

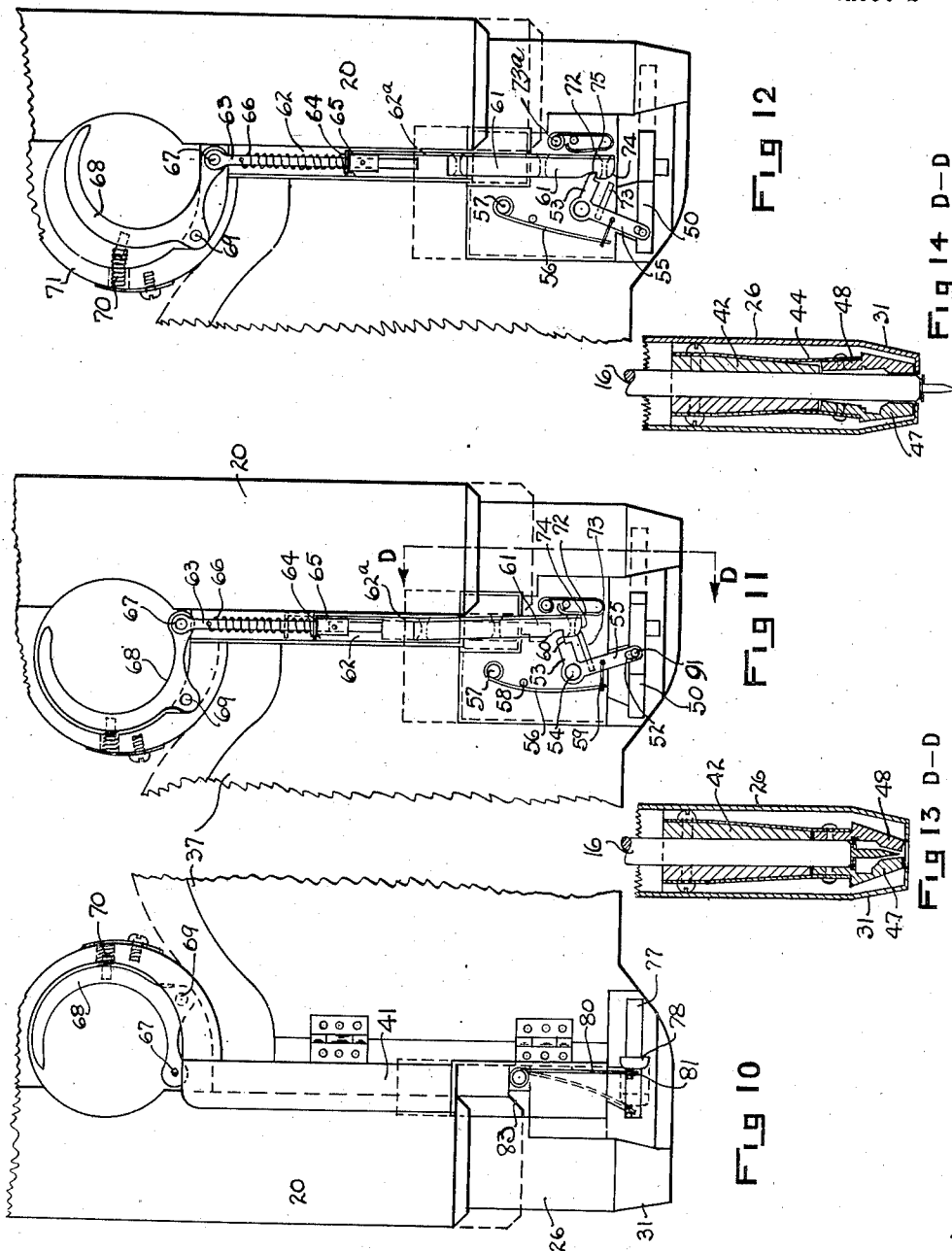
April 20, 1937.

E. L. DAY

2,078,064

NAIL AND TACK DRIVING DEVICE

Original Filed April 7, 1932 2 Sheets-Sheet 2



EDWIN L. DAY INVENTOR.

BY *Jesse R. Stone*
Arthur B. Clark

ATTORNEYS

UNITED STATES PATENT OFFICE

2,078,064

NAIL AND TACK DRIVING DEVICE

Edwin Lee Day, Houston, Tex.

Application April 7, 1932, Serial No. 603,697

Renewed April 20, 1936

8 Claims. (Cl. 1—53)

My invention relates to machines for delivering and driving tacks and the like. The device is designed for electrical operation although it may be otherwise operated.

It is an object of the invention to provide a device for driving tacks and the like at the desired point quickly and accurately.

I aim to provide a device for placing the tacks in positions not easily accessible with the usual method of driving with a hammer, and driving them mechanically into position.

Another object is to provide a tack driver which will deliver and drive the tacks in any position, either vertical or horizontal or intermediate positions.

I desire to provide a device which is light in weight and of a shape to be easily handled and operated and portable to the place where it is to be used.

In the drawings herewith I have illustrated a device adapted particularly for driving tacks, it being understood, however, that nails, staples and the like can also be driven by my device with slight modification in the shape of the delivering mechanism.

Fig. 1 is a side view mostly in central longitudinal section showing my assembly apparatus with a tack in position for driving.

Fig. 2 is a top plan view of a strip of tape with tacks therein.

Fig. 3 is a similar side view in section longitudinally of the tape.

Fig. 4 is a broken section taken on the plane A—A of Fig. 1.

Fig. 5 is a transverse section on the plane C—C of Fig. 1.

Fig. 6 is a similar section taken on the plane B—B of Fig. 1 and looking in the direction of the arrow.

Fig. 7 is a broken section detail of the tack feeding element.

Fig. 8 is a broken transverse section on the plane C—C of Fig. 1 with the parts in position, different from that shown in Fig. 5.

Fig. 9 is a side elevation of the tack feeding element showing a tack in position.

Fig. 10 is a side elevation of the forward end of the device.

Fig. 11 is a similar view from the opposite side of the device.

Fig. 12 is a view like Fig. 11, but showing the parts in different position.

Figs. 13 and 14 are both broken sections on the plane D—D of Fig. 11 longitudinally of the tack

holding mechanism illustrating the parts in different position for driving the tack.

Fig. 15 is a broken sectional view of the plane E—E of Fig. 1.

The general shape of my tack driving device is something like that of an automatic pistol. There is a handle portion 1 which is preferably cylindrical in shape, one end of which is connected at 2 to the housing 3 of the motor. The shaft 4 of said motor extends axially through the cylindrical housing 1. At the end of the housing opposite to the motor, the housing is closed by an end plug 5 which furnishes a support within a recess 6 for the shaft 4 of the motor.

Within the end of the housing adjacent the motor is a sleeve 7 which is connected to the housing by screws 8 and to the motor housing by means of screws 9. Adjacent to this connecting sleeve is a bearing member 10 secured rigidly to the housing and having a support for the shaft 4. A similar bearing support is spaced from the forward end at 11.

Between these two supports, upon the shaft 4, is a cylindrical block 12 which forms a fly-wheel upon the shaft, balancing it in operation and tending to steady the rotation of the shaft. The fly-wheel is connected to the shaft by means of a transverse pin indicated in the dotted lines at 13.

Adjacent the bearing block 5 the shaft is formed with a cam-shaped enlargement 14 thereon which is adapted to contact with the head 15 upon the hammer shaft 16. The cam 14 is housed within a cylindrical block 17. As will be seen from Fig. 4 the block 17 is recessed at 18 to receive the head 15 of the hammer shaft, and it will be noted that there is a clearance shown at 19 allowing the cam 14 upon the shaft to rotate without contact with the block. The cam is, however, adapted to engage and strike a short blow upon the head 15 at each rotation when the head is moved into engagement therewith.

The hammer shaft 16 extends at right angles to the shaft 4 of the motor, and projects axially of the cylindrical housing 20 secured at right angles to the housing 1 and extending downwardly therefrom. Within the housing 20 is a bearing block 21 which is secured rigidly within the housing by means of set screws 22. This block affords a bearing or guide for the upper end of the hammer shaft.

The hammer shaft has a spring 23 thereon bearing at one end upon the bearing block 21, and at the other upon a ring 24 secured adjustably to the hammer shaft by the set screw 25.

This spring tends to hold the hammer shaft 16 and the head 15 away from the cam 14.

Slidable within the housing 20 is a barrel 26. This barrel is spaced within the housing and has a bearing at its upper end within a sleeve 27 secured to the housing. At its lower end it fits slidably within a similar ring 28, also secured rigidly to the housing. The barrel has thereon an outer collar 29 fixed to the barrel and adapted to limit the relative downward movement of the barrel in the housing. It also furnishes a support for a compression spring 30 which bears between the collar 29 and the bearing sleeve 27, tending to hold the barrel downwardly relative to the housing.

The barrel 26 extends downwardly beyond the housing and its lower end is tapered inwardly at 31 and connects with a plate 32 which partially closes the end thereof leaving an opening 33 for the ejection of the tack.

The tacks are fed into position adjacent the lower end of the hammer 34 upon the end of the hammer shaft. The tacks are mounted, as shown in Figs. 2 and 3, upon a strip of tape 35. This tape is preferably formed as shown in Fig. 2, with a slightly enlarged portion 35 to receive the tack connected to the next adjacent enlarged portion by a narrower strip 36. The tape, with the tacks thus fixed in position therein, is wound in a spiral coil within a magazine 37. The end of the tape at the forward side is carried in beneath the hammer adjacent the lower end of the barrel. The mechanism by which tacks are fed will be later described. The magazine 37 is secured to an irregular shaped connecting block 38 which is in turn connected with the lower end of the barrel 26. The forward side of the block 38 is formed with a dovetailed key 39 shown best in Fig. 6. It interfits slidably with a key-way 40 formed in a bar 41 secured on the rearward side of the housing 20. This bar with the key-way therein is movable downwardly against the action of the spring 30 as will be later described. The bar 41 is formed rigidly upon the barrel 20 and moves downward therewith in the operation of the device.

Within the barrel 26 is a chuck which furnishes a guide for the hammer and also receives the tacks as they are fed forward beneath the hammer. This chuck is cylindrical in general outline as shown at 42 in Fig. 6. It has its outer side formed with three spaced notches 43 within which are housed the spring arms 44. These three arms, as will be noted from Fig. 6, are on the side away from the magazine. The notches, or grooves, 44 are deepened downwardly as shown in Fig. 1, and the lower ends of the arms therein are connected with jaws 45, 47, or 48 of the chuck. There are three of these jaws, the forward one away from the magazine, is shown in section in Fig. 1. It tapers downwardly on its outer surface, and its inner surface is formed with a tack receiving recess 46. The two side jaws 47 and 48, as seen in Figs. 8 and 13 are adapted to engage the tack on opposite sides. The jaw 47 has a tapered notch therein to receive the tack, while the jaw 48 is recessed slightly on its inner side to push the tack into the recess 46 in the jaw 47 of the chuck. These three jaws are held resiliently toward each other by the springs 44 previously noted. The springs 44 are flexed easily outwardly to allow the tacks to enter between them and also to allow the hammer to engage the tack, as seen in Fig. 14.

The tack is delivered from the magazine to the

chuck by means of a sliding bar 50. This bar is seen best in Figs. 5 and 8. It is of angular shape, having one end offset slightly to one side of the channel 51 through which the tacks are moved. The forward end of the bar is placed in line with the channel through which the tacks are moved, and has a notch 52 formed therein at one side to receive the tack, the forward wall of the recess being beveled off at 53. The bar behind the recess is also beveled at 54 so that when the bar is retracted to engage a new tack, the beveled surface will come into contact with the tack and the bar will be moved away therefrom in an obvious manner. To allow this movement of the bar in the housing, it is recessed slightly at 55 on the side opposite the tack receiving notch.

The bar 50 is reciprocated to move one tack after the other beneath the hammer by a trigger mechanism shown best in Figs. 11 and 12. As will be noted, this tack feeding bar 50 is slidable transversely of the barrel 26. It has between its ends a laterally projecting pin 91 to interfit with a slotted opening 52 in a bell crank lever 53. This lever is pivoted upon a pin 54 on the side of the magazine adjacent the barrel. The lower arm 55 of the lever is held rearwardly to move the tack feeding device away from the hammer by means of a spring 56. Any type of spring might be used for this purpose. I have shown a small leaf spring mounted at one end upon a pin 57 and bearing against a fulcrum 58 and connected at its opposite end by means of a link 59 with the arm 55 of the lever. The other arm 53 of the bell crank lever is notched at 60 to engage with a plate 61 slidable longitudinally of the housing 20.

The plate 61 is movable within a channel 62 formed at the side of the housing 20 and is connected by means of a flat spring member 62a with a rod 63. The end of the spring member is bent at right angles as shown at 64 and formed with an opening to receive the end of the rod 63 which is slidable through said opening. A collar 65 formed on the end of the rod 63 engages with the hooked end of the spring 65 as will be obvious. There is a spring 66 connected at one end to an opening in the rod 63 and which bears at its other end against the end 64 of the spring 62. It will be noted particularly from Fig. 11 that this connection between the rod 63 and the sliding plate or bar 61 allows the bar 61 a slight lateral movement in operation. There is also a resilient play between the operating rod 63 and the inner end of the spring arm 62.

The rod 63 is connected at 67 to a trigger arm 68. Said trigger is pivoted at 69, and tends to be moved inwardly to depress the rod 63 by a spring 70 housed within a support 71 on the side of the upper housing.

The lower end of the bar or plate 61 is held resiliently toward the arm 53 of the bell crank lever by means of a spring 72 mounted at 73a upon a pin projecting from the side of the housing. There is a finger 73 formed on the inner side of the arm 55 of the bell crank lever which is intended to engage with the rounded end 74 of the bar 61 and move it against the spring 72 and out of engagement with the arm 53 at the lever. The bar is recessed at 75 to interlock with the notched end 60 of the lever so as to hold the parts in engaged position.

With reference particularly to Figs. 8 and 10 it will be seen that I have formed a sliding plate 77 on the side of the tack feeding channel 51

opposite the feeding bar 50. This plate 77 has a laterally projecting finger 78 by means of which the plate 77 may be manually moved. The forward end of the plate 77 is off-set from the plate and is formed with a notch 79 therein to engage with the adjacent tack which is being fed toward the hammer. This plate is held normally away from the barrel 26 by means of the spring 80 on the outer side of the housing. This spring is fitted within an eyelet 81 in the side of the plate but allows the plate to be moved toward the barrel by means of the finger 78 to engage a tack and move it toward the hammer. This device is for use in moving tacks into position when it is not desired to operate the hammer.

The operation of the device will now be explained. With reference to Figs. 11 and 12 it will be seen that a pull upon the trigger 68 will move the sliding bar 61 away from the bell crank lever 53 and will throw the lower end of said lever toward the right and move the tack feeding bar 50 toward the hammer and slide a tack into position beneath the hammer. As will be noted from Fig. 6, the hammer 34 is formed with a lateral key or knife member 32 at the inner side thereof, which, when the hammer is depressed, will engage the tape and sever the forward end of the tape together with the foremost tack from the tape and allow the hammer to move the tack downwardly between the arms of the chuck. As the tack is fed toward the arms it moves into a converging notch or groove and forces the two lateral arms 47 and 48 aside to allow the tack to be received within the notch 49 as previously noted. The springs holding the arms 45, 47 and 48 exert a small enough force so that they are easily moved laterally in operation.

When the tack is in position below the hammer the motor is started and will be left continually running during the operation of the device. The rotation of the shaft 4 of the motor will bring the cam 14 thereon into contact with the head 15 of the hammer and strike a succession of rapid blows thereon. The hammer head is held out of contact with the cam by the spring 23. When the tack is ready to be driven, the point of the barrel 26 is positioned where the tack is to be driven and a straight downward push is exerted upon the housing 1 as a handle, thus moving the outer housing 20 downwardly in a telescoping action over the barrel 26. In Fig. 1 the movement of the housing over the barrel is indicated in dotted lines, and it will be seen that when the housing has been telescoped over the barrel the lower end of the barrel and the plate 41 will engage against a shoulder indicated at 43 which limits the downward movement of the housing. This downward movement of the parts will bring the hammer into contact with the tack and the head of the hammer will be pushed into engagement with the rotating cam 14 on the motor shaft. A series of rapid blows will thus be delivered by the cam upon the hammer and as the telescoping action continues the tack will be driven into the material. This will be done very rapidly, due to the rapidity of the blows of the cam upon the hammer so that the driving of the tack will take only as long as is necessary to shove the housing downwardly to contact with the shoulder 43 as previously noted.

With reference now to Figs. 11 and 12. When the trigger 68 is pulled upwardly from the position in Fig. 12 to advance the bar 50 to feed a tack below the hammer, the notch 79 therein will move upwardly into the position shown in Fig. 11

and the pin 73 on the lever will engage against the rounded end 74 of the sliding bar and push it away from the notch 60 in the bell crank lever and allow the spring 66 adjacent the trigger to push the sliding bar 61 back into retracted position. Then, when the housing is telescoped downwardly to move the hammer against the tack, the sliding bar 61 will be also moved downwardly, the lower end thereof pushing past the end of the arm 53 of the bell crank lever and the parts will again be automatically latched in position as shown in Fig. 12 ready to feed another tack manually by the operator by actuating the trigger 68 beneath the hammer as previously described.

As will be seen particularly from Figs. 13 and 14, a movement of the hammer downwardly pushing the tack between the jaws 45, 47 and 48 will move the jaws of the chuck laterally and the hammer will advance into the position shown in Fig. 4 with the jaws of the chuck pressing resiliently against the hammer but not interfering in any way with the driving of the tack. When the tack has been completely driven into position the lift of the operator upon the handle 1 will allow the housing and the hammer 20 to be moved upwardly through the action of the spring 30, thus placing the parts in position to repeat the operation.

It will be seen that all that is necessary to drive the tack after it has been fed into position will be to push straight toward the point where the tack is to be driven, placing the forward end with the opening 33 directly over the point where the tack is to be driven and then push directly toward that point. It will make no difference whether this is in a horizontal or upward direction, and as the motor is continuously running, as soon as the housing is compressed by telescoping the housing over the barrel, the hammer will immediately come in contact with the head of the tack and will be pushed into contact also with the cam on the motor shaft and the driving of the tack will commence. As the reciprocation of the hammer is exceedingly rapid, the tack will be driven almost instantly. The knife at the side of the hammer indicated at 32 in the drawing, will sever the tape upon which the tack is mounted and leave the tack with a small washer of tape beneath the head of the tack as it is driven. This will protect the material from contact with the head of the tack and will be an additional advantage of the manner in which the tacks are mounted.

The advantage of my invention lies largely in its neat and compact arrangement. The motor is very small and light and the device can be moved readily from place to place without tiring the operator, and the tacks will be automatically delivered into position and driven at the point desired, with very slight effort on the part of the operator. The advantages of this construction will be apparent. Tacks may be driven into otherwise inaccessible places, either on the floor, wall, or ceiling of a room, or upon upholstery in positions where a tack can not be otherwise easily inserted.

Having described my invention, what I claim is:

1. A tack-driving device including a light portable housing, said housing forming a handle by means of which said device is moved to tack driving position, a motor thereon, a cam on the shaft of said motor within said housing, a hammer shaft adapted to be moved into contact with said cam, manually operated means to move 75

tacks into position to be engaged by said hammer shaft including a trigger adjacent said handle, a slide bar, and means operatively engaging said trigger and slide bar, and a chuck to hold each of said tacks while it is being driven by said hammer shaft.

2. A tack-driving device including a light portable motor, a rotating shaft thereon, a housing for said shaft acting as a handle, a hammer shaft extending perpendicularly from said housing, a hammer housing about said hammer shaft, a hammer barrel slidable in said hammer housing, a chuck below said barrel, means to feed tacks below said hammer to said chuck, and means on said rotating motor shaft adapted to strike a succession of blows upon said hammer shaft.

3. A tack-driving device including a light portable electric motor, a rotating shaft thereon, a housing for said shaft acting as a handle, a hammer shaft extending perpendicularly from said housing, a hammer housing about said shaft, a hammer barrel slidable in said hammer housing, a chuck below said barrel, manually operated means to feed tacks below said hammer to said chuck, and means on said motor shaft adapted to strike a succession of blows upon said hammer shaft when said hammer housing is moved forwardly over said barrel.

4. A tack-driving device including an electric motor having a shaft, a housing for said shaft forming a handle, a hammer shaft extending at right angles to said housing, means on said motor shaft to strike a continuous series of blows upon said hammer shaft, a tack magazine, a longitudinally extensible housing for said hammer shaft, said motor shaft being moved into contact with said hammer shaft when said housing is contracted longitudinally, and manually controlled means to feed tacks from said magazine to a point below said hammer shaft.

5. A tack-driving device including a motor having a shaft, a hammer shaft at right angles to said motor shaft, a spring normally holding said hammer shaft away from said motor shaft,

means on said motor shaft to engage and strike blows upon said hammer shaft, a tack magazine, means to feed tacks from said magazine to a point below said hammer shaft, and a housing for said hammer shaft adapted to be engaged against the work and moved to bring said hammer shaft into working contact with said striking means.

6. A tack-driving device including a motor having a shaft, a hammer shaft at right angles to said motor shaft, a spring normally holding said hammer shaft away from said motor shaft, means on said motor shaft to engage and strike blows upon said hammer shaft, a tack magazine, means to feed tacks from said magazine to a point below said hammer shaft, including a slide bar having notches therein to engage said tacks, means to manually move said slide bar, said spring being compressible to bring said hammer shaft into engagement with said striking means when said device is engaged with the work.

7. A light portable tack-driving device including an electric motor, a motor shaft housing forming a handle, a hammer housing extending perpendicularly therefrom, a hammer operable by means on the shaft of said motor, a magazine to contain tacks, a slidable bar adjacent said magazine, and means manually operable from a point adjacent said handle to move said feed bar to feed tacks from said magazine into position to be engaged by said hammer.

8. A tack-driving device including a light portable housing, said housing forming a handle by means of which said device is moved to tack driving position, a motor thereon, a cam on the shaft of said motor within said housing, a hammer shaft normally spaced from said cam but adapted to be moved into contact with said cam, means adjacent said handle and manually operable to move tacks into position to be engaged by said hammer, and a chuck to hold each of said tacks while it is being driven by said hammer.

EDWIN LEE DAY.