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OVERHEAD STAPLING MACHINE

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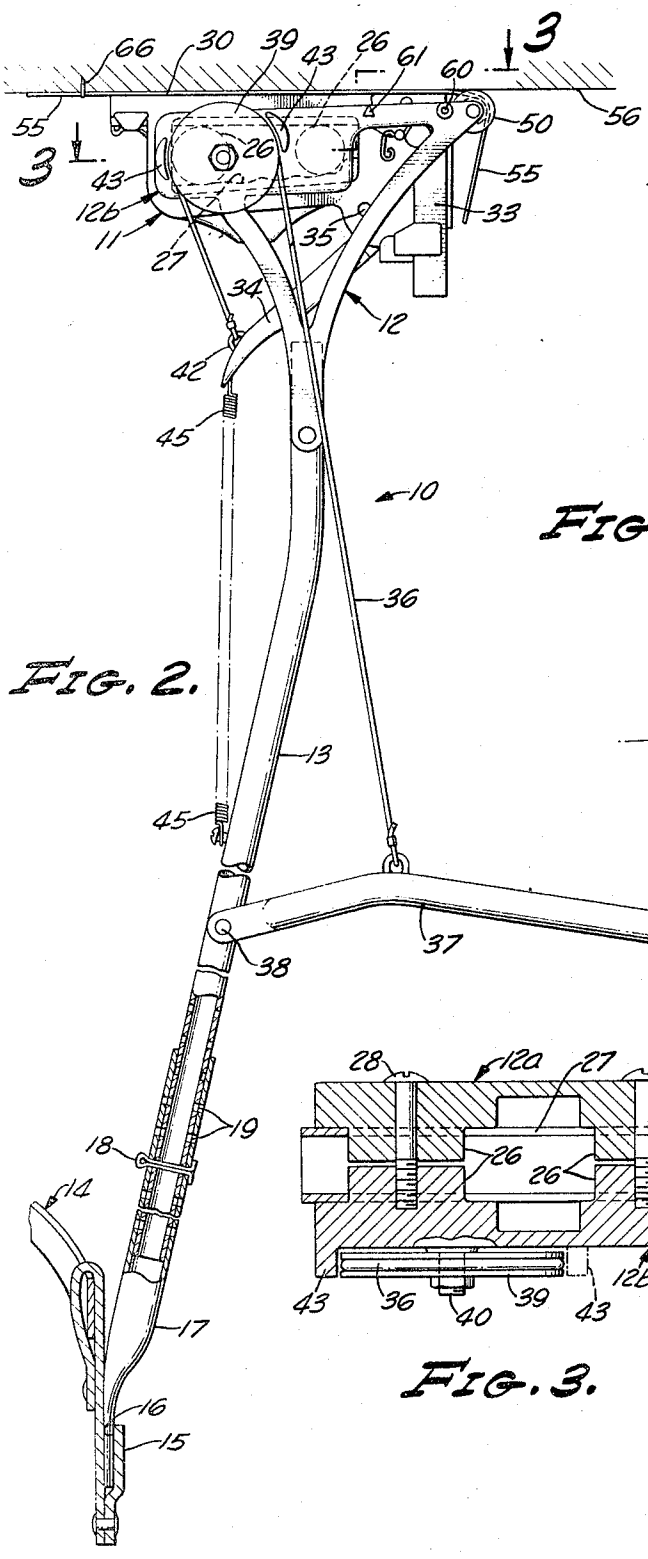


FIG. 2.

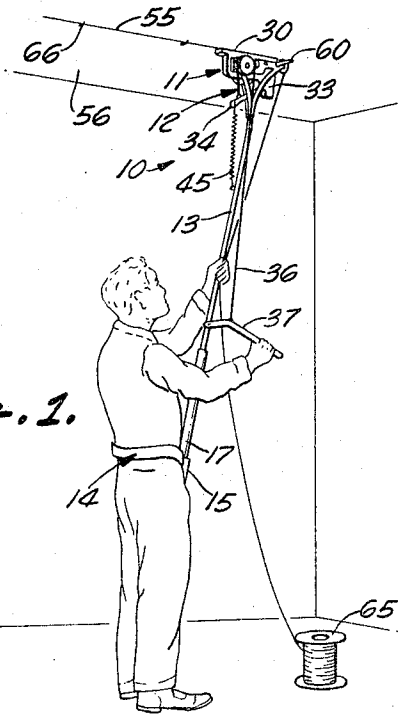


FIG. 1.

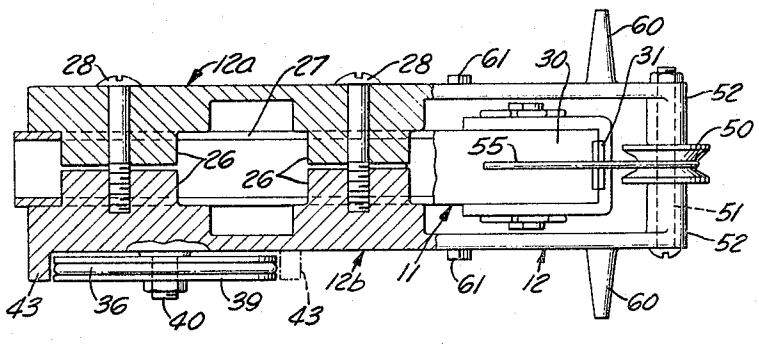


FIG. 3.

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OVERHEAD STAPLING MACHINE

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This invention relates to stapling machines and more particularly to an improved and unique type of stapling mechanism for installing continuous lengths of wire against ceilings without need for scaffolding and by a single workman standing on the floor using one hand to support the machine and tension the wire and using the other to actuate the control for the stapler.

The present invention is particularly useful in installing resistance heating wire to a ceiling but has many other uses of a related nature and enabling a single workman to fasten material to a remote surface without need for scaffolding, ladders or other aids customarily required heretofore. For example in applying electric heating wire to a room ceiling it has been customary to first erect scaffolding beneath the entire ceiling at such a height that one workman can string wire against the ceiling as a second workman uses a hand-held stapler and advances it along the wire to staple it in place. Such practice made mandatory by previously available equipment is costly both as respects the installation and removal of the necessary scaffolding and as respects the actual installation of the wire itself.

By the present invention there is provided a simply constructed lightweight easily-operated tool the weight of which is primarily supported in a harness worn by the workman leaving one hand free to control the drag applied to the wire and the second to actuate the control mechanism for the stapler. Featured is a roller at the advance end of the tool having the dual function of holding the wire captive against the ceiling, centered beneath the stapling station, and aiding in maintaining the wire taut while being stapled. Featured also are positioning indicators projecting from either side of the main frame adjacent the staple driving head and by which the operator can easily and quickly position the driving head both while negotiating return bends and while laying the next run at a uniform distance from previously installed runs.

Accordingly it is a primary object of the present invention to provide an improved stapling mechanism particularly suitable for use in stapling wire and the like to an overhead ceiling in a more convenient and efficacious manner and without need for scaffolding, ladders or other supports for the operator.

Another object of the invention is the provision of a simple lightweight stapling machine adapted to be supported by a harness worn by the operator and manipulatable to drive staples into a ceiling while the operator remains standing on the room floor.

Another object of the invention is the provision of an overhead stapling mechanism having a remote actuator therfor and guide means projecting from its sides by which the operator can accurately judge the position of the next staple to be driven.

Another object of the invention is the provision of an overhead stapling mechanism having a remote support and actuating control and utilizing wire guide means at its advance end useful in positioning and controlling the wire while being stapled in place.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIGURE 1 is a view in perspective showing a preferred embodiment of the invention stapler in use to install wire against a ceiling;

FIGURE 2 is a fragmentary enlarged view in side elevation of the stapling mechanism; and

FIGURE 3 is a fragmentary cross-sectional view taken along the broken line 3—3 on FIGURE 2 and showing constructional details.

Referring to FIGURE 1 there is shown one illustrative embodiment of the invention stapling machine designated generally **10**. The machine includes any suitable conventional type staple driving mechanism **11** rigidly secured to a main frame **12** having an elongated handle **13** arranged to be supported at its lower end by the operator utilizing a harness **14**. As here shown harness **14** comprises a belt provided with suitable fastening means, not shown, for securing it about the operator's waist and including a fitting **15** providing a socket **16** telescopically seating the flattened lower end of tubular fitting **17**. This fitting is adjustably secured to the handle **13** as by a cotter pin **18**. It will be understood that the lower end of the handle and of fitting **17** are provided with a series of holes **19** for selectively seating the cotter pin **18** or other locking retainer means to lock the fitting assembled in different adjusted positions. In lieu of the cotter pin it will be recognized that fitting **17** can be provided with a spring leaf having one end anchored to the fitting and the other provided with a detent pin engageable in a selected pair of openings **19**.

Referring to FIGURES 2 and 3 it will be understood that the staple driving mechanism **11**, as here shown is clamped between a pair of main frame members **12***a*, **12***b*, FIGURE 2, formed of strong lightweight metal. These frame members include bosses **26** projecting toward one another from the inner faces of the frame members and seating in a cutout **27** formed in the stapling mechanism and commonly provided to receive the fingers of the operator when the mechanism is used by itself and gripped in the hand. Frame halves **12***a*, **12***b* are held in assembled position as by cap screws **28** mating with threads in the remote ones of bosses **26**. If desired suitable resilient packing means may be interposed between the inner faces of the main frame members and the outer sides of the stapling mechanism.

Stapling mechanism **11** includes the usual staple storing magazine closely adjacent an elongated generally flat surfaced supporting shoe **30** extending from end to end of the mechanism. This shoe has a staple dispensing opening **31** (FIGURE 3) at its foremost end through which the staple is driven by powerful spring actuated driving mechanism of known type concealed within driving head **33**. This spring is first cocked and then released in well known manner by reciprocation of an operating handle **34** pivotally supported on a pin **35** extending crosswise of the forward end of the mechanism.

Operating handle **34**, as here shown by way of example, may be cocked and released by an operating linkage comprising a flexible cable **36** attached at its lower end to an operating handle **37** pivotally connected to the lower end of handle **13** by a pivot pin **38**. The upper end of cable **36** passes over a pulley **39** supported on a pivot pin **40** mounted in the side wall of frame member **12***b* and having its upper end secured to handle **34** by an eyelet **42**. Cable **36** is held captive in grooved pulley **39** by a pair of guard bosses **43** integral with frame member **12***b*. The operatnig linkage and handle **34** of the staple machine is normally held in its retracted position by a tension spring **45** connected between staple handle **34** and tool handle **13**. This spring may be dispensed with by employing a sufficiently strong handle retraction spring in machine **11**.

An important feature of the stapling machine is the provision of wire guiding, tensioning and control means

across the forward or advanced end of the machine. As herein shown this guide means comprises a deeply grooved roller **50** supported on a pin **51** between the inner adjacent ends of bosses **52** carried at the forward end of main frame **12**. As is best shown in FIGURE 2, the rim edges of pulley **50** lie substantially flush with the ceiling surface when machine shoe **30** is held against a wire **55** pressed against ceiling **56**. It is therefore evident that pulley **50** cooperates with the ceiling in holding the wire captive as the machine is advanced along the wire. It will also be observed from FIGURE 3 that guide roller **50** is positioned to hold wire **55** centered between the legs of a staple being dispensed through opening **31** of driving head **33**.

Another important feature of the invention stapling machine is the provision of means along either side of the forward end of the machine designed to aid the operator in positioning the staples at return bends of the wire as well as in maintain successive runs of the wire parallel and suitably spaced from one another. In this connection it will be understood that in applying electrical heating wire to a ceiling to heat the room by radiation building codes customarily provide for minimum spacing, as one and one-half inches, between adjacent runs of the wire. To this end machine **10** is provided with a pair of tapering bosses **60**, **60** projecting from either side of main frame **12** directly opposite staple dispensing slot **31**, the outer ends of these bosses terminating at the desired minimum distance from the center line of the machine. A second set of bosses, arrows or other suitable indicators **61**, **61** (FIGURE 2) project from the opposite sides of the main frame at the prescribed minimum distance of say one and one-half inches rearward of staple dispensing slot **31**. These position indicators are normally used only when driving the second staple at a return bend as will be understood from a description of the operation set forth below.

In the operation of the described machine, the operator straps harness **14** about his waist and seats the lower end of fitting **17** in socket **16**. If necessary the lower end of the handle is properly adjusted for most convenient use by a particular operator. In this connection it will be noted that the machine is usually held at a suitable forward inclination to the vertical with the driving mechanism proper positioned forwardly of the operator and in a comfortable line of sight. By this means the pressure of the machine against the ceiling is easily regulated by the operator using his left hand to shift handle **13** either toward or away from him.

The wire being installed is supplied from a spool **65** positioned on the floor with the free end of the wire passing through the operator's left hand and over guide roller **50** and rearwardly over shoe **30** and past staple dispensing slot **31**. To drive a staple, the operator grasps actuating handle **37** in his right hand and pulls it toward him to tension cable **36** and thereby handle **34** of the stapling machine. As soon as one staple is driven the operator moves forwardly while maintaining the desired drag tension on wire **55** and manipulates handle **37** to drive staples **66** astride the wire at appropriate distances.

When the operator approaches the edge of the ceiling he drives a staple and then rotates machine **10** through 90 degrees and advances it along the wire the desired spacing between runs of the wiring a distance readily determined by aligning position indicators **61** directly beneath the last installed run of the wire. The operator then drives the second corner staple and again rotates the machine through another 90 degree arc and proceeds to lay the next parallel run of the wire. As he does so he makes frequent checks to ascertain that the outer end of one of guide bosses **60** is generally opposite the last installed run thereby assuring that the installed runs will be parallel and spaced a minimum distance from one another.

While this particular overhead stapling machine herein

shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A stapling tool for use in installing wire against a ceiling by an operator standing on the floor, said tool comprising magazine-fed operator-controlled means for driving a staple upon each actuation thereof, rigid support means attached to said stable driving means and by which the operator can hold the latter means pressed against the ceiling, means at the advance end of said staple driving means to aid in holding the loose end of the wire being installed taut and between the legs of the staple next to be driven, and means including actuator means near the lower end of said rigid support means operable by the operator to control the operation of said staple driving means.

2. An overhead stapling tool for use in securing wire to a ceiling while supported thereagainst by an operator spaced substantially below said ceiling and without need for raising his arms above his head, said stapling tool comprising a magazine-fed operator-controlled staple driving means having rigid supporting means extending downwardly therefrom and by which said staple driving means can be held against the ceiling, harness means adapted to be worn by the operator to support said tool from the lower end of said rigid supporting means, and remote control means extending from said stapling means to a convenient operating position near the lower end of said rigid supporting means and by which said stapling means can be activated to drive a staple.

3. A stapling tool as defined in claim **2** characterized in that said harness means and the lower end of said rigid support include readily disconnectable coupling means releasably supporting said stapling tool on said harness under normal operating conditions.

4. A stapling tool as defined in claim **2** characterized in that said harness includes socket means for telescopically seating the lower end of said rigid support, and belt means adapted to embrace the body of the operator while using said stapling tool.

5. A stapling tool as defined in claim **2** characterized in the provision of deeply grooved wire guide means at the advance end of said stapling means and effective to hold the loose end of a wire aligned with installed portions of the wire while the tool is being advanced to the next stapling station along the wire.

6. A stapling tool as defined in claim **5** characterized in that said wire guide means includes a roller supporting the wire as said tool is advanced across the ceiling in the direction in which the wire is being installed.

7. An accessory for use in stapling wire or the like in a desired pattern on a ceiling and adapted to use a conventional type staple driving mechanism, said accessory comprising frame means having a long rigid handle, harness means attachable to the lower end of said handle and adapted to be worn by an operator while using said accessory, pulley means supported on said frame including flexible power transmitting means passing over said pulley means, manually actuatable control means mounted on the lower end of said handle and attached to said power transmitting means, the remote end of said power transmitting means being adapted for connection to a conventional staple driving mechanism to actuate the latter, and means for clamping a conventional staple driving mechanism in said frame means in position to drive a staple upwardly into a ceiling while supported thereagainst by an operator at the lower end of said handle, and wire guide means at one end of said frame means adapted for use in holding a wire taut against the ceiling while in the process of being stapled to the ceiling.

8. An accessory as defined in claim 7 characterized in the provision of means at the advance end of said main frame and adapted to aid the operator in holding the accessory a predetermined distance from wire previously installed before actuating said control means.

9. A stapling tool useful in installing wire and the like against a ceiling by an operator standing on the floor without need for scaffolding, said tool having an elongated handle adapted to have its lower end supported by the operator, an inverted stapling mechanism supported at the upper end of said handle with its base closely adjacent the ceiling, power transmitting means connected to said mechanism and including control means positioned near the lower end of said handle in a convenient operating position for the operator, and wire guide means at one end of said stapling mechanism through which the loose end of a wire undergoing installation passes and useful in aiding the operator to hold the wire taut and in position to be stapled against the ceiling while the stapling mechanism is operating to drive a staple into the ceiling astride the taut wire.

10. A stapling tool as defined in claim 9 characterized in that said handle includes means for varying the effective length thereof to accommodate the tool to use in rooms of different ceiling heights and to operators of different heights.

11. A stapling tool as defined in claim 9 and wherein said staple driving mechanism has a staple driving station near the advance end of said tool and guide means along at least one side of said tool and positioned a predetermined distance rearward from said staple driving station and useful to the workman in positioning said tool to drive the staples at the two corners of a return bend loop.

12. A stapling tool as defined in claim 9 characterized in the provision of means projecting laterally from the opposite sides of said tool and useful in aiding the workman in installing successive runs of wire a desired distance apart and generally parallel to one another.

13. A stapling tool for use in installing wire against a ceiling by an operator supported appreciably below the ceiling, said tool having a long tubular handle, a bifurcated frame secured to the upper end of said handle, an inverted stapling mechanism clamped within said bifurcated frame, a grooved roller mounted on said frame closely adjacent the staple driving end of said mechanism with its rim edges substantially flush with the ceiling when said tool is held thereagainst and cooperating therewith to hold a wire captive, actuating means for said stapling mechanism including operating linkage means movably carried by said handle and connected to operate said mechanism to drive a staple, and spring means for returning said linkage to its starting position in readiness for use in a repeat staple-driving operation.

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