13, both the spring 12 and flange ring 13 being held under compressed tension between the bushing 14 which is driven into the open end of the tool holder 10 and the flange 15 at the head of the boring 11, and through

which there is a circular boring 16. A tool 17 is adapted to have the handle thereof inserted into the bushing 14 and the circular boring 16 so that the shoulder 18 of said tool will bear on the flange ring 13.

The cylinder 7 also has at its upper end an external threading 19, and also has a shoulder 20 formed by cutting out the threaded portion 19. In the shoulder 20 is a cylindrical boring 21. A driving mechanism housing 22 is internally threaded at 23 so as to engage the external threading 19 of the cylinder 7, and has air vents 24 which maintain atmospheric pressure uniformly in the inner chamber 25 of said housing 22. The upper end of said housing terminates in a handle 26 of usual construction. The housing 22 has a bearing 27 which is adapted to receive a spindle 28 of a driving plate 29, which plate also has an eccentric projection 30 in which there is a circular cut out or bearing 31. The exterior of the eccentric 30 is also adapted to be used as a bearing over which a plunger connector arm 31^a having a circular head 32 is adapted to be mounted. An eccentric pin 33 of a driven plate 34 is adapted to fit into the bearing 31 of the eccentric projection 30, thereby holding the plunger connector 31 in position on the eccentric projection 30 so that the circular head 32 will rotate freely thereon. The driven plate 34 also has a spindle 35 which is adapted to fit into and rotate freely in a bearing 36 of a removable circular plate 37 which is externally threaded so as to engage the internal threading 38 of the housing 22 with a left hand thread so that it will tend to tighten as the device vibrates in operation. The spindle 36 terminates in an external threading 39, over which a nut 40 is adapted to be threaded. The removable plate 37 has a circular sub-housing 41, which is externally threaded at 42, so that it is adapted to receive the internally threaded cap 43. The circular sub-housing 41 is adapted to contain suitable grease for lubricating the device, indicated at 44. The lower end of the plunger arm 31 terminates in a ball 45 which is adapted to fit a socket 46 of a plunger 47, which plunger is adapted to slide on the inside of the cylinder 7. Lower portions of the driving plate 29 and driven plate 34 are designated as 29^a and 34^a, respectively, and are both adapted to act as counter-balances to the connector arm 31 and

plunger 47. The plunger 47 has an air pocket 48 which is adapted to receive the head 49 of a tappet or hammer 50, which head 49 is of smaller diameter than the hammer 50 and forms therewith a shoulder 56 adapted to register just below the upper circular cut-out 9 in the cylinder 7 when the hammer 50 is in the lower position. An alternative form of tappet or hammer 50 is shown in Figures 5 and 6, in which the hammer has a cylindrical portion 52 in which there are vertical borings 53 adapted to act as air passages connecting the cut-out 51 with the space between the hammer 50 and the plunger 47, thereby permitting the use of a longer and heavier tappet 50.

The spindle 28 terminates in an external threading 54, over which a flexible shaft, not shown, leading from a source of power, which also is not shown herein, is adapted to be fastened and retained in position by means of a slot 55 in which a key on said shaft is adapted to be locked.

In the housing 22 is mounted a lock member 56 which is always under spring pressure, so that said lock 56 will engage with the boring 21 in the cylinder 7 and effect a locking when the housing 22 is screwed down onto the cylinder 7 at 19.

Several registering cut-outs 9 may be arranged so as to vary the amount of vacuum formed in the inside of the cylinder 7, which variation will vary the blow of the hammer 50 in direct ratio with the variation of the vacuum.

The operation of my device is as follows:

The power is turned on from the source of power which is not shown, which thereby rotates the spindle 54, the driving plate 29, and through the eccentrics 33 and 30 rotates the driven plate 34 therewith, which carry the connecting arm 31 therewith, thereby raising and lowering the plunger 47 which is connected to said arm 31 to the ball 45 and socket 46. The tappet 50 is in its normal or lower position as shown in Figure 1, and the air is therefore maintained at atmospheric pressure on the inside of the cylinder 7 as it circulates freely from both ends of the device, through the tool holder 10 and the air vents 24, at the power housing end of the device, and circulating freely through the longitudinal borings 8, and thence through the circular cut-outs 9 to the inside of the cylinder 7. As the operator then holds the handle 26 with one hand and directs the application of the tool 17 with the other hand and presses down to perform the proposed operation with the tool 17, the upper or handle end of the tool will project through the circular boring 16 so that the tool 17 pushes with it on the tappet or hammer 50, thereby raising the circular cut-out 51 until it stops registering with the circular cut-out 9, whereupon the sliding of the plunger 47 in the upward or backward movement will cause a vacuum on the inside of the cylinder 7 so the hammer 50 will slide up therein until the head 47 cushions in the air pocket 48 of the plunger 47, whereupon it will be pushed downwardly by the downward drive of the plunger 47 and the lower end or base of the hammer 50 will strike a blow on the upper or handle end of the tool 17. This operation will continue with the rapid blows of the hammer 50 on the tool 17 until the operator releases the pressure on the tool 17, whereupon the spring 12 will, through the pushing of the flange ring 13 against the shoulder 18 of the tool 17, restore the tool to its normal position so that the upper end does not project against the lower end of the hammer 50, and the hammer 50 will slide down to its normal position where circular cut-out 51 registers with the cut-out 9, whereby atmospheric pressure is again restored to the cylinder 7 thereby stopping the movement up and down of the hammer 50 in the cylinder 7.

I claim:

1. In a vacuum power hammer the combination of a single piece cylinder comprising a tool holder at one end, a reciprocatory plunger in said cylinder, means for actuating said plunger, and a reciprocatory hammer movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction, consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmospheric pressure therein, and means for interrupting the same between the hammer and plunger.
2. In a vacuum power hammer the combination of a single piece cylinder comprising a tool holder at one end, a reciprocatory plunger in said cylinder having an air cushion pocket, means for actuating said plunger, and a reciprocatory hammer having a head adapted to cushion in said air cushion pocket movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmospheric pressure therein, and means for interrupting the same between the hammer and plunger.

3. In a vacuum power hammer the combination of a cylinder comprising a tool holder at one end, a reciprocatory plunger in said cylinder, means for actuating said plunger, and a reciprocatory hammer movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction, consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmospheric pressure therein, and means for interrupting the same between the hammer and plunger consisting of a circular cut-out on said hammer adapted to register with the upper circular cut-out in said cylinder.
4. In a vacuum power hammer the combination of a single piece cylinder comprising a tool holder at one end, a reciprocatory plunger in said cylinder having an air cushion pocket, means for actuating said plunger, and a reciprocatory hammer having a head adapted to cushion in said air cushion pocket movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmospheric pressure therein, and means for interrupting the same between the hammer and plunger, consisting of a circular cut-out on said hammer adapted to register with the upper circular cut-out in said cylinder.
5. In a vacuum power hammer the combination of a single piece cylinder comprising a tool holder at one end having a flange ring mounted in the cylindrical boring of said holder under downward spring pressure, a reciprocatory plunger in said cylinder, means for actuating said plunger, and a reciprocatory hammer movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction.
6. In a vacuum power hammer the combination of a cylinder comprising a tool holder at one end having a flange ring mounted in the cylindrical boring of said holder under downward spring pressure, a reciprocatory plunger in said cylinder having an air cushion pocket, means for actuating said plunger, and a reciprocating hammer having a head adapted to cushion in said air cushion pocket movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction.
7. In a vacuum power hammer the combination of a single piece cylinder comprising a tool holder at one end having a flange ring mounted in the cylindrical boring of said holder under downward spring pressure, a reciprocatory plunger in said cylinder, and a reciprocatory hammer movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction.
8. In a vacuum power hammer the combination of a cylinder comprising a tool holder at one end having a flange ring mounted in the cylindrical boring of said holder under downward spring pressure, a reciprocatory plunger in said cylinder having an air cushion pocket, means for actuating said plunger, and a reciprocatory hammer having a head adapted to cushion in said air cushion pocket movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmospheric pressure therein, and means for interrupting the same between the hammer and the plunger.
9. In a vacuum power hammer the combination of a single piece cylinder comprising a tool holder at one end having a flange ring mounted in the cylindrical boring of said holder under downward spring pressure, a reciprocatory plunger in said cylinder

der having an air cushion pocket, means for actuating said plunger, and a reciprocatory hammer movable in said cylinder between said tool holder and said plunger, and said
 5 cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger when said plunger is moving in a direction away from said
 10 tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the opposite direction, consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmos-
 15 pheric pressure therein, and means for interrupting the same between the hammer and plunger consisting of a circular cut-out on said hammer adapted to register with the upper circular cut-out in said cylinder.

10. In a vacuum power hammer the com-
 20 bination of a single piece cylinder comprising a tool holder at one end having a flange ring mounted in the cylindrical boring of said holder under downward spring pres-
 25 sure, a reciprocatory plunger in said cylinder having an air cushion pocket, means for actuating said plunger, and a reciprocatory hammer having a head adapted to cushion
 30 in said air cushion pocket movable in said cylinder between said tool holder and said plunger, and said cylinder embodying means for producing a vacuum between the end of the hammer and the end of the plunger

when said plunger is moving in a direction away from said tool holder and forcing said hammer against the end of the tool holder when the plunger moves in the op-
 35 posite direction consisting of longitudinal borings and circular cut-outs in said cylinder adapted to maintain atmospheric pressure therein, and means for interrupting the
 40 same between the hammer and plunger, consisting of a circular cut-out on said hammer adapted to register with the upper circular cut-out in said cylinder.

11. A hammer adapted to reciprocate in
 45 the cylinder of a vacuum power hammer and having a head, a circular cut-out in said head, and a cylindrical portion having air passages adapted to effect an air communi-
 50 cation between air passages in said cylinder with the inside of the cylinder above said hammer.

12. In a vacuum power hammer a single
 55 piece cylinder, a reciprocatory tappet therein having a head in which is a circular cut-out adapted to register with a circular cut-out in said cylinder, and a cylindrical por-
 60 tion having air passages communicating with said tappet cut-out and the inside of said cylinder above said hammer.

In testimony whereof I affix my signature.

LOUIS E. GOLLY.