M. D. PHELAN.

PORTABLE POWER TACKER.

APPLICATION FILED JAN. 2, 1907.

958,002. **Patented May 17, 1910.**

4 SHEETS—SHEET 1.

Fig. 2.

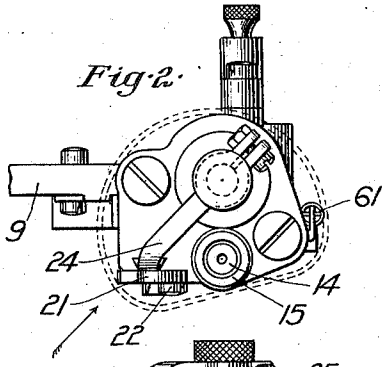
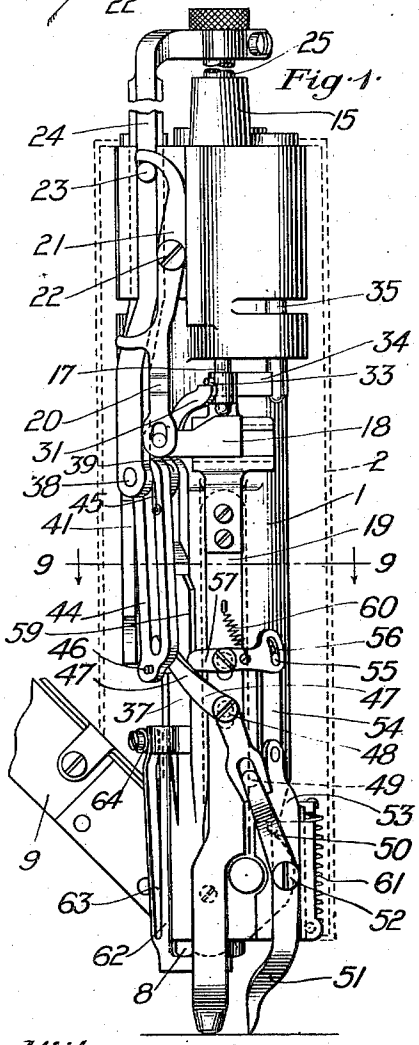


Fig. 1.



Witnesses:

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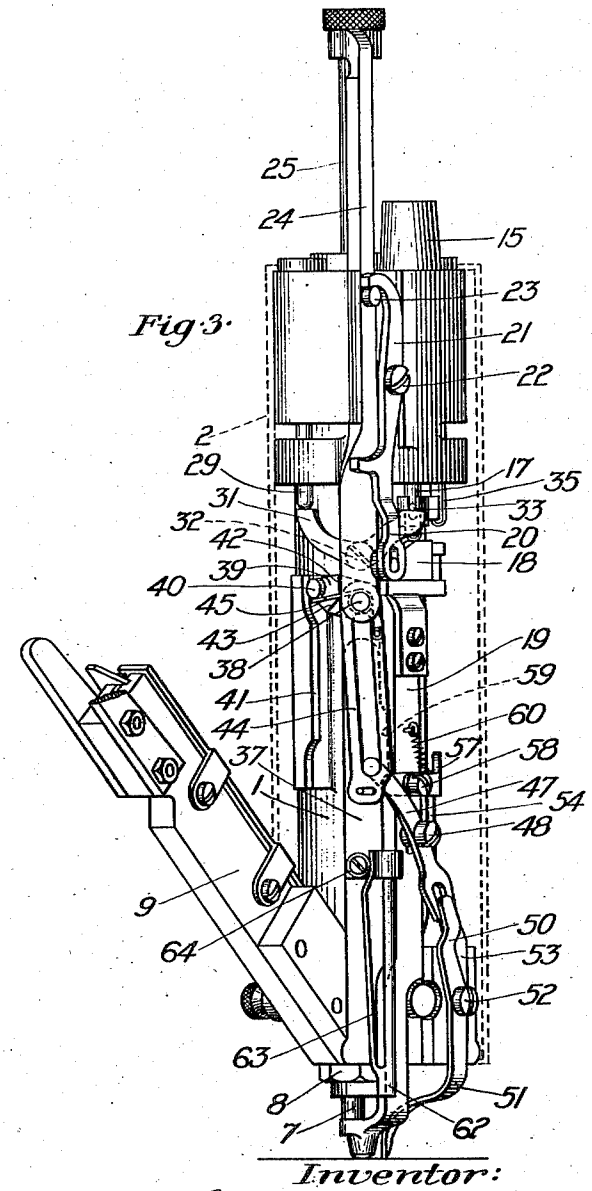
Fig. 3.



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4 SHEETS—SHEET 2.

Fig. 5.

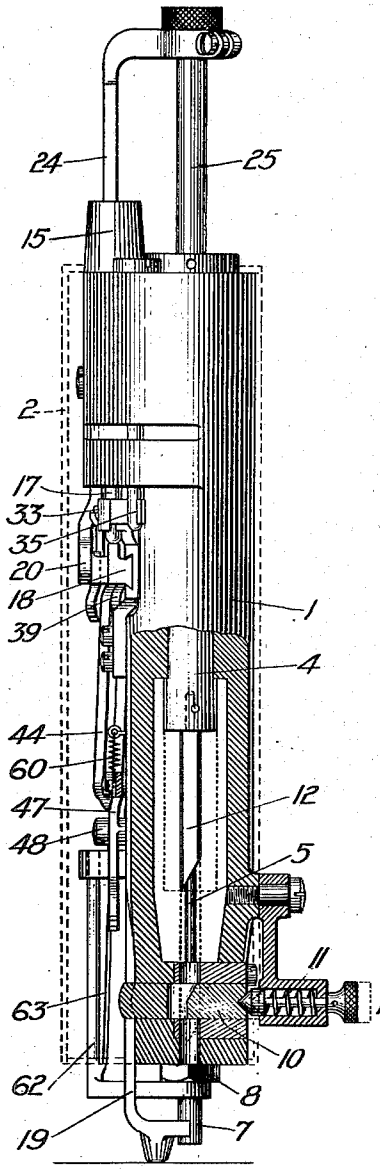
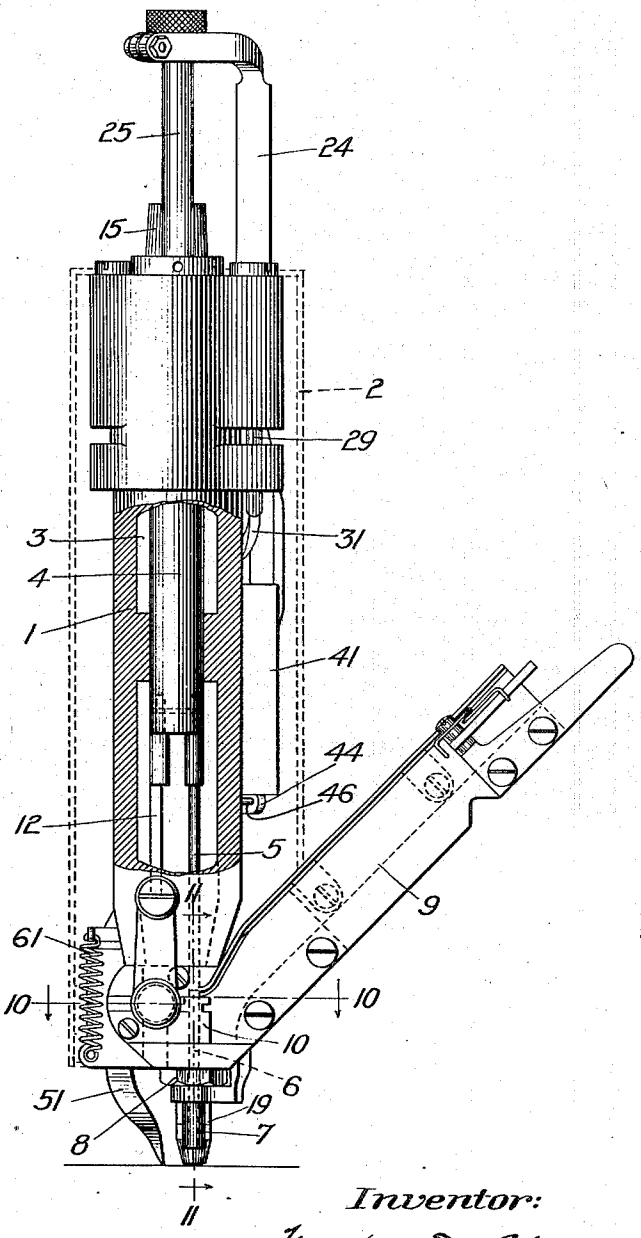


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 6.

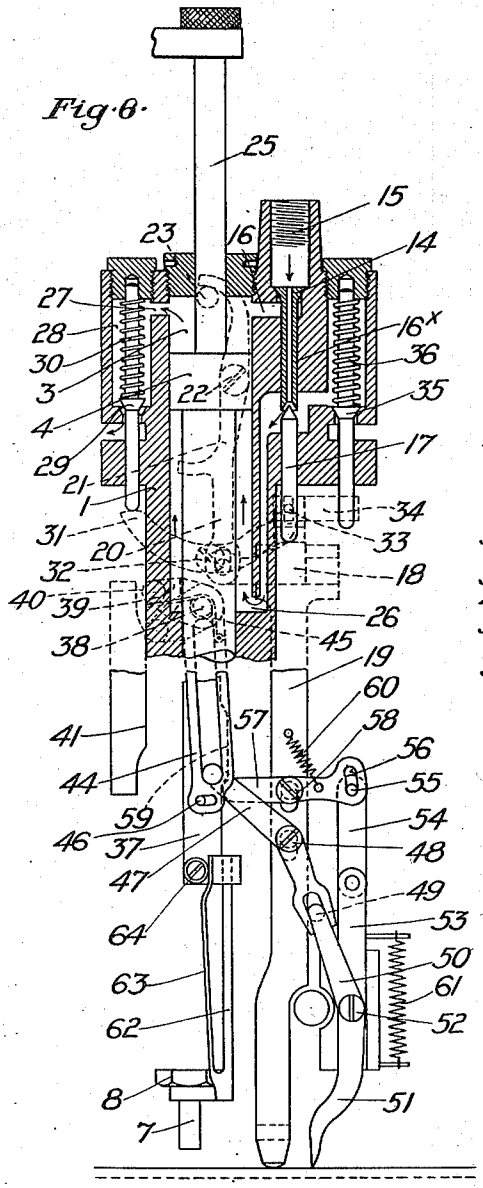
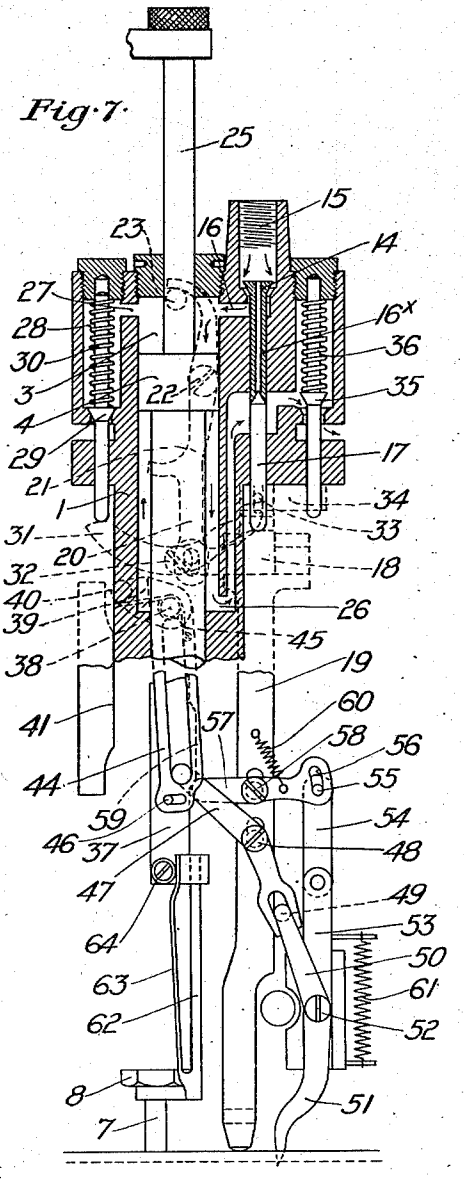


Fig. 7.



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PORTABLE POWER TACKER.

APPLICATION FILED JAN. 2, 1907.

958,002. **Patented May 17, 1910.**

4 SHEETS—SHEET 4.

Fig. 8.

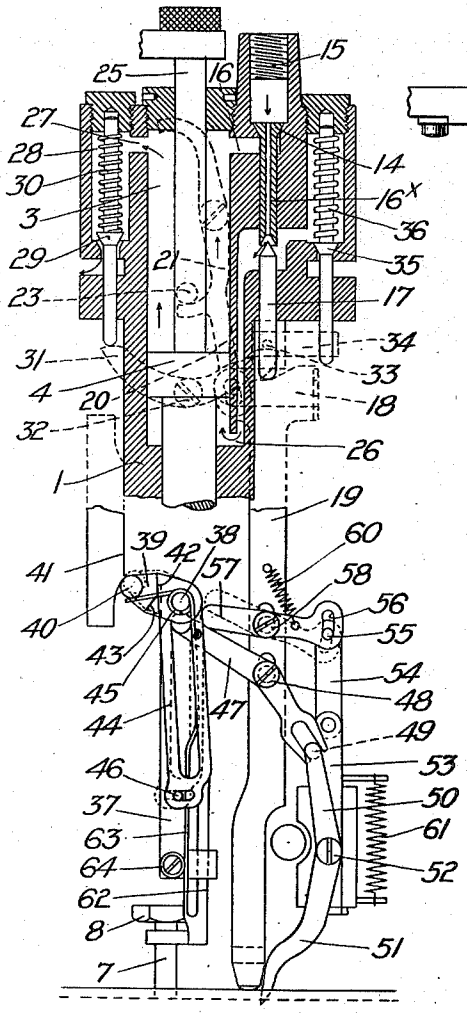


Fig. 9.

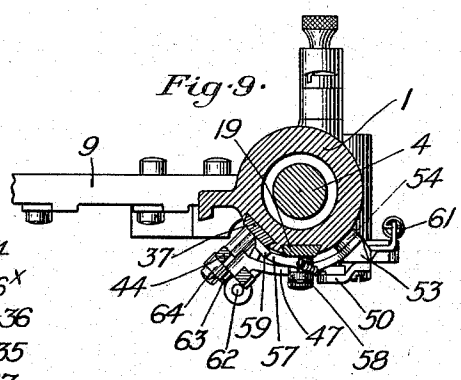


Fig. 10.

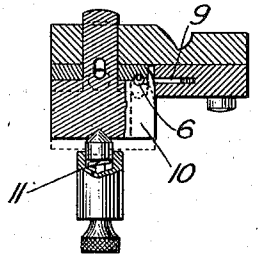


Fig. 11.

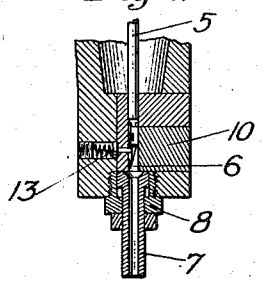
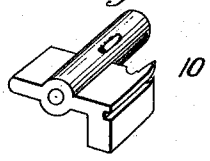


Fig. 12.



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UNITED STATES PATENT OFFICE.

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PORTABLE POWER-TACKER.

958,002. Specification of Letters Patent. Patented May 17, 1910.

Application filed January 2, 1907. Serial No. 350,492.

To all whom it may concern:

Be it known that I, MERTON D. PHELAN, a citizen of the United States, residing at Boston, in the county of Suffolk, State of Massachusetts, have invented an Improvement in Portable Power-Tackers, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

In the manufacture of boots and shoes and particularly in connection with the use of lasting machines of the "bed" type or "wiper" type it is customary, after having lasted in the upper and linings at the toe and heel ends of the shoe, to withdraw the wipers slightly to expose the edges or margins of the infolded materials and then to tack such margins or edges down upon or to the insole. For this purpose what is known as a "hand tacker" is commonly used, the same comprising a holder adapted to be held in one hand and provided with tack supplying means, the tacks being driven therefrom by a hammer or other suitable device manipulated by the other hand, the tacks being driven as frequently as desired around the ends of the sole.

My invention aims to improve tackers generally and especially such as are adapted for use in lasting as above referred to.

My invention comprehends a pneumatic tacker which may be used instead of a hand tacker, yet, which may be moved about by the operator quite as freely as the hand tacker.

My invention comprehends, also, novel means for feeding the tacker whether pneumatic or not, from point to point at which it is desired the tacks shall be driven.

The above and other features of my invention will be best understood from a description of one embodiment of said invention illustrated in the accompanying drawings.

Referring to the drawings: Figure 1 is a side elevation of a tacker illustrating one embodiment of my invention; Fig. 2 is a top view of Fig. 1; Fig. 3 is a view from the left of Fig. 1, at an angle of about 45° thereto; Fig. 4 is a view from the opposite side of Fig. 1, the shell being broken away to expose some of the operating parts; Fig. 5 is a view from the left, Fig. 4, also broken away; Figs. 6, 7 and 8 are diagrammatic views illustrating the action of the various parts; Fig. 9 is a horizontal section on the dotted line 9—9, Fig. 1; and Figs. 10, 11 and 12, details to be referred to.

In the particular embodiment of my invention selected for illustration herein and shown in the drawings the shell or casing for carrying the various working parts is indicated at 1, it being of suitable material, shape and construction to serve the required purpose. While various of the working parts are here shown in full lines upon the exterior of said shell, said parts may be concealed by a jacket 2, shown in dotted lines, if desired.

Within the shell and near the top thereof (see Fig. 6) is formed a cylinder 3, in which plays a piston 4 of a semi-trunk type, the same at its lower end projecting through the bottom end of the cylinder and constituting a driver carrier. This driver carrier (see Fig. 4) has mounted in its lower end a driver 5, adapted to travel in a vertical tack driver passage 6 (see Fig. 11) formed in the lower end of the shell and into which the tacks to be driven are fed. The lower end of this driver passage is formed in an extensible throat 7, adapted to slide vertically in a guide plug, screwed into the bottom of the shell. The slidable throat 7 is headed at its upper end to form a limiting stop 8 to prevent its dropping too low and it is likewise adapted at its upper end to seat against the bottom of the shell, adjacent the same, in order that its own passage may constitute a continuation of the shell passage with a substantially unbroken wall.

The tacks to be driven are loaded in desired manner into an inclined raceway 9 (see Fig. 4) which delivers its tacks in position to be picked off singly by a separator 10 (see Fig. 12), adapted to slide transversely to the exit end of the raceway and to force the tacks picked off by it into the driver passage immediately beneath the elevated driver, as best shown in Fig. 11. This separator and its operating means may be of any suitable or desired type, operating in a manner well understood by those skilled in the art. In the present instance it is held in its inward position (see Fig. 5) by a spring 11, it being moved back against the tension of its spring by the beveled lower end of a separator actuator 12, secured to the lower end of the piston. As the piston descends to drive one tack, the separator actuator 12

forces back the separator 10 to permit a new tack to slide out from the end of the raceway into a recess close beside the driver passage. As the driver is returned to its elevated position the spring moves the separator to close the end of the raceway against further flow of tacks therefrom and to transfer the tack received by it into the driver passage (see Fig. 11). These details do not necessarily concern my invention.

To cause reciprocation of the piston 4 in its cylinder any suitable arrangement of valve or valves may be employed. In the present instance I have provided at the right of the cylinder as viewed in Fig. 6 a vertically movable, tubular tappet valve 14 which, when raised from its seat (see Fig. 7), admits fluid under pressure, for example air, through the inlet 15 (connected with any flexible hose or conductor) passing thence around the said valve and through the port 16 to the cylinder, above the piston, to drive the piston downward and thereby drive the tack. This valve is maintained in its elevated position for inlet of said fluid by a tubular stem $16^{\times}$ having its lower, open end recessed conically to constitute a seat for the conical end of a plug valve 17, vertically movable in the head of the shell. This plug valve 17 (see Fig. 1) is supported at its lower end upon a cam slide 18 mounted in the upper end of a slide bar 19, to be described. The cam slide 18 is reciprocated horizontally by the depending arm 20 of a yoke 21, fulcrumed at 22 to the shell head. The ends of this yoke overlie or intercept the path of movement of a pin 23 on a vertically arranged slide bar 24, connected at its upper end with an extension 25 of the piston 4. As the piston descends in the driving of a tack this slide bar 24 is, of course, moved with it and its pin 23, just before the piston reaches the limit of its movement strikes the lower arm of the yoke and deflects the latter to the right, Fig. 1, to cause the cam slide 18 to be moved to drop the plug valve 17, thereby opening the lower end of the tubular valve stem $16^{\times}$ and at the same time, by removing the support for the tappet valve 14, permitting the latter to drop to its seat. This cuts off the supply of fluid under pressure to the upper side of the piston and at the same time admits pressure through the tubular valve (see Fig. 6), thence through the port 26 to the lower end of the cylinder, beneath the piston therein, to cause the latter to be returned to its elevated position. The exhaust from the upper end of the cylinder takes place through the exhaust port 27 (see Fig. 6) into the valve chamber 28, thence to the atmosphere past the valve 29. This valve is normally pressed by a spring 30 upon its seat and is held lifted from its seat to permit of the exhaust by a lever 31 (Fig. 6) fulcrumed to the shell at 32 and with its opposite end (see Fig. 1) acted upon by a pin 33 on the stem of the plug valve 17. The pressure of the fluid in the port 26, tending to depress the plug valve 17, in addition to the spring 36, to be described, are sufficient to rock the lever 31 and elevate the exhaust valve 29 against the spring of the latter. Connected also with the stem of the plug valve 17 is an arm 34 (shown in full lines Fig. 1 and dotted lines Figs. 6 and 7) which carries at its end a second exhaust valve 35, acted upon and pressed to its seat by said spring 36. When the plug valve 17 is depressed to admit air to the lower end of the cylinder, the exhaust valve 35 is, by the same movement, seated to cover the exhaust for the same end of the cylinder. When, however, the piston, impelled by pressure admitted past the plug valve 17, rises, and just before it reaches the end of its upward movement, the said pin 23 meets the uppermost arm of the yoke 21 and turns the latter to cause its depending arm 20 to move the cam slide 18 to the left (Fig. 1) thereby to elevate the plug valve 17, first to cut off the supply of fluid to the under side of the piston and open the exhaust 35, and, through the lever 31 permit the spring 30 to close the exhaust valve 29 and, by its further movement, to lift the inlet valve 14 to admit air under pressure above the piston to repeat the cycle of movements just described. Here, then, is one form of mechanism which effects the rapid reciprocation of the tack driver to cause the tacks to be driven rapidly into the work. Obviously, the rate at which the piston will be reciprocated may be varied by varying the several ports and passages or the pressure of the fluid employed as a motive power.

It has been stated that the cam slide 18 is mounted in the upper end of the slide bar 19. This slide bar I shall hereinafter refer to as a "starting bar," because it controls the starting and stopping of the device, in other words, the period during which it is possible for the device to operate. This starting bar is mounted to slide vertically in the outer wall of the shell and, at its lower end, is adapted as shown to rest upon the work, or a surface adjacent thereto, the idea being that the device, which otherwise is strictly automatic, shall be restrained against operation except when brought to the work, proper proximity to the work being indicated by contact thereby or by some adjacent surface with the lower end of said starting bar.

When not in use the starting bar is maintained in its depressed or lowermost position, in which position the cam slide 18, notwithstanding it is in its extreme left hand position, is at so low a level that the plug valve 17 is depressed and the inlet valve 14 seated. In this position no air under pressure

can reach the upper side of the piston, the air, however, being admitted to the under side of the piston to maintain the latter elevated and the tacker otherwise ready for use. When the device as herein arranged is brought to the work, for instance, to tack in place the inturned upper of a shoe being lasted in a bed lasting machine, the moment the throat of the device is brought into position close beside the edges of the wipers that have been slightly withdrawn to permit of the tacking, the starting bar upon contacting with the upper surface of the wipers, or either of them, is elevated relative to the shell and thereby the cam slide 18 is correspondingly elevated to cut off the air from the under side of the piston, open the exhaust therefrom, close the exhaust from the upper side of the piston and admit air thereat to drive the piston downward, thereby to drive a tack out through the throat into the work close beside the wiper which, by its contact with the starting bar, had caused the operation of the device. Thereafter, so long as the starting bar is held in its elevated position by either wiper, the said device may be drawn along, following the active edges of the wipers and driving the tacks in rapid succession into the stock along a line approximately following the curvature of the active edges of the wipers. In other words, the starting bar furnishes a support for the tacker, by resting upon the wipers, the nozzle or throat of the tacker overhanging the active edges of the wipers and dropping into close proximity with the work adjacent thereto, and so long as the tacker is drawn around the inner or active edges of the wipers, supported by the wipers through the starting bar referred to, the tacker will continue to operate, driving its tacks beside the wipers into the work.

To prevent the tacks being driven more rapidly than is desired relative to the rate at which the device is fed or drawn along, that is to say, to prevent the tacks being driven too frequently or too infrequently, I have provided herein means for causing a predetermined feed of the device following the driving of each tack of the series.

Referring to the drawings, Fig. 6, the shell is provided at the left of the starting bar 19 with suitable ways for a vertically sliding carrier bar 37 connected to the bar 24 at 38. At its upper end this carrier bar has fulcrumed to it also at 38 (see Figs. 3 and 6) a horizontally extended dog 39, provided at its free end with a pin 40, adapted to travel along a stationary cam 41 mounted on the tacker shell. Said dog 39 is provided just back of the pin 40 with a pair of angularly arranged shoulders 42, 43. These shoulders are adapted to coöperate with the side face of a slotted link 44, loosely pivoted upon the fulcrum 38 of said dog and connected therewith in a yielding manner by a spring 45 which maintains the said dog normally in position with its stop face 42 in contact with the side face of the link. A horizontal slot in the bottom of the link receives a pin 46, which limits the side swing of the link. The slot in said link receives the outturned upper end of a lever 47, fulcrumed at 48 on the shell and (see Figs. 6 and 7) has its lower end forked to receive a pin 49 on the upper arm 50 of a feed dog 51. This feed dog is fulcrumed at 52 upon a vertically sliding dog carrier 53, mounted in a bearing on the shell, and at its upper end has jointed to it a link 54. The upper end of this link carries a pin 55, which plays in a slot 56 in the end of a lever 57, fulcrumed at 58 on the shell, the starting bar being slotted to clear the fulcrum 58 as well as the fulcrum 48 previously referred to. The opposite end of said lever 57 stands in the track of a cam 59 on the side of the carrier bar 37 referred to. The lever 57 is held yieldingly in its position (Figs. 6 and 7) by a spring 60. The dog carrier 53 is also acted upon and drawn always toward its lowermost position by a spring 61, connecting the same with the bearing therefor. When now the piston is driven downward to drive a tack, it causes the cam 59 on the carrier bar 37 to engage the lever 57 and turn it to lift the feed dog against the action of its spring 61. Immediately thereafter the pin on the end of the dog 39 (Figs. 3 and 6) meets the stationary cam 41 and, by reason of the contact of its upper stop surface 42 with the side of the slotted link 44, causes the said link to be swung to the left at its lower end. This causes the upper arm of the lever 47 to be carried to the left, causing its lower, forked arm to turn the feed dog 51 from its position removed from the tack driving throat (Figs. 1 and 2) into position close beside the said throat. During this time the lever 57, which was acted upon early in the stroke by the cam 59, has held the feed dog in its elevated position but, just before the piston reaches the end of its downward stroke, said cam 59 clears its lever 57 and permits the dog spring 61 to pull the fed dog down into the work or into engagement therewith. After the feed dog has thus engaged the work and just prior to the end of the down stroke, the pin on the dog 39 clears the stationary cam 41 but the dog of course cannot return to its original position because held by its engagement with the work. When the tack has thus been driven, as the piston begins its return or up stroke, the pin on said dog 39 engages the said cam 41, this time at its lower end and, moving in the opposite direction, causes the said dog to turn about its fulcrum in the opposite direction from that before until its lower stop surface 43 contacts with the slotted link 44, this time below the ful-

crum of the latter instead of above said fulcrum as previously. As now the said dog is depressed by the cam in rising past the latter, it causes the lower end of said slotted link to be swung this time to the right and thereby correspondingly to move the upper arm of the lever 47, causing its lower, slotted arm to turn the feed dog to throw its point relatively to the right, or away from the throat of the tacker. Since the dog cannot move because impinging upon or in the work, the effect of said relative movement is to cause the tacker itself to be fed oppositely or to the left a distance determined by the proportion and adjustment of the parts. After this feed of the throat and driver has taken place, or previously, the cam 59 on the carrier bar, which depressed and cleared the lever 57 on its down stroke, meets the said lever, this time from below, and turns it in order to clear it as it passes. This turning of the said lever, however, produces no effect upon the feed dog because of the slot 56 which plays past the pin 55, which controls the elevation of said feed dog. Just before the piston reaches the limit of its up stroke said lever 57 again clears said cam 59 and assumes its position (Fig. 6) under the action of its spring 60, in readiness to be again depressed to lift the feed dog preparatory to a new feed as the next tack is driven. Thus the device is entirely automatic, both in its driving and tack feeding, as well as in its bodily or work feeding movement.

Because the device operates so rapidly and for convenience in handling, it is desirable that the operator be permitted to drag the device along with the starting bar in continuous but sliding contact with the upper surface of the wiper and, if the throat of the tacker were caused to depend into close contact with the work, it would be likely to drag against the work and obstruct the feed. On the other hand, it is desirable for accurate tack driving that the said throat reach nearly or quite to the work immediately adjacent the point at which the tack is to be driven. To meet these conditions, the throat 7 (see Fig. 11) as stated, is made vertically slidable in order that it may be dropped into contact with the work at the moment of tack driving and then raised to clear the work during the period of feed. To accomplish this vertical reciprocation of the said throat it is provided (see Figs. 3 and 8) with a laterally and vertically extended slide 62 which moves in suitable bearings therefor on the shell. Secured to this slide is a resilient or spring member 63, of general cam shape with which coöperates (see Fig. 3) a stud 64 on the lower end of the carrier bar 37. When the said carrier bar is depressed by the piston as the latter begins its descent, the stud 64 engages the abrupt incline of said spring cam 63 and depresses the latter before it until the connected throat contacts with the stock to lay the latter preparatory to receiving the tack, and is arrested in its descent by contact of its headed portion with the holding plug 8 (Fig. 11.) This insures proper position of the throat relative to the work, the said stud thereafter riding up the incline of the said spring cam, which latter gives way before it to permit of the remainder of the downward stroke of the piston to drive the tack. On the return stroke, and before the feed takes place, the return or upward movement of said stud by its frictional contact with the face of said spring cam causes the latter now to be raised and with it the said throat to clear the throat of the work before occurrence of the feed.

It will be observed that all the movements of the particular mechanism illustrated are interconnected in such a way that there can be no interruption in the proper order of the several movements. The device is entirely automatic, nevertheless however rapidly the tacks may be driven it is certain that the feed will occur regularly and always for the desired distance and that the throat will always be next the work at the moment a tack is driven, and removed from the work before the feed occurs. The fact that the feed dog is held in contact with the work by a spring, permits the starting bar always to remain in continuous contact with the wiper upon which it rests, for the spring gives way as the feed dog walks along, instead of requiring the tacker to rise from the wiper and drop thereupon.

While my invention is particularly adapted to a hand tacker, portable for the purpose described, nevertheless, my invention is not restricted thereto. I desire it to be understood that my invention is applicable to any use or type of machine to which it is adapted and in connection with which it should, either in whole or in part, prove useful.

My invention is not limited to the particular embodiment thereof herein shown for the same, obviously, may be varied without departing from the spirit and scope of my invention.

While I have heretofore and in the claims shall refer to a tack driving device or tacker, the term "tack" is to be construed to cover any form of fastening of whatever length or character.

Claims.

1. A tack driving device comprising in combination tack driving mechanism, feeding means for moving said device in substantially the plane of the work, and an extensible throat, both operated by said tack driving mechanism.

2. A tack driving device provided with a

slidably mounted extensible throat, means frictionally to move it toward and from the work, and pneumatically operated automatic step-by-step feed for moving the device over the work.

3. A portable tack driving device provided with an extensible throat normally in retracted position, and means yieldingly to move it in the direction of the work.

4. A tack driving device provided with an extensible throat normally in retracted position, a guide for said throat, a stop to limit the outward movement of said throat relatively to its guide, and pneumatically operated automatic step-by-step feed for moving the device over the work.

5. A portable tack driving device having a pneumatically operated step-by-step feed for automatically moving the device over the work, a spring to impel it toward the work, and means positively to lift it therefrom.

6. A portable power tack driving device, comprising a casing, a throat having a passageway for tacks therethrough, a pneumatically operated driver for driving the tacks, a feed device for feeding tacks to be driven, means connected to the driving means for operating the feed device, and a slide mounted on the casing and movable by placing the device in position to drive tacks for starting the operation of the driver.

7. A portable power tack driving device, comprising a casing, a throat having a passageway for tacks therethrough, a pneumatically operated driver for driving the tacks, a tack raceway connected to and portable with the tack driving device, a feed device for feeding tacks to be driven, means connected to the driving means for operating the feed device, and a slide mounted on the casing and movable by placing the device in position to drive tacks for starting the operation of the driver.

8. A portable power operated tack driving device, comprising a casing, a throat for the passage of tacks therethrough, a tack raceway connected to said casing, a pneumatically operated driver for driving the tacks, valves for controlling the operation of the driver, a slide carried by the casing and having an extended portion by which it is moved in placing the tack driving device in tack driving position, and valve operating means connected to said slide for starting the tack driving device.

9. A portable tack driving device for moving over the work provided with an automatic step by step feed for moving said device over the work and with an extensible tack driving throat, combined with a work contacting starter for said device, feed and throat.

10. A portable power operated tack driving device, comprising a casing, pneumatically operated driving means mounted thereon, a tack raceway connected to the casing, a feeding slide for detaching a tack from the raceway and moving it into tack driving position, means connected to the driving means for moving the slide, valves for controlling the action of the driver, a slide mounted on the casing, and a part operated by the slide for moving one of the valves for starting the driving device when it is placed in tack driving position.

11. A tack driving device comprising, in combination, tack driving mechanism, a dog 51 for feeding the device along the work, a starter 19 having its lower end adjacent the end of the dog for setting the device in operation, and means for operating the dog 51.

12. In a tack driving device, the combination of tack driving mechanisms, fluid pressure means for operating the same, a casing, valves for controlling the operation of the tack driving mechanism, a lever pivotally mounted on the casing and controlling the said valves, and a slide on the casing having one end normally below the end of the casing and operatively related to one of the valves on the casing to cause the tack driving mechanism to start into operation when the device is placed in tack driving position.

13. In a tack driving device, the combination of a portable casing, a pneumatically operated driver carried by the casing, valves for controlling the action of the driver, a throat having a passageway for tacks extended beyond the end of the casing, and a slide having an end normally extended beyond the end of the throat and mounted on and portable with said portable casing, said slide having a part to move a valve and start the device into operation as it is placed in tack driving position.

14. In a tack driving device, the combination of a tack driver, means for actuating the same, pneumatically operated feeding means for moving the device, a throat, and means for raising the throat from the work to permit feeding movement and lowering it to the work for tack driving.

15. In a portable tack driving device, the combination of a tack driver, means for operating the same, feeding means for moving the device along the work, a throat, means for raising the throat from the work during feeding movement, and a starter for controlling the operating means adapted to have sustained contact with a part adjacent the work during the operation of said device.

16. In a tack driving device, the combination of a portable casing, a pneumatically operated driver carried by the casing, valves for controlling the action of the driver, a

throat having a passageway for tacks extended beyond the end of the casing, a feeding device to supply tacks to the throat, means movable with the driver for operating the feeding device, and a slide having an end normally extended beyond the end of the throat and mounted on and portable with said portable casing, said slide having a part to move a valve and start the device into operation as it is placed in tack driving position.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

MERTON D. PHELAN.

Witnesses:

FREDERICK L. EMERY,

ROBERT H. KAMMLER.