Nov. 19, 1940. J. H. ABRAMSON ET AL 2,221,903

CABLE PULLER

Filed July 31, 1937 2 Sheets-Sheet 1

Fig. 1

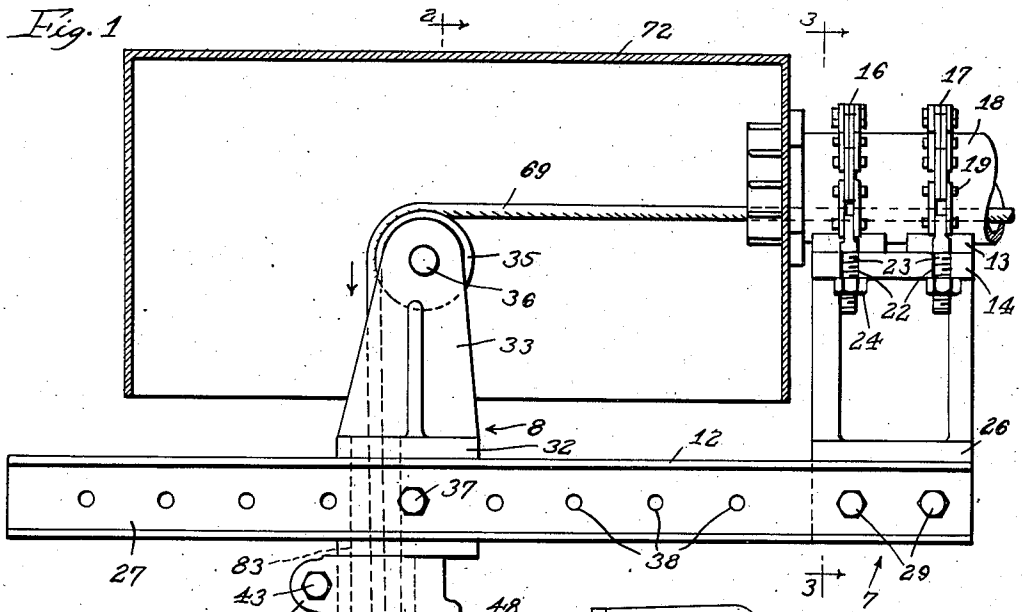


Fig. 2

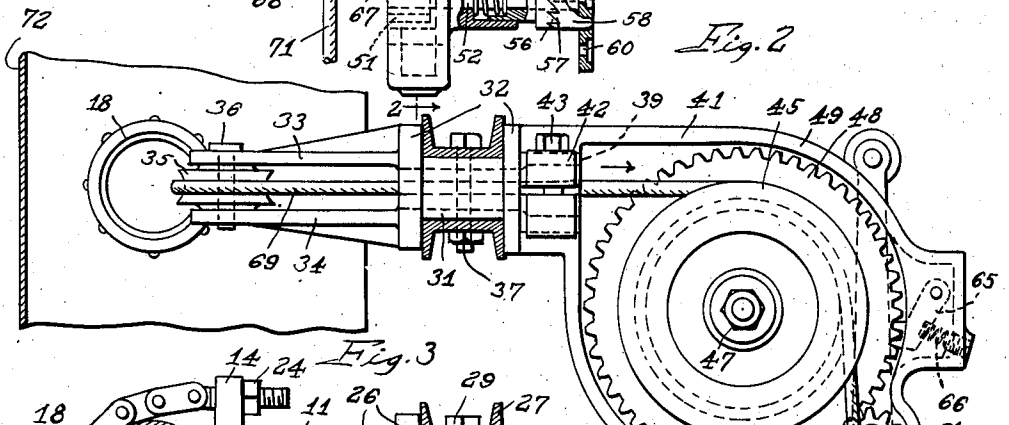
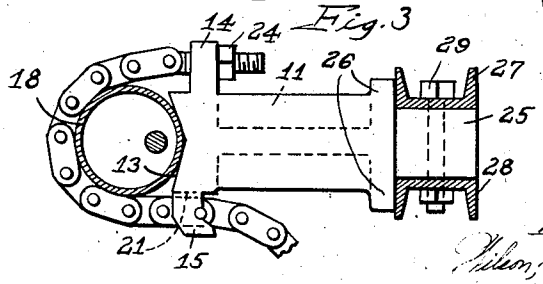


Fig. 3



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Fig. 4

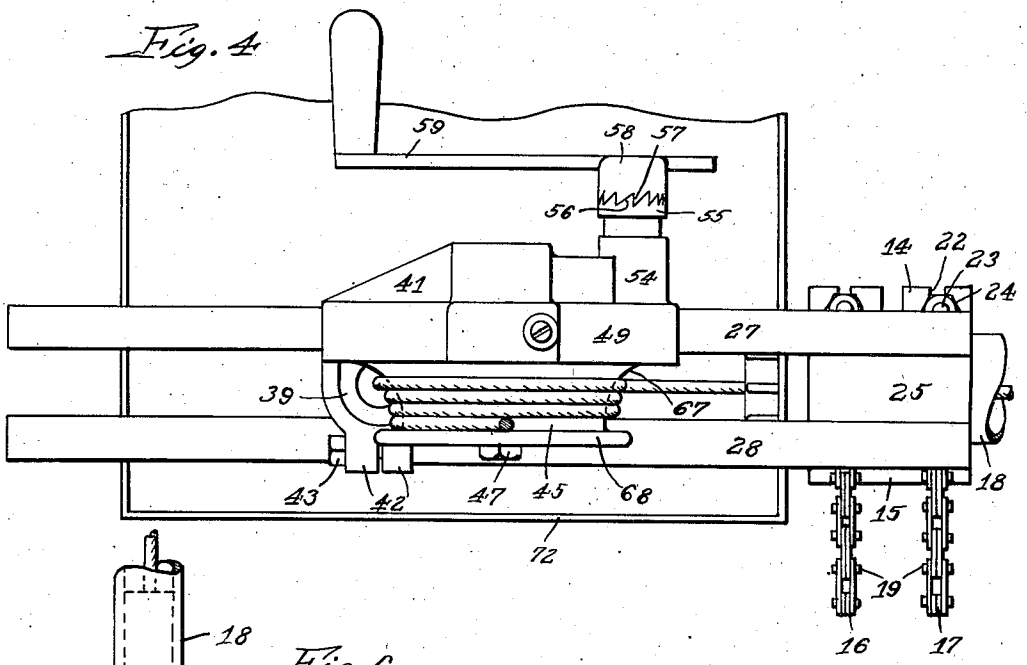


Fig. 6

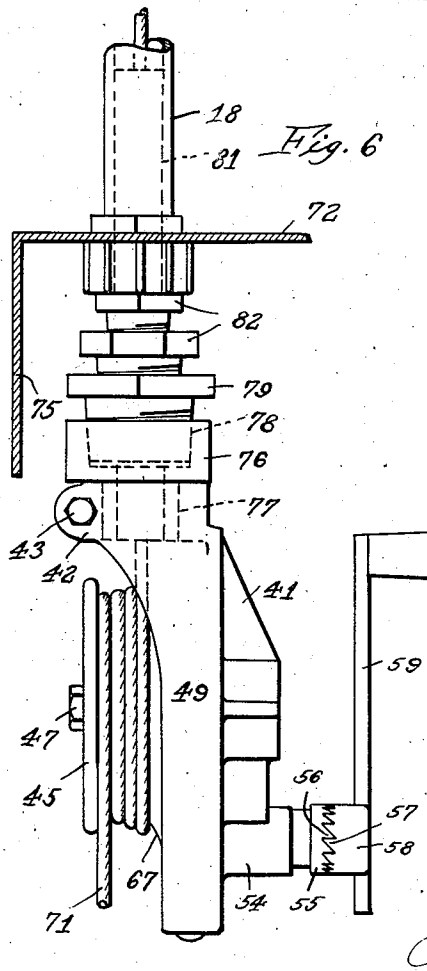
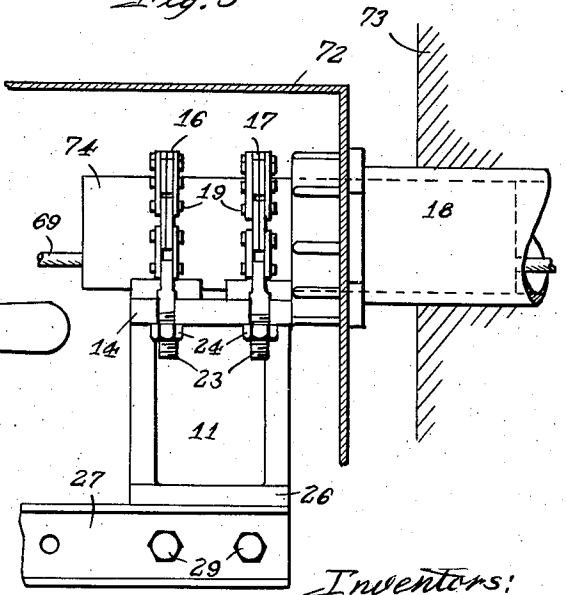


Fig. 5



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2,221,903

CABLE PULLER

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Application July 31, 1937, Serial No. 156,679

11 Claims. (Cl. 175—376)

This invention relates to pulling devices of the type adapted particularly for drawing cables, electrical wiring, and the like through conduits of buildings, and for analogous uses.

An object of the invention is to provide a portable, light weight device for pulling cables, wires and the like, which is quickly and easily brought into operative position and which is readily adaptable to the many different positions and conditions under which cables and wires must be pulled in modern construction operations.

A further object of the invention is the provision of a puller adapted to pull directly against the conduit so that the counter-force of the pulling operations is applied to the conduit through which the cable is pulled.

Another object is the provision of a puller adapted to draw an excess of cable or wire through the conduit for use in making connections in distributor boxes and the like, or to be drawn through additional stretches of conduit for step by step pulling of long cables.

Another object of the invention is the provision of a generally improved cable puller wherein only a relatively small proportion of the pulling line is carried on the reel whereby to maintain the weight of the reel at a minimum.

We have also aimed to provide a device of the character described having improved and quick detachable means for attaching the device to a conduit or pipe together with other features facilitating the pulling of cables under adverse circumstances.

Other objects and attendant advantages will be apparent to those skilled in the art from the following description and the accompanying drawings, in which—

Figure 1 is a top view of the cable puller showing the same attached to a conduit and terminal box;

Fig. 2 is a section on the line 2—2 of Figure 1;

Fig. 3 is a section on the line 3—3 of Figure 1;

Fig. 4 is an elevation showing the cable puller in operative position with respect to a conduit and terminal box;

Fig. 5 is a fragmentary view showing the manner of attachment of the puller where there is insufficient exposed conduit for attachment of the puller thereto, and

Fig. 6 is an elevation showing a still further manner in which the puller may be employed.

Figures 1 to 4, inclusive, show the most common manner in which the pulling device is employed where the puller is attached to the previously installed conduit of a building and employed for the purpose of pulling electrical wiring and the like through the conduits. The adaptability of the puller to the various conditions and situations which may arise in the wiring of a building is in part illustrated in Figs. 5 and 6. The device consists in general of a puller frame designated by the numeral 7, a reel support designated by the numeral 8, and a reel designated by the numeral 9.

The puller frame 7 includes a bracket portion designated generally by the numeral 11 and a rail portion designated generally by the numeral 12. The bracket portion has a V-shaped groove 13 at one end and oppositely projecting flanges 14 and 15 adjacent thereto adapted to support chains designated generally by the numerals 16 and 17 for the purpose of supporting the frame on a conduit 18. It will be understood that the conduit 18 may be any of a wide variety of conduits and pipes commonly employed for the purpose of carrying wires and cables such as those used in electrical wiring operations, telephone work, and in numerous analogous arts. The chains 16 and 17 have outwardly projecting link pins 19 adapted to abut against the flange 15 when the chain is seated in slots 21 in the flange 15. The flange 14 is likewise provided with slots 22 for the reception of bolts 23 attached to the ends of the chains 16 and 17, the bolts having nuts 24 adapted to abut against the flange 14. In operation, the nuts 24 are screwed to the outer end of the bolts 23, the bolts inserted in the slots 22, and the chain pulled tight against the conduit 18 and the appropriate pin 19 caused to abut against the flange 15. Thereupon, the nuts 24 are tightened until the bracket 11 is firmly attached to the conduit. The opposite end of the bracket 11 has a portion 25 of reduced cross-section providing shoulders 26, rails in the form of channel members 27 and 28 being seated on the portion 25 and attached by means of bolts 29, the sides of the rails abutting the shoulders 26, as best shown in Fig. 3. The rails 27 and 28 project from the bracket 11 at right angles, as best shown in Figure 1, and serve for the attachment of the reel support 8 at any of a plurality of spaced intervals beyond the end of the conduit 18.

The reel support has a centrally disposed portion 31 adapted to be received between the rails 27 and 28, as best shown in Fig. 2, and has spaced shoulders 32 adapted to abut against opposite sides of the rail. The reel support also has a pair of spaced arms 33 and 34 projecting outwardly in parallel relation with the bracket 11

and supporting therebetween a pulley 35 on a pin 36 extending between the arms, the pulley being adapted to rotate freely under the influence of a cable, as will presently be described. The pulley is supported so that the edge thereof remote from the rails will lie in the region of an extension on the axis of the conduit 18, as best shown in Fig. 2, so that the cable trained therein and passing through the conduit will be free of the walls of the conduit when drawn taut. The reel support is fixedly attached to the rails by means of a bolt and nut 37 adapted to be positioned in any of a plurality of holes 38 in the rails 27 and 28 to space the reel support and reel at different distances from the bracket 11. On the opposite side of the rails from the arms 33 and 34, the reel support has a cylindrical boss 39 adapted to be received in a reel casing 41.

The reel 9 includes the casing 41, which has a split collar portion 42 adapted to receive the boss 39 of the reel support to support the reel on the reel support so that the reel may be rotated thereon to any radial position. A bolt or cap screw 43 serves to tighten the collar on the boss so as to retain the reel in any desired rotative position. The casing 41 has a shaft 44 centrally located therein upon which is supported a drum designated generally by the numeral 45 through a hub 46, the drum being retained thereon through a nut 47 threaded onto the end of the shaft. The drum 45 has integrally therewith a ring gear 48 substantially enclosed within an overhanging rim 49 of the casing 48, the ring gear being engaged by a pinion 51 attached to a shaft 52 journaled in the casing 41, the shaft 52 projecting beyond the casing, as shown at 53, and through a boss 54. A racheted handle is carried on the projecting end of the the shaft 53 which includes a spring pressed rachet member 55 having rachet teeth 56 adapted to engage ratchet teeth 57 on a ratchet member 58. The ratchet member 58 is journaled on the shaft 52 and has a handle 59 seated in a slot 61, the ratchet member 58 and handle 59 being secured to the shaft 52 by a screw 62. The handle 59 may have a plurality of screw holes 60 for the reception of the screw 62 so as to vary the effective length of the handle. The ratchet member 55 has a key 63 which prevents rotative movement of the ratchet member with respect to the shaft, but permits of longitudinal movement thereof. A spring 64 urges the ratchet member 55 into engagement with the member 58 so that the handle 59 may be used in a ratchet fashion to index the shaft 52 and consequently rotate the ring gear 49 and drum 45. A detent 65 operates against the ring gear 48 as best shown in Fig. 2 to prevent movement of the ring gear and the drum in a counterclockwise direction facing Fig. 2, the detent being urged into engagement with the gear by a spring 66. The drum 45 has a sloping inner portion 67 and an annular shoulder 68 such that a cable 69 may be given three or four turns about the drum so as to rest on the sloping portion 67, with the pull being exercised on the inside loop of the drum as shown in Figure 1, the free or loose end 71 of the line being adjacent the shoulder 69. In this way the pulling force urges the respective loops outward and downward along the portion 67 so as to bind the respective loops and prevent slippage, and yet permit of movement of the line around the drum and out at the shoulder side of the drum. This arrangement permits of the use of a large amount or length of line without winding all of the line on the drum, thus maintaining the size of the drum and the weight of the reel at a minimum.

In connection with the preceding discussion, we have described the puller as being connected directly onto the conduit of a building or structure. However, as will be understood by those skilled in the art, it is frequently found that insufficient conduit extends from the wall, floor, or other parts of the building structure to permit of attachment of the frame thereto; for example, as shown in Fig. 5, wherein the terminal box designated generally by the numeral 72 is positioned in close proximity to a wall 73. The structure of our device is such as to adapt itself readily to such conditions through the use of relatively simple expedients. Under these circumstances a short piece of conduit 74 of the next succeeding smaller size from the conduit 18 is inserted into the end of the conduit 18 and the bracket 11 attached thereto as shown in Fig. 5, so that one side of the bracket 11 abuts against the end of the conduit 18 whereby the force of the pulling operations is exerted against the end of the conduit 18 in substantially the same manner as in Figure 1.

The adaptability of the device is further shown in Fig. 6, wherein the conduit 18 enters the terminal box 72 in such proximity to a side wall 75 of the terminal box or in close proximity to some other analogous obstacle. Under such circumstances the reel is detached from the reel support 7 and a fitting 76 having a boss 77 is inserted within the split collar 42 of the reel. The fitting has an internally threaded portion 78 adapted to receive the conventional conduit reducer 79 into which a short length of conduit 81 may be threaded directly, or additional reducers 82 may be used depending upon the size of the conduit 18. The short piece of conduit 81 serves as a pilot to guide the reel with respect to the conduit 18 during the pulling operations.

In operating the device, the pulling line 69 is drawn through the conduit from box to box or through the stretch of conduit through which the cables or wires are pulled. One end of the pulling line 69 is then attached either to the end of the cable or to a point intermediate the ends of the cable in the manner heretofore known in the art. The puller is then attached to the conduit in the manner heretofore described, and the residue of the cable is trained over the pulley 35, threaded through an opening 83 in the reel support 8, and given three or four turns around the drum 45, the remainder of the puller line represented by the numeral 71 remaining coiled on the floor. Thereupon the handle 59 is operated to rotate the gear 48 and drum 45 in a clockwise direction facing Fig. 2, drawing the pulling line through the conduit and around the pulley 35, as indicated by the arrows, the line reeling off the drum as shown at 71 as the pulling operations proceed. This causes the cable or wire to be drawn through the conduit and the end brought out into the terminal box 72. If the pulling line is attached to the cable at a point intermediate the ends of the cable, a considerable excess of cable can be drawn out of the conduit either for attachment within the terminal box or to be re-pulled through additional sections of conduit.

Attention is directed to the manner in which the pulling force is applied. It will be seen that the device contemplates that the counterforce produced in pulling the cable through the conduit be applied directly to the conduit itself. In the past the most common means for pulling

cable has been through a pulling mechanism attached to the floor or walls of the building frequently utilizing a truck to provide the necessary power. The result was that very frequently the conduit system was pulled from the walls or other structure because the tendency was to pull the conduit with the cable so that the pulling force was transmitted from the cable to the conduit tending to tear the wall structure from its support. In the present instance the counterforce is applied directly back to the conduit which is offering the resistance to the movement of the cable, and there is consequently no tendency to disturb the supports for the conduit. A matter of considerable importance in the present invention is the capacity of the device to accommodate itself to the varying conditions under which the different pulling operations must be performed and the close proximity of the pulling device to the point at which the pressure must be applied. In other words, the puller is located in close proximity to the end of the conduit and is thus capable of operating within very limited space. Furthermore, the device is so constructed as to be capable of operation in spite of the close quarters and adjacent obstacles which would normally interfere with the work. Thus, means are provided for varying the spacing of the reel support 8 and the bracket 11. Likewise, the reel is supported on the reel support in such manner that it may be turned in any radial position for actuation of the handle. In addition, the handle is arranged with ratchet means such that it need only be turned through a portion of a complete revolution to accomplish the pulling operation. Furthermore, this ratchet mechanism eliminates the necessity on a hard pull for the operator to turn the handle completely around through positions in which the arm of the operator cannot exert its maximum force, but instead, permits of operating the handle through a limited arc at which the maximum force may be applied thereto. Furthermore, the detent 65 prevents return movement of the drum and loss of tension on the pulling line upon release of the handle or upon change in direction of its rotation as in ratcheting.

The device is likewise arranged so that the reel proper may be used alone as shown in Fig. 6 where the pull is direct and may be used with the reel support 8 where the pull may best proceed around a right angle. This construction permits of pulling the cable along the axis of the conduit so that the insulation is not scraped by the passage of the cable over the edge of the conduit at an angle with respect to the outlet from the conduit. Likewise, the pulling line 69 does not rub over the edge of the conduit during the pulling operations, and as a result, a minimum of force is required to pull the cable.

Attention is also directed to the means for supporting the puller on the conduit, which permits of rigid attachment of the puller to any of a plurality of conduit sizes with the minimum of effort and time.

Another advantage of the invention is that the device is light in weight and may be operated by a single man and yet produce sufficient power to accomplish the most difficult pulling operations.

While we have thus described and illustrated the specific embodiment of the invention, we are aware that the principles herein disclosed may be embodied in numerous specific forms within the spirit of the invention, but we do not wish to be limited except as required by the scope of the appended claims, in which we claim:

1. The combination in a cable puller of a frame having means for supporting the same on the exterior of a conduit adjacent the end thereof, means on the frame for supporting a pulley in spaced relation to the end of the conduit adjacent the longitudinal axis thereof, a winding drum, means for rotatably supporting the winding drum on the frame on an axis parallel to the axis of the conduit and spaced therefrom, a pulling line adapted to be stretched through said conduit trained over said pulley and wound on said drum, and means for rotating said drum to wind said line thereover and draw a cable attached to the line through said conduit.

2. The combination in a cable puller of a frame having means for supporting the same on a conduit adjacent the end thereof and a portion extending beyond the end of the conduit, a rotatable winding drum carried on said portion, a puller line adapted to be positioned in said conduit and turned on said drum, means for rotating the drum to wind the pulling line thereover to pull a cable through the conduit, and means on said frame portion beyond the end of the conduit for guiding the pulling line to maintain the line emerging from the conduit free of the conduit.

3. The combination in a cable puller of a frame having means for supporting the same on a conduit adjacent the end thereof, and a rail portion extending beyond the end of and in approximate parallel relation to the conduit, a reel support adapted to be positioned at any of a plurality of spaced intervals along said rail portion, said support having a pulley beyond the end of the conduit for guiding a pulling line therein, a pulling line for drawing a cable through said conduit trained over said pulley, and a reel on said reel support including a drum adapted to receive a plurality of turns of said line, and means for rotating said drum to draw the line through the conduit, said reel and reel support having interfitting means for predetermining the position of the reel thereon.

4. The combination in a cable puller of a frame having means for supporting the same on a conduit adjacent the end thereof, and a rail portion extending beyond the end of and in approximate parallel relation to the conduit, a reel support adapted to be positioned at any of a plurality of spaced intervals along said rail portion, said support having a pulley beyond the end of the conduit for guiding a pulling line therein, a pulling line for drawing a cable through said conduit trained over said pulley, and a reel on said reel support including a drum adapted to receive a plurality of turns of said line, means for rotating said drum to draw the line through the conduit, said reel and reel support having interfitting means for predetermining the position of the reel thereon.

5. The combination in a cable puller of a puller frame comprising a clamping portion for attachment to a conduit through which cable is to be pulled, and a rail portion, a reel support carried on said rail portion for movement between a plurality of positions, said reel support having a pulley adjacent the center line of the conduit, and a reel carried on said reel support and rotatable thereon about an axis transverse to the rail portion, said reel comprising a rotatable drum, a pulling line passed intermediate its ends around said drum and having one end adapted for at-

tachment to a cable in said conduit, means for rotating said drum in one direction to draw the pulling line and wire through the conduit, and means for preventing return movement of said drum.

6. The combination in a cable puller of a frame having means for supporting the same on a conduit adjacent the end thereof, and a rail portion extending beyond the end of the conduit, a reel support including a sleeve, adapted to be positioned at any of a plurality of spaced intervals along said rail portion, said support having a pulley beyond the end of the conduit for guiding a pulling line therein, a pulling line for drawing a cable through said conduit trained over said pulley, and a winding drum tangentially disposed with respect to the axis of said sleeve for rotation of the reel on said reel support about an axis defined by said line, and means for rotating the drum to draw the line and cable through said conduit.

7. The combination in a portable puller for electric cable, of a frame comprising a metal plate, a sleeve laterally offset from the plane of said plate and a peripheral flange integral with the plate, a drum secured to one side of said plate and seated partly within said flange, a pulling cable having several turns on said drum intermediate the ends of the cable, a gear secured to said drum on the side thereof adjacent said plate, said gear being enclosed by said flange, and a crank-driven spur gear carried on said plate for engagement with the gear on said drum for manual rotation of the drum, the drum projecting beyond said flange for manipulation of the cable and removal thereof from the drum.

8. The combination recited in claim 7 including a handle for rotating said spur gear, and ratchet means interposed between the handle and the gear.

9. The combination in a portable puller for electric cable of a frame, quick releasable means for clamping the same on a conduit adjacent the end thereof to support the same beyond the end of the conduit, a rotatable winding drum carried on said frame, a puller line adapted to be positioned in said conduit and turned on said drum, means for rotating the drum to wind the pulling line thereover to pull the cable through the conduit, and means on said frame for guiding the pulling line into registration with the opening of said conduit to maintain the line emerging therefrom free from the end of the conduit.

10. The combination in a portable puller for electric cable of a frame including a clamp for rigidly attaching the same to a conduit adjacent the end thereof and spaced rails extending beyond the end of the conduit, a reel support shaped to be secured between the rails in a fixed position at any of a plurality of spaced points therein, said support having shape characteristics cooperable with said rails to prevent rotation with respect thereto, an arm projecting to a point adjacent the axis of said conduit and a reel supporting sleeve, a pulley carried on said arm at the end thereof for guiding a pulling line with respect to said conduit, a pulling line for drawing a cable through said conduit trained over said pulley, and a reel having a collar for reception of said sleeve to support the reel on said support, said reel including a drum adapted to receive said line, and means for rotating said drum to draw the line through the conduit.

11. The combination in a cable puller of a frame having means for supporting the same on the exterior of a conduit adjacent the end thereof, means on the frame for supporting a pulley in spaced relation to the end of the conduit adjacent the longitudinal axis thereof, a winding drum, means for rotatably supporting the winding drum on the frame spaced from the axis of the conduit, a pulling line adapted to be stretched through said conduit trained over said pulley and wound on said drum, and means for rotating said drum to wind said line thereover and draw a cable attached to the line through said conduit.

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