

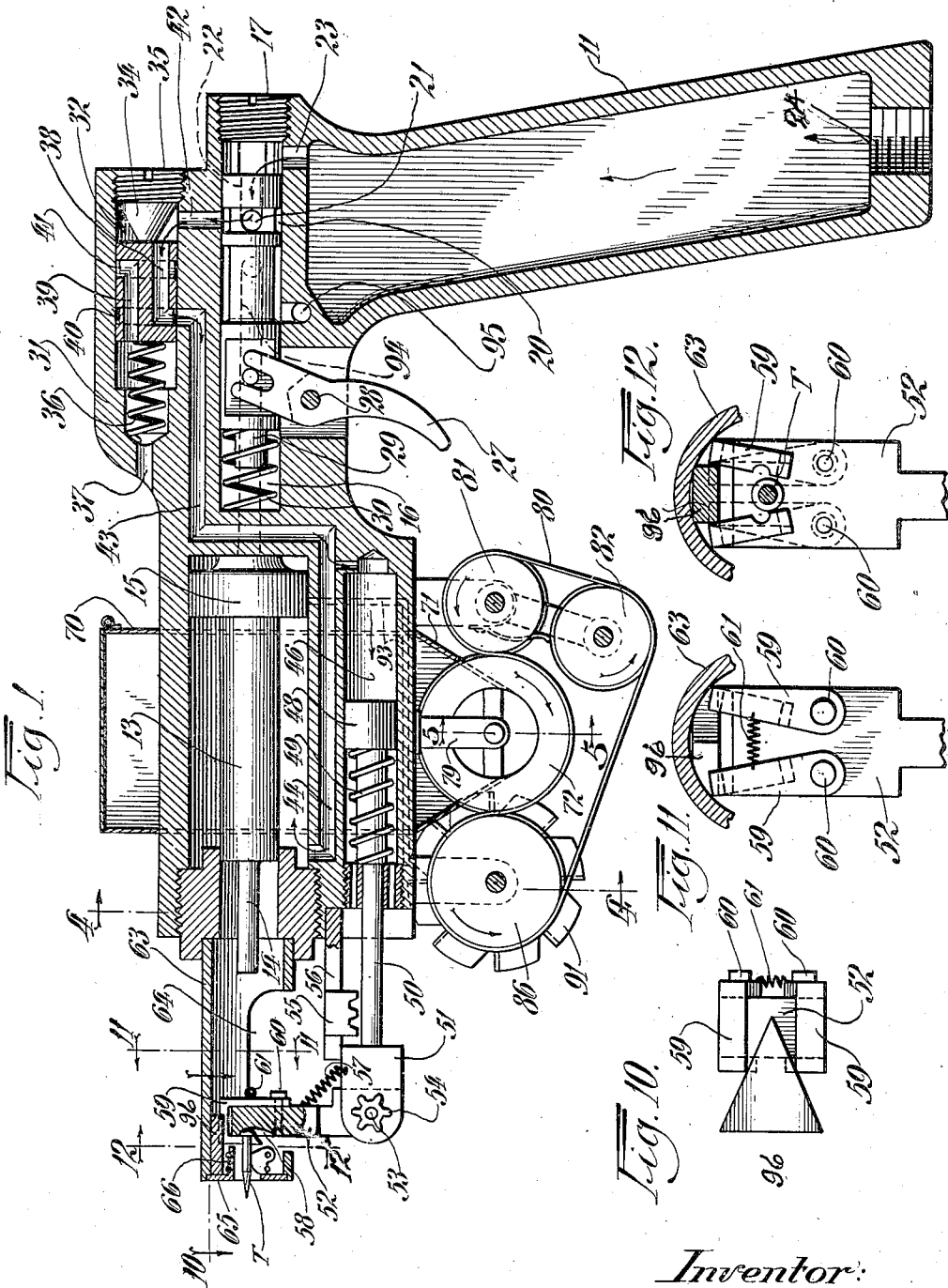
April 8, 1930.

W. D. BURGER
AUTOMATIC TACK HAMMER

1,753,499

Filed Sept. 21, 1928

3 Sheets-Sheet 1



Inventor:
Walter D. Burger
By *Samuel R. Manning*
Attorney.

April 8, 1930.

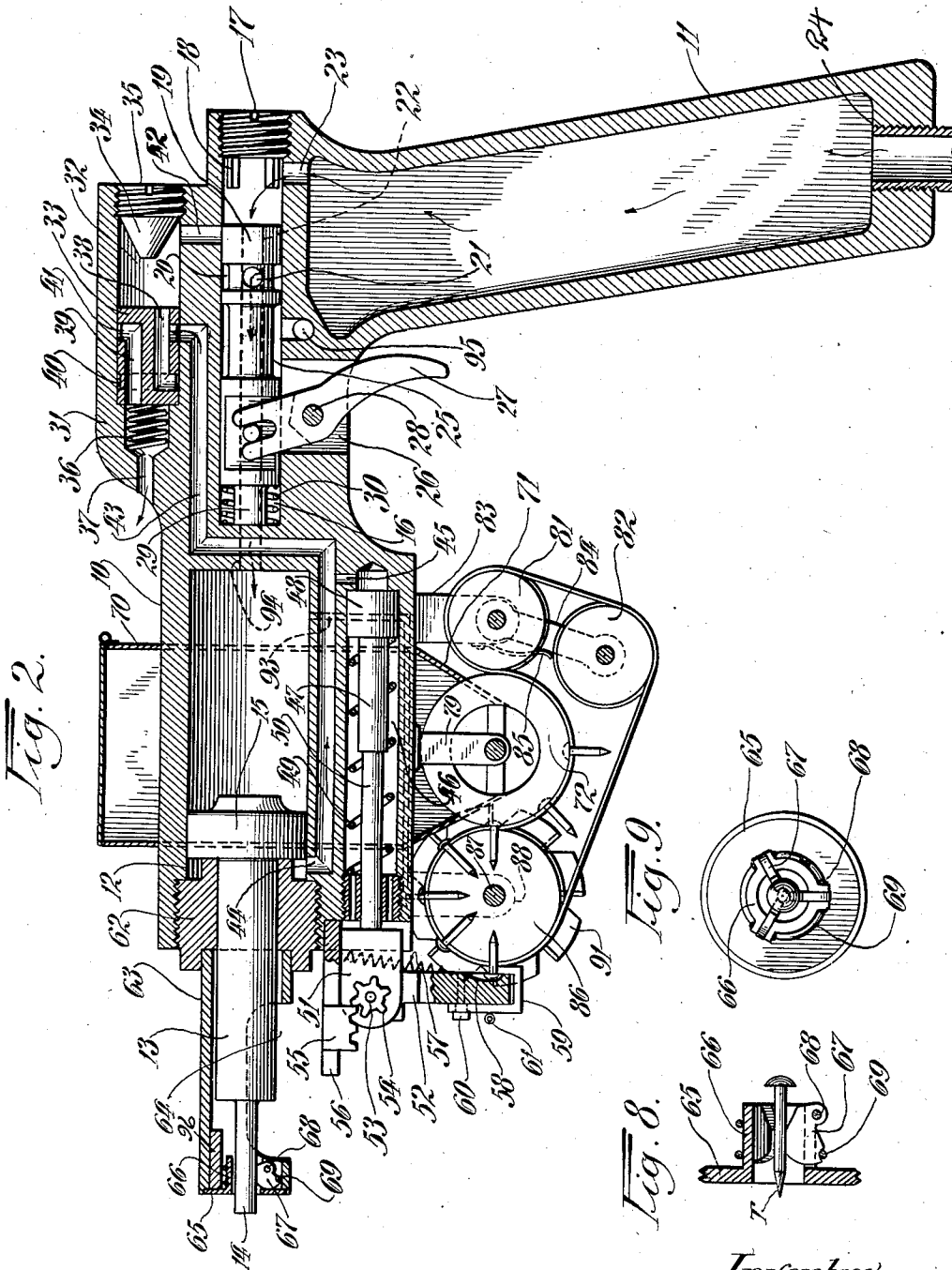
W. D. BURGER

1,753,499

AUTOMATIC TACK HAMMER

Filed Sept. 21, 1928

3 Sheets-Sheet 2



Inventor:
Walter D. Burger
By Samuel W. Manning,
Attorney.

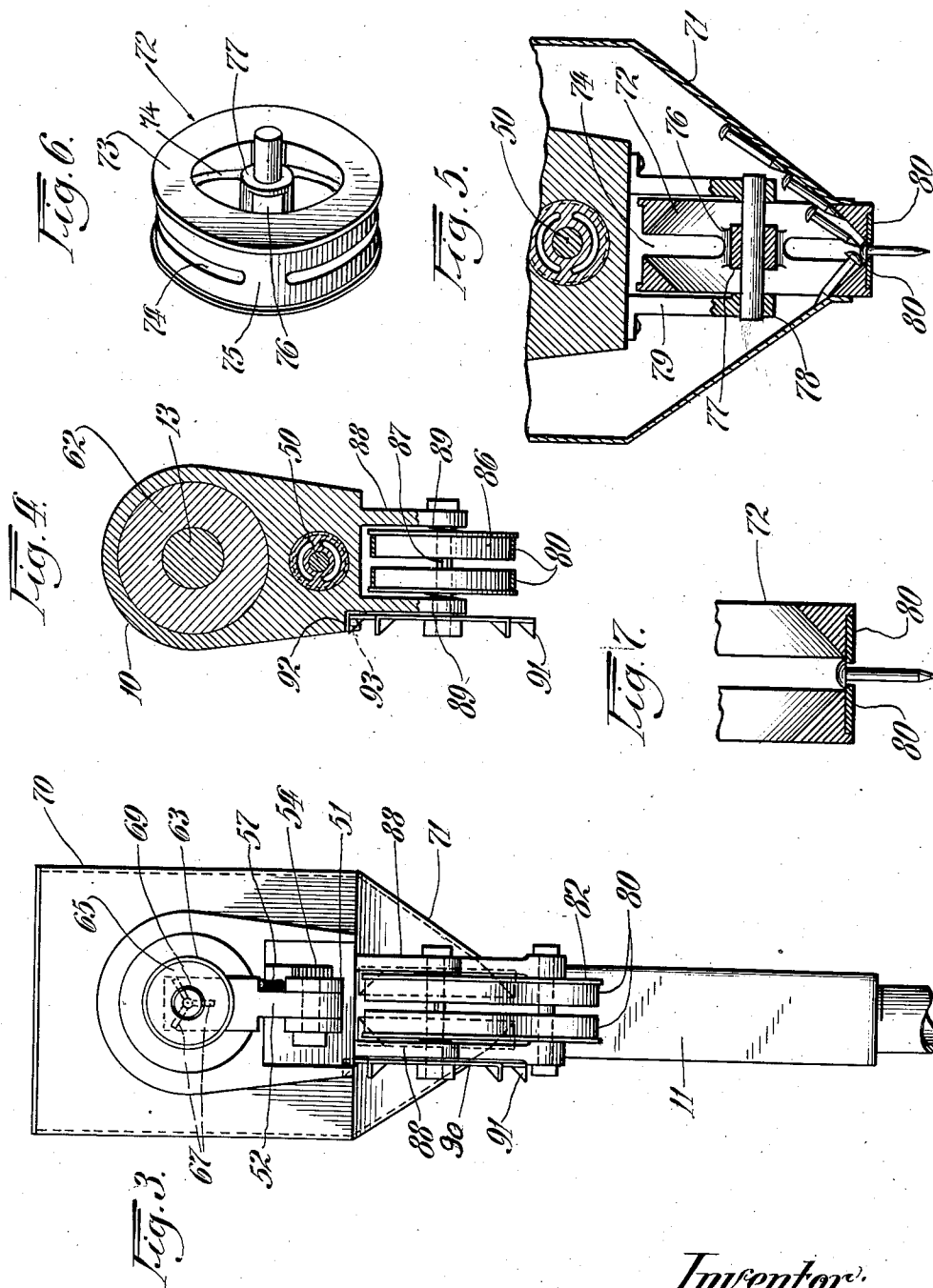
April 8, 1930.

W. D. BURGER
AUTOMATIC TACK HAMMER

1,753,499

Filed Sept. 21, 1928

3 Sheets-Sheet 3



Inventor:
Walter D. Burger
By Samuel W. Banning
Attorney.

UNITED STATES PATENT OFFICE

WALTER D. BURGER, OF FOREST PARK, ILLINOIS

AUTOMATIC TACK HAMMER

Application filed September 21, 1928. Serial No. 307,514.

This invention relates to improvements in automatic tack hammers, of which the following is a specification.

This invention relates to a pneumatically operated magazine-fed tack hammer, designed primarily for the purpose of delivering and driving small tacks in restricted areas where the use of an ordinary tack hammer would be inconvenient or impossible, and the invention relates more particularly to the means provided for delivering the tacks, point outward, to the driving position, and to the means for driving the tacks thus delivered. The present mechanism is designed to employ pneumatic pressure for all of the operations required so that manual positioning of the tacks is unnecessary.

With this end in view, the invention comprises a barrel provided with a pistol grip and adapted to be manipulated in a manner similar to the firing of a revolver, and by a suitable manipulation of the trigger, the tacks may be successively delivered to the firing position and driven to place one at a time without lowering the hammer or changing its position except in so far as necessary to shift it from time to time in the driving of the tacks at required points.

Further objects and details will appear from the description of the invention in conjunction with the accompanying drawings wherein

Figure 1 is a longitudinal, sectional elevation showing the hammer with a tack positioned for firing with the driving plunger retracted and with the tack-holding arm swung upwardly to the delivering position;

Fig. 2 is similar in all respects to Fig. 1, with the exception that the plunger is shown in striking position with the tack delivering arm lowered and with the valves differently positioned as required in the firing operation;

Fig. 3 is a front elevation;

Fig. 4 is a cross section, taken on line 4—4 of Fig. 1;

Fig. 5 is a sectional detail showing the tack feeding wheel and hopper, taken on line 5—5 of Fig. 1;

Fig. 6 is a perspective view of the tack feeding wheel;

Fig. 7 is an enlarged sectional detail of the slotted periphery of the tack feeding wheel and associated feeding belts;

Fig. 8 is an enlarged sectional detail of the chuck members for holding the tacks in firing position at the muzzle of the hammer gun;

Fig. 9 is an inner face view of the same;

Fig. 10 is a view of the wedge at the muzzle of the gun for spreading the gripping fingers which deliver the tack to firing position;

Fig. 11 is a view of said gripping fingers and associated parts, taken on line 11—11 of Fig. 1; and

Fig. 12 is a similar view, taken on line 12—12 of Fig. 1, showing the fingers spread to release a tack.

The hammer or gun, as it may properly be termed, comprises a barrel 10 terminating at its rear end in a hollow pistol grip 11. The barrel is provided with a main bore 12 which provides for the reciprocation of a plunger 13, reduced at its forward end to provide an elongated striker 14, and enlarged at its rear end to provide a head 15 which constitutes a piston for reciprocating the plunger within the bore. The barrel behind the plunger bore 12 is provided with a valve bore 16 closed at its rear end by a screw plug 17 having on its inner face a boss 18 adapted to serve as a stop for limiting the rearward movement of a reciprocating main valve member 19 designed to primarily control the delivery of pressure to the piston 15 and the other working portions of the hammer gun.

The valve 19 is provided with a rear circumferential groove or channel 20 and at this point the valve is also provided with a transverse bore 21 communicating with a longitudinal bore 22 drilled into the rear end of the valve member. Pressure is admitted through the bore 22 and the cross bore 21 through an air inlet port 23 communicating with the interior of the pistol grip which provides a passage or conduit for compressed air which is admitted through a threaded aperture 24 in the end of the pistol grip.

The valve member is reduced at its intermediate portion 25 and is provided near its for-

ward end with a recess 26 into which projects the upper bifurcated head of a trigger 27 pivoted on a cross pin 28 and working within a slot or recess 29 formed in the gun immediately in advance of the point of connection for the pistol grip. The forward end of the valve member terminates in a boss 29 around which is coiled a spring 30, tending to hold the valve member in its rearward position and in contact with the boss 18 which serves as a stop for restricting the reciprocation of the valve member.

Immediately above the bore 16 which furnishes a valve chamber for the main operating valve, is located an elongated boss or protuberance 31 which is longitudinally bored to afford a valve chamber 32 for the reception of a shuttle valve 33 which, when in its rearmost position, bears against a boss 34 formed on the inner face of a screw plug 35. The forward end of the shuttle valve bears against a coil spring 36 which occupies the forward end of the valve chamber, which latter is drilled to afford a release port 37 opening to the atmosphere.

The shuttle valve is provided with passages 38 and 39, the former of which opens outwardly into a forward peripheral groove 40 and the latter of which opens outwardly into a rear peripheral groove 41. It will be noted that the passage 38 leads from the rear end of the shuttle valve to a point in advance of the center while the passage 39 leads from the forward end to a point to the rear of the center.

The shuttle valve chamber communicates with the main valve chamber through a port 42 which, when the main valve is retracted, registers with the rear annular groove 20 around the main valve so that with the parts in the position shown in Figure 1, there will be a direct flow of pressure through the port 23 and through the main valve and thence through the port 42 to the rear end of the shuttle valve chamber.

The shuttle valve chamber has leading therefrom an air passage 43 which ultimately opens into the forward end of the bore 12 at the point 44 and with the parts adjusted as in Figure 1, the pressure admitted through the shuttle valve will act against the forward face of the piston 15, thus holding the plunger in its rearmost position.

The passage 43 has leading therefrom a side passage 45 which communicates with a chamber 46 formed on the lower side of the barrel which chamber affords a housing for a plunger 47, terminating in a piston 48 which acts against the tension of a spring 49. With the parts illustrated as in Figure 1, the plunger 47 is shown advanced, which is the operation required in delivering a tack to the firing position. The plunger at its forward end carries a rod 50 upon which is mounted a head 51 bifurcated at its forward end to receive

the inner end of a swinging tack carrying arm 52 which is mounted upon a pin 53 which at its outer end carries a pinion 54. The pinion is fitted to engage with a short rack 55 carried by a forwardly projecting plate 56, the teeth of the rack being aligned with the teeth of the pinion so that as the rod 50 is advanced or retracted, the pinion will be momentarily rotated to a degree sufficient to swing it past the medial position, the ultimate movement of the arm, however, being imparted by the action of a spring 57. The arm 52 is capable of moving throughout a compass of 180° from the depending tack-receiving position shown in Figure 2 to the tack-delivering position shown in Figure 1.

The free end of the arm 52 is provided on the tack-holding face with a groove or notch 58 and on the opposite sides of this notch are located L-shaped clamping fingers 59, each of which is pivoted to a pin 60 which permits a limited lateral swinging movement of the two fingers in opposition to one another, although the fingers are normally held in closely adjacent gripping relation to one another by the provision of a spring 61 which connects the two fingers together.

The head of the tack T is held within the notch 58 by the engagement of the two fingers against the body of the tack at points immediately behind the head and with the tack thus gripped, the arm is swung from the lowermost position in which the point of the tack extends to the rear into the reverse or upper position in which the point is presented forwardly and in alignment with the line of movement of the striker.

The front end of the hammer barrel is provided with a threaded block 62 bored to permit reciprocation of the plunger 13, and this block, in turn, carries a forwardly projecting muzzle tube 63 which is cut away on the underside 64 to afford clearance for the swinging movements of the tack carrying arm. The forward end of the muzzle tube is closed by a disc 65 which carries an inwardly extending flange 66 which affords a pivotal mounting for three chuck dogs 67, each pivoted upon a pin 68 and adapted to be swung inwardly by the action of a split ring spring 69 which encircles the three chuck dogs at a point in advance of the pivotal mountings therefor, the arrangement being such that the three dogs will engage in unison the body of a tack and prevent its rearward withdrawal but will at the same time freely swing forwardly to permit the head of the tack and also the head of the driver to pass through the muzzle aperture without hindrance so that the tack may be driven completely into the surface against which the muzzle of the gun is presented.

The mechanism for segregating the tacks from the mass in the magazine, and delivering them one at a time to the tack-carrying

arm when in the position shown in Figure 2, will now be described in detail. The mass of tacks in the first instance is delivered into a hopper 70 which surrounds the barrel and terminates at its lower end in inwardly converging walls constituting a chute 71. The chute portion of the hopper surrounds a feeding wheel 72 which, as illustrated in Figures 5 and 6, comprises two ring-shaped sections 73 separated by a slot 74 save for the provision on each side of a connecting web 75 which merges into a pair of inwardly extending spokes 76 united with a hub 77 which arrangement is necessary in order to unite the two sections of the wheel into an integral structure. The wheel is mounted upon a short shaft 78 which is carried by brackets 79 depending from the barrel of the hammer gun, which arrangement permits the feeding wheel to rotate freely within the chute portion of the hopper.

The ring-shaped wheel sections are beveled on their inner surfaces to afford outwardly converging circular walls extending to the slot 74 so that tacks delivered into the interior of the wheel as shown in Figure 6 will be directed downwardly toward the slot between the wheel sections and will fall point downwardly therethrough. The sections of the feeding wheel afford mountings for a pair of endless feeding belts 80, each formed of a section of thin, flexible sheet metal, preferably brass, and the two feeding belts are held in spaced relation to one another to afford a slot or channel of sufficient width to permit the body of a tack to fall through between the belt sections without, however, permitting the head to slip through. It will be noted from Figure 6 that the belt sections project inwardly beyond the margins of the slot between the wheel sections, which arrangement permits the tack heads to clear the wheel and be caught and held between the belt sections so that as the belt sections travel around the wheel, the tacks will arrange themselves in suspended relation and be fed forward by the advance of the feeding belts.

In addition to the feeding wheel, the belt sections are carried over a rear upper idle roller 81 and a lower rear idle roller 82, the former of which is journaled upon a bracket 83 and the latter of which is journaled at the free end of links 84, a suitable spring 85 being provided to impart a rearward thrust to the links in order to maintain a suitable tension on the belt sections.

The belt sections are also carried around a pair of forward feeding wheels 86 which lie abreast of one another and are slidably splined upon a shaft 87 carried by bracket hangers 88 near the forward end of the gun barrel and these forward wheels are pressed toward one another by the action of springs 89 interposed between the wheel sections and the adjacent bracket hangers. Each wheel

section 86 is flanged around its outer margin and the arrangement serves to press the feeding belts toward one another so that the tacks will be tightly clamped and held between the belts as the latter are carried forwardly. A feeding movement is imparted to the belt sections by means of a fan wheel 90 which is fixed upon the shaft 87, the fan wheel being provided with fan blades 91. The wheel is so disposed that its upper portion will rotate within a slot or recess 92 in the wall of the barrel which slot communicates with an open forward end of an air duct 93, the rear end of which opens into the piston chamber 12 near the rear end thereof. The arrangement is such that after the piston 15 has moved forward a slight distance, the port 93 will be opened and a jet of air discharged against the fan blades causing a rotation of the shaft 87 which imparts a feeding movement to the belt. A suitable housing, not shown, may be provided to enclose the feeding wheels and belts above described.

In addition to the air passages already described, the barrel is provided with a longitudinally extending air duct 94, the rear of which opens inwardly into the main operating valve chamber at a point adjacent the reduced portion of the valve 25 when the valve is in retracted position. The forward end of this duct opens through the rear wall of the chamber 12 behind the piston therein. An air relief port 95 is also provided which opens inwardly to the main valve chamber and outwardly to the atmosphere. A wedge 96 serves to spread the clamping fingers 59 when swung upwardly to deliver the tacks to the chuck dogs 67.

Operation

The tacks are fed en masse into the hopper 70 and fall down into the interior of the feeding wheel. The arrangement is such that the tacks will tend to arrange themselves point downwardly through the slot in the wheel and be caught between the feeding belts which embrace the lower portion of the wheel. The tacks are carried by the tack-feeding belts over the forward spring-pressed feeding wheels with their points extending inwardly toward the axis of the wheels and with their heads presented outwardly. With the tacks advancing to feeding position, the arm 52 will occupy the position shown in Fig. 2, with the L-shaped fingers 59 opening upwardly and inwardly, so that, as the head of the tack is brought into register with these fingers, it will be engaged between the fingers and stripped away from engagement with the feeding belts and held firmly with its head within the notch 58. With a tack thus engaged, and with the valve mechanisms adjusted to the positions indicated in Fig. 1, that is, with both the main operating valve and the shuttle valve retracted, the admission of pressure through the main valve,

through the shuttle valve, and through the port 43 to the chamber 46, will cause the plunger 48 to advance against the spring 49. and, in so advancing the pinion 54 will be engaged by the rack 55, and the arm 52 will be swung upwardly concurrently with the forward movement of the arm, so that at the conclusion of these movements the arm will reach the position shown in Figure 1 with the tack projecting through the chuck dogs which grip the tack and hold it on position for driving.

As soon as the impetus of the air has driven the plunger 48 to the limit of its forward movement, and has driven back the piston 15 to the limit of its rearward movement, it will begin to act effectively upon the shuttle valve and will move the shuttle valve forward against the tension of the spring 36, which will thus position the shuttle valve so that it will provide communication between the passage 43 and the atmosphere, thereby allowing the plunger 48 to restore to its rearward position under the tension of the spring 49 and release the pressure ahead of the driving piston in preparation for the firing of the same when the trigger is pulled.

The retraction of the plunger 48 thus restores the arm 52 to its lower position and clears the way for the advance of the driving member 14, leaving the tack in position in the muzzle of the gun. In short, prior to the firing of the gun, the plunger 48 and the shuttle valve 33 will assume the positions indicated in Fig. 2, with the understanding, however, that the firing piston will still be in its retracted position.

With the parts thus positioned, the trigger will be pulled which advances the valve 19 against the tension of the spring 30, which brings the port 21 into register with the port 94, and this admits pressure behind the driving piston 15, which will advance the driving piston, the way being now cleared for striking a blow upon the head of the tack. As the piston 15 advances, it will open the port 93, so that concurrently with the driving operation air will be admitted to the fan port, thereby causing a rotation of the fan, thus imparting a feeding movement to the feeding belts for the purpose of bringing another tack into register with the free end of the arm 52, which will thus be loaded while the previously positioned tack is being driven.

With full pressure admitted behind the piston, the pressure on the opposite side thereof will be negligible in amount, and will not build up in any degree sufficient to cushion the piston in its driving stroke, it being understood that the driving stroke of the piston takes place after the admitted pressure has been vented upon completion of the tack-delivering operation and before the pulling of the trigger. During the driving stroke the shuttle valve will be cut off from direct com-

munication with the source of pressure, so that opportunity will be afforded for the escape by seepage of the small quantity of air trapped behind the shuttle valve, which permits the spring 36 to act and restore the shuttle valve to normal position. The arrangement is such that the driving piston 15 and the tack-feeding plunger piston 48 will always act in alternation to one another; that is to say, a tack-feeding operation will always alternate with a driving operation. After a tack has been driven and the trigger released, the restoration of the main operating valve will bring the duct 94 into register with the vent opening 95 so that the pressure behind the piston 15 will be released.

The invention is one which permits the tacks to be accurately and rapidly driven in positions which would be difficult of access under ordinary circumstances. The feeding arrangement is one which presents the point of a tack in projecting position so that it may be properly centered before driving, which is of advantage particularly in cases where the hammer gun is used in tacking fabric to a wooden backing or the like.

Although the invention has been described with particularity, it is not the intention to limit the same to the precise details shown, since variations thereof may be made without departing from the spirit of the invention.

I claim:

1. In a device of the class described, the combination of a barrel, a hammer device mounted for reciprocation within the barrel, a magazine for the retention of tacks, feeding means associated with a magazine for selecting and arranging tacks, an arm associated with said feeding means and mounted for movement for carrying a tack from the feeding means to the muzzle of the barrel, means at the muzzle of the barrel for engaging a tack so delivered, and means adapted to actuate the tack-delivering arm and hammer device in alternation with one another, and to operate the tack-feeding means for carrying tacks to the arm concurrently with a driving stroke of the hammer device.

2. In a device of the class described, the combination of a barrel, a hammer device mounted for reciprocation within the barrel, a hopper for retaining tacks, tack-feeding mechanism comprising separated feeding belts and wheel mechanism for segregating tacks from the hopper and clamping the same in properly arranged relation between the feeding belts, means associated with the feeding belts for stripping the tacks singly therefrom and delivering the same to the muzzle of the barrel, and means for actuating the hammer device and tack-delivering device in alternation to one another.

3. In a device of the class described, the combination of a barrel, a hammer device

mounted for reciprocation within the barrel, a hopper for retaining tacks, tack-feeding mechanism comprising separated feeding belts and wheel mechanism for segregating tacks from the hopper and clamping the same in properly arranged relation between the feeding belts, means associated with the feeding belts for stripping the tacks singly therefrom and delivering the same to the muzzle of the barrel, means for actuating the hammer device and tack-delivering device in alternation to one another, and means for actuating the feeding belts concurrently with a driving movement of the hammer device.

4. In a mechanism of the class described, the combination of a barrel, a hammer device operable therein, a magazine for the retention of tacks, a feeding wheel associated with the magazine and hollow on its interior and provided with a slot around its periphery for the arranging of tacks with their points outwardly projecting through said slot, a pair of separated feeding belts associated with said feeding wheel for engaging and holding the tacks adjacent the heads thereof, a swinging arm adapted when in lowered position to co-act with the feeding belts in stripping tacks singly therefrom, means for upwardly swinging said arm to present the tacks to the muzzle of the barrel point outwardly, means in the muzzle for engaging and holding the tacks delivered by the arm, and means for operating the hammer device and swinging arm in alternation with one another and for operating the feeding belts concurrently with a driving movement of the hammer device.

5. In a mechanism of the class described, the combination of a barrel, a hammer device operable therein, a magazine for the retention of tacks, a feeding wheel associated with the magazine and hollow on its interior and provided with a slot around its periphery for the arranging of tacks with their points outwardly projecting through said slot, a pair of separated feeding belts associated with said feeding wheel for engaging and holding the tacks adjacent the heads thereof, a swinging arm adapted when in lowered position to co-act with the feeding belts in stripping tacks singly therefrom, means for upwardly swinging said arm to present the tacks to the muzzle of the barrel point outwardly, means in the muzzle for engaging and holding the tacks delivered by the arm, and means for operating the hammer device and swinging arm in alternation with one another and for operating the feeding belts concurrently with a driving movement of the hammer device, said means including pressure valves and passages for actuating the several devices.

6. In a device of the class described, the combination of a barrel provided at its end with a pistol grip, the barrel being provided with a main hammer plunger chamber and a feeding plunger chamber, a hammer plunger

mounted within the first mentioned chamber and a feeding plunger mounted within the second mentioned chamber, a valve mechanism for admitting pressure to the respective chambers, a swinging arm carried by the feeding plunger, rack and pinion mechanism for swinging the arm during its movements of advance and retraction to carry a tack from tack-receiving to tack-delivering position in the muzzle of the barrel, and pneumatically operated means for delivering tacks singly to the swinging arm.

7. In a device of the class described, the combination of a barrel provided at its end with a pistol grip, the barrel being provided with a main hammer plunger chamber and a feeding plunger chamber, a hammer plunger mounted within the first mentioned chamber and a feeding plunger mounted within the second mentioned chamber, a valve mechanism for admitting pressure to the respective chambers, a swinging arm carried by the feeding plunger, rack and pinion mechanism for swinging the arm during its movement of advance and retraction to carry a tack from tack-receiving to tack-delivering position in the muzzle of the barrel, and pneumatically operated means for delivering tacks singly to the swinging arm, said means including a pair of feeding belts adapted to clamp the tacks and deliver them in arranged relation to the swinging arm.

8. In a mechanism of the class described the combination of a barrel provided with a hammer plunger chamber and a feeding plunger chamber, the barrel being provided with air ducts for admitting pressure to and releasing pressure from the respective chambers, valve mechanism for controlling the admission and release of pressure, a tack magazine carried by the barrel, a feeding wheel associated with the magazine and provided with a peripheral slot and having a hollow interior adapted to receive the tacks thereinto and permit the projection of their points outwardly therefrom, a pair of endless feeding belts in separated relation and passing around the feeding wheel and adapted to engage the tacks outwardly projecting from the feeding wheel, pneumatic means for operating the feeding belts, a feeding arm journaled upon the end of the feeding plunger and adapted to swing from a position adjacent the feeding belts to a position adjacent the muzzle of the barrel, said arm being provided with spring-pressed fingers adapted to engage and hold the tacks delivered by the feeding belts, chuck mechanism in the muzzle of the barrel for engaging tacks delivered by the feeding arm and a trigger for controlling the condition of release of pressure for actuating the mechanisms.

9. In a device of the class described, the combination of a barrel provided with a pistol grip, a tack magazine surrounding the bar-

rel, tack-segregating and feeding devices located below the barrel and in associated relation with the magazine, a tack-driving device mounted for reciprocation within the barrel, a tack-delivering device adapted to move from a position adjacent the tack-feeding devices to a position adjacent the muzzle of the barrel, said delivering device being provided with fingers adapted to engage and remove the tacks singly from the tack-feeding devices and means for actuating the several devices in timed relation to one another.

10. In a device of the class described, the combination of a barrel, a tack-driving device mounted for reciprocation within the barrel, a magazine associated with the barrel, tack-feeding devices associated with the magazine and located below the barrel and adapted to segregate and arrange the tacks, a tack-feeding arm journaled upon a reciprocating member and adapted to move from a position having its free end adjacent to the tack-feeding mechanisms to a position adjacent the muzzle of the barrel, the ultimate movement of the arm being a straight line forward reciprocatory movement, chuck members in the muzzle of the barrel for engaging the tacks and means for actuating the mechanisms in timed relation to one another.

11. In a device of the class described, the combination of a barrel, a tack-driving device mounted for reciprocation within the barrel, a magazine associated with the barrel, tack-feeding devices associated with the magazine and located below the barrel and adapted to segregate and arrange the tacks, a tack-feeding arm journaled upon a reciprocating member and adapted to move from a position having its free end adjacent to the tack-feeding mechanisms to a position adjacent the muzzle of the barrel, the ultimate movement of the arm being a straight line forward reciprocatory movement, chuck members in the muzzle of the barrel for engaging the tacks, means for actuating the mechanisms in timed relation to one another, said means including valve means and ducts for admitting pressure and a trigger for controlling the operation of said valve means.

In witness that I claim the foregoing I have hereunto subscribed my name this 15th day of September, 1928.

WALTER D. BURGER.

55

60

65