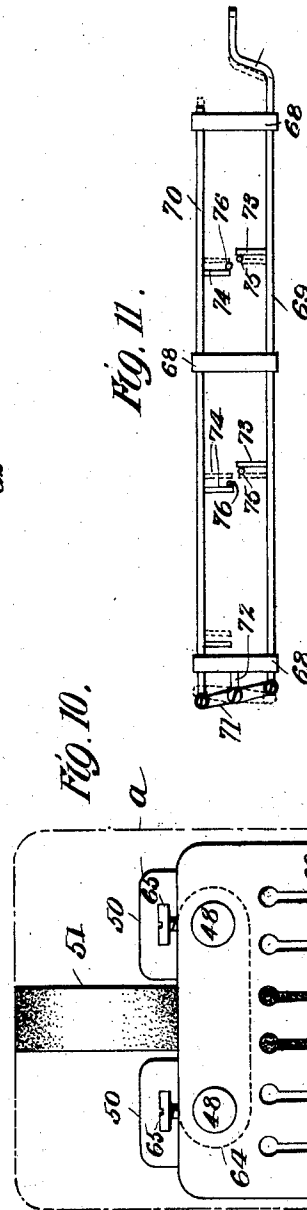
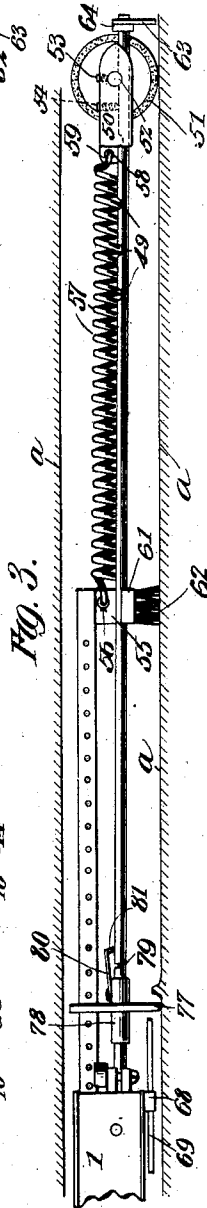
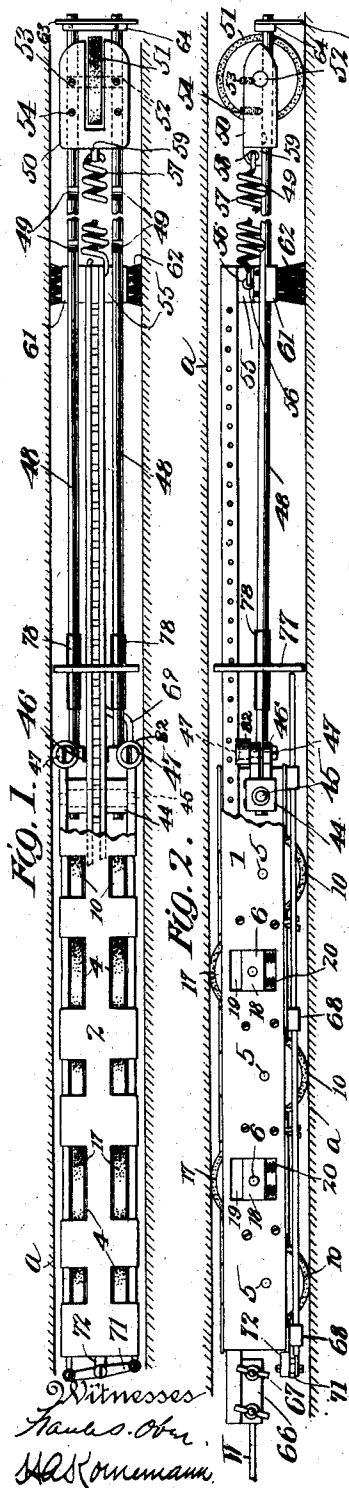


A. H. DE VOE.
CONDUIT THREADING DEVICE.
APPLICATION FILED OCT. 24, 1906.

3 SHEETS—SHEET 1.



Witnesses
Paul S. Ober
H. R. Krumm

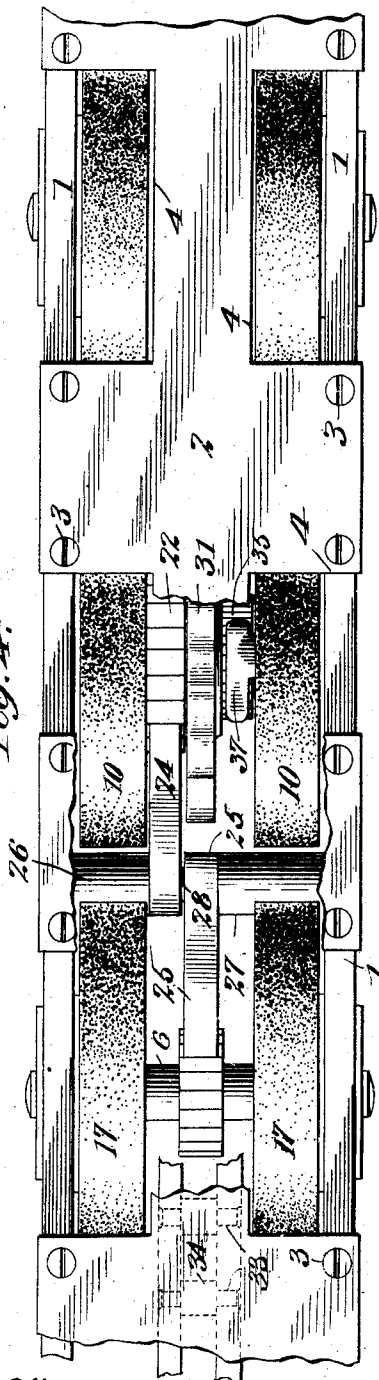
Inventor
Albert H. DeVoe
By his Attorneys
Kury & Miller

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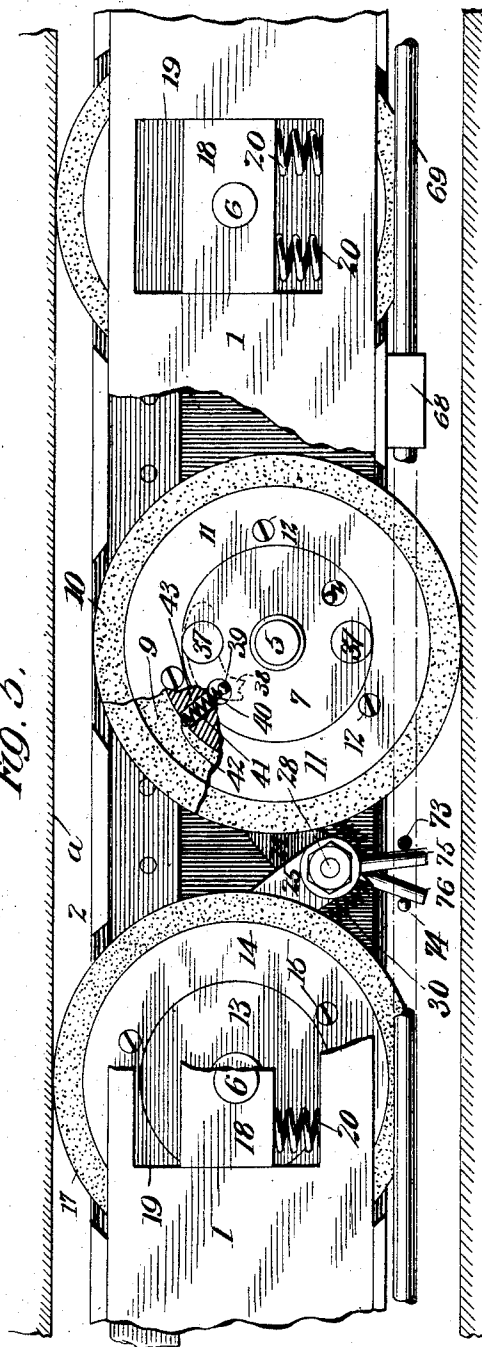
3 SHEETS—SHEET 2.

FIG. 4.



Witnesses
H. S. Ober
H. Konemann

FIG. 5.



Inventor
Albert H. DeVoe
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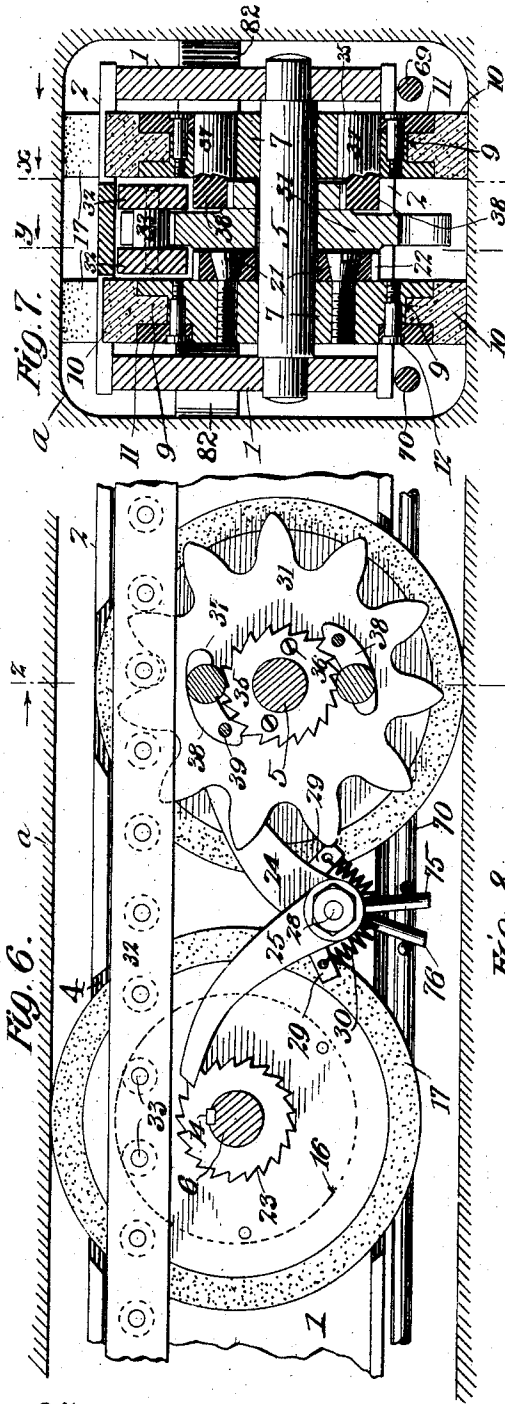
No. 873,996.

PATENTED DEC. 17, 1907.

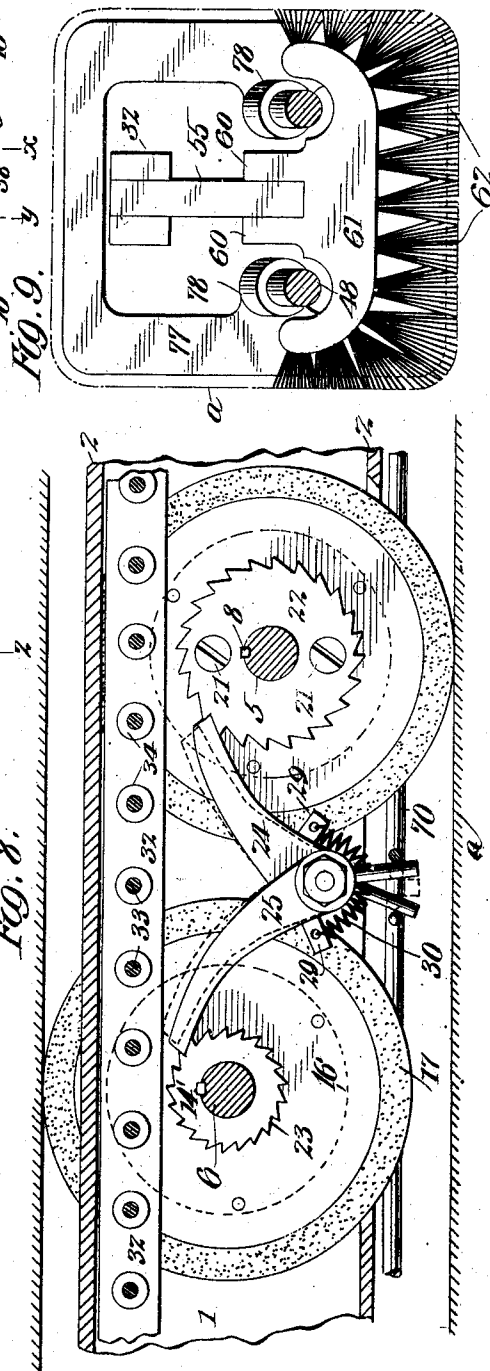
A. H. DE VOE.
CONDUIT THREADING DEVICE.

APPLICATION FILED OCT. 24, 1906.

3 SHEETS—SHEET 3.



Witnesses
Francis Ober
H. A. Konemann



Inventor
Albert H. DeVoe
By his Attorney
Kunz & Miller

UNITED STATES PATENT OFFICE.

ALBERT H. DE VOE, OF ELIZABETH, NEW JERSEY.

CONDUIT-THREADING DEVICE.

No. 873,996.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed October 24, 1906. Serial No. 340,270.

To all whom it may concern:

Be it known that I, ALBERT H. DE VOE, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Conduit-Threading Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object to provide a simple and effective device for passing a wire or cord through conduits for the purpose of drawing through the same an electrical cable composed of a number of conducting wires.

Although numerous attempts have been made heretofore to construct traveling carriages capable of drawing the initial wire through the tubular conduit, such devices have thus far proved ineffective, and the common practice is at the present time to employ a sectional rod of which the component short lengths are successively fastened together at the manhole at one end of the conduit and the wire attached to the final length, and the composite rod thus formed is drawn through the conduit from the manhole at the opposite end and its advance sections successively detached for corresponding use in the next conduit section. Such expedient has many disadvantages, among which is that of breakage of the rod sections at the joints, causing serious difficulty and much delay of the work in the removal of the broken parts.

In its preferred form, the present improvement comprises a carriage traveling on wheels which are adapted to rotate freely in one direction but are locked from rotation in the opposite direction, and means, connected with the wire to be carried through the conduit, for driving such wheels. Means are also provided for cleaning the conduit in advance of the carriage and for unlocking the propelling wheels to permit their retrograde movement in case it encounters obstructions which cannot be removed by such means, whereby the carriage may be readily withdrawn from the end of the conduit at which it started for removal of the obstruction by the necessary means preparatory to a succeeding threading operation.

The invention consists in the constructive features of the device herein shown and described and set forth in the claims annexed.

The improvement will be understood by reference to the accompanying drawings, in which—

Figure 1 is a plan and Fig. 2 a side elevation, partly in section, of conduit threading carriage embodying my present improvements, with a portion of the thrust-rods and the rack-bar spring removed, and Fig. 3 is an elevation of the forward portion of the carriage and representing in full the parts of which portions are omitted in the preceding figures. Fig. 4 is a plan of the central portion of the carriage with a portion of the top plate removed to expose the parts beneath, and Fig. 5 is a side elevation of the same with a portion of the side-wall removed for a like purpose. Fig. 6 is a sectional elevation of a portion of the carriage representing one of the propelling wheels and an adjacent pressure wheel with their connections, upon the section line $x x$ in Fig. 7, which is a transverse section of the carriage in the line $z z$ of Fig. 6. Fig. 8 is a sectional elevation similar to Fig. 6 but on the line $y y$ of Fig. 7. Fig. 9 is an end elevation of the forward portion of the device in section in advance of the brush to expose the latter in front elevation, and Fig. 10 is an end elevation representing in front view the scraping plate and the forward bearing wheel. Fig. 11 is a plan representing the throw-out device for the locking members of the propelling and pressure wheels. Figs. 4 to 11 inclusive are upon a larger scale than the preceding figures.

The carriage is represented in the drawings as inclosed by the walls a of one of the tubular compartments of an electrical conduit, and is shown constructed with a frame composed of the side-walls 1 and top and bottom plates 2 secured thereon by means of screws 3 and each formed with lateral notches 4 to accommodate the projecting portions of the laterally spaced driving and pressure wheels fixed upon the transverse axles 5 and 6, respectively.

The driving wheels, of which three pairs are represented in Figs. 1 and 2, are each constructed of a hub portion 7 which is shown secured to its respective axle 5 by means of a key 8 and is formed upon its inner periphery with an annular groove entered by the annular tongue 9 of a rubber tire 10 secured therein by means of the annular plate 11 secured to the hub portion by means

of screws 12. The pressure wheels are similarly constructed with the hub portions 13 secured by keys 14' to their respective axles 6 and afford, with the annular plates 14 secured thereon by screws 15 peripheral grooves entered by the tongues 16 of the rubber tires 17. The axles 5 are journaled in fixed bearings in the side plates 2, but the axles 6 are journaled in the bearing-blocks 18 having their ends fitted to the opposite edges of the rectangular openings 19 within the side plates 1 and pressed normally upward by means of springs 20 interposed between such blocks and the bottoms of the openings 19, whereby a yielding pressure is imposed upon the upper and lower walls *a* of the conduit by the pressure and driving wheels, respectively, to insure an effective rolling contact between the driving wheels and the adjacent wall of the conduit.

One of the driving wheels of each pair has secured thereto by means of screws 21 a ratchet wheel 22, and each pressure wheel axle has fixed thereon intermediate its ends a ratchet wheel 23 having teeth oppositely disposed to those of the wheel 22, and the ratchet wheels upon adjacent axles are engaged by pawls 24 and 25, respectively, having tubular hubs 26 and 27 mounted upon a common intermediate supporting stud 28 and each provided with a lateral pin 29 connected with the similar pin upon the other by means of a spring 30 serving to yieldingly maintain the pawls in engagement with their respective ratchet wheels to prevent retrograde movement of their connected driving and pressure wheels.

Loosely mounted upon each of the driving wheel axles 5 intermediate its ends is a sprocket wheel 31 adapted to be engaged by a longitudinally movable rack-bar formed of the side-rods 32 and intermediate studs 33 carrying anti-friction rollers 34 adapted to enter the spaces between the teeth of the ratchet wheels to rotate the latter alternately in opposite directions. A ratchet-wheel 35 is secured by screws 36 to one side of each of the sprocket wheels 31, and the adjacent driving wheel hub is formed with diametrically opposite bearing apertures in which are journaled the lateral hubs 37 of pawls 38 having teeth at their outer ends adapted to engage those of the ratchet-wheels 35 and each provided near its toothed end with a lateral pin 39 adapted to enter a transverse hole 40 in the driving wheel hub intersected by a radial hole 41 having at its outer end a pin 42 between which latter and the pin 39 is interposed a spring 43 adapted to maintain the pawl 38 in operative relation with its respective ratchet-wheel 35 with which it forms a clutch device operative in one direction only for coupling the driving wheels with their actuating sprocket-wheel for propelling the carriage in a forward direction while per-

mitting the independent retrograde movement of the sprocket-wheel after each operative movement of the same.

The carriage frame is provided at its forward end with a block 44 pivotally mounted upon a cross-rod 45 and provided with a pair of split sockets 46 with shouldered clamp-screws 47 for securing in the latter the rearward ends of a pair of parallel thrust-rods 48 having spaced notches 49 in the upper sides of their outer end portions to which is fitted the bifurcated block 50 carrying the preferably rubber-tired guide-wheel 51 mounted upon the shaft 52 fixed within transverse holes in the block 50 and entering one of the notches 49 in each of the rods 48, thus serving to lock the block in place as well as sustain the wheel 51 within its central recess within the block. The shaft 52 is retained in place by set-screws 53, and the block 50 is steadied upon the rods 48 by set-screws 54.

The forward end of the rack-bar has secured between its side-bars 32 the depending attachment plate 55 having a transverse hole 56 in which is introduced one end of the propelling spring 57 having its other end secured in a similar hole 58 in a rearwardly extending ear 59 upon the wheel-block 50, said plate 55 being embraced at its lower edge by the spaced ears 60 of a brush-block 61 having tufts of bristles 62 projecting from the bottom and upturned side portions as shown in Fig. 9, so as to move in contact with the lower portion of the conduit, whose inner surface is indicated in dotted lines in said figure.

Secured to the forward extremities of the thrust-rods 48 is a slotted scraping-blade 63 having a hub portion 64 perforated to receive the rods 48 and provided with set-screws 65 for securing the same in place. This scraper is formed with parallel slots extending from its lower edge to give it flexibility and is provided to loosen any particles of dirt adhering to the bottom of the conduit to enable the brush to sweep them through the conduit and into the manhole at the farther end to prepare it to receive the cable. The rack-bar is provided at its rearward end with depending clamp-plates 66 of well-known form having clamp-screws 67, whereby the forward end of the wire *w* to be threaded through the conduit is securely attached to the rack-bar.

Mounted in suitable bearings 68 upon the bottom of the carriage frame are two parallel reciprocating rods 69 and 70 having their rearward ends pivotally connected with the opposite ends of a rock-lever 71 pivoted intermediate its ends upon a lug 72 projecting from the carriage frame. Each of the rods 69 and 70 has projecting at intervals toward the other the tappet-pins 73 and 74, respectively, so arranged as to be adapted to engage from opposite sides the inclined arms

75 and 76 depending respectively from the sleeves 27 and 26, so that the engagement of the tappet-pins with their respective arms 75 and 76 will serve to turn the sleeves 27 and 26 upon their common supporting studs and thus simultaneously disengage the pawls 25 and 24 from their respective ratchet-wheels 23 and 22. As represented in Fig. 11, the rod 69 is the longer of the two and has its forward end bent inwardly to lie near the middle of the conduit just behind a thrust-plate 77 constructed with bearing sleeves 78 slidably mounted upon the thrust-rods 48. The plate 77 conforms in outline with the shape of the conduit with a little clearance space all around its periphery, and has the middle portion removed to permit the passage of the parts extending from the carriage frame in advance of the same. The thrust-plate remains normally stationary upon the supporting rods 48, but if it should strike an obstruction, like a lump of cement, as represented slightly in advance thereof in Fig. 3, the movement of the plate with the carriage would be arrested, and its engagement with the forward end of the rod 69 would cause the shifting of the two rods 69 and 70 from the position indicated by the rock-lever 71 in Fig. 1 to that represented in Fig. 11, thus throwing the tappet-pins 73 backwardly and the tappet-pins 74 forwardly in engagement with the depending arms of the hubs 27 and 26 of the pawls 23 and 22 whereby the holding pawls would be retracted from their respective ratchet-wheels and the driving and pressure wheels would be permitted to rotate backwardly so as to enable the carriage to be drawn to the initial end of the conduit.

While the friction of the sleeves 78 upon their supporting rods 48 and that of the rods 69 and 70 in their bearings 68 will be found in most cases sufficient to prevent the return of the pawls 24 and 25 to operative relation with their respective ratchet-wheels, I have in Fig. 3 shown the bars 48 provided with notches 79 and the sleeves 78 provided with forwardly projecting spring blades 80 having downturned lips 81 adapted to snap into such notches when the sleeves are slid backwardly upon the rods 48, thus locking them positively in operative engagement with the rod 69.

The device is usually constructed of such dimensions that its parts may be all assembled before introduction into the manhole at one end of the conduit. Where necessary, however, in case the manhole is under normal size, the thrust-rods 46 may be temporarily detached and the same, with the connected parts, introduced into the conduit, after which the body of the carriage may be attached by means of the clamp-screws 47 and the end of the wire *w* fastened within the clamp 66.

The carriage having been pushed into the

initial end of the conduit as far as convenient, so as to bring all its bearing wheels into contact with the walls of the same, the wire with the attached rack-bar are drawn backwardly a considerable distance in opposition to the spring 57 during which operation the engagement of the holding pawls 24 and 25 with their respective ratchet-wheels serves to prevent the backward movement of the carriage, while the sprocket-wheels 31 carrying with them the ratchet-wheels 35 without resistance by the pawls 38 rotate idly with the rack-bar. Upon the release of the wire *w*, the rack-bar acts under the influence of the spring 57 to regain its initial position, and consequently rotates the sprocket-wheels 31 forwardly, when the ratchet-wheels 35 are coupled to the driving-wheels and thus impart a forward impulse to the same commensurate with the strength of the spring 57. Owing to the nature of the clutch connections of the driving and pressure wheels with the actuating and holding devices, it will be seen that, not only will the carriage be moved through the conduit a distance corresponding with the traverse of the rack-bar in setting the propelling spring, but by the momentum of the carriage the traverse of the latter will considerably exceed such distance, depending upon the strength of the propelling spring.

In order to insure against the rubbing of the carriage frame against the side walls of the conduit, the shouldered studs 47 are provided with bearing portions to receive the laterally projecting steadying rollers 82 which are in practice of such a size as to afford only a slight clearance from the conduit side walls, thereby maintaining the forward portion of the body of the carriage out of contact with the conduit. As these rollers are disposed near the thrust-plate 77, they prevent the accidental engagement of the latter with the side walls of the conduit, which would effect the premature shifting of the detent-pawl tripping-rods 69 which would raise the pawls 24 and 25 and thereby render the propelling mechanism, when actuated by means of the wire *w*, ineffective. The steadying rollers 82 therefore cooperate with the thrust-plate 77 in enabling the latter to perform its normal function only when a material obstruction is encountered in the conduit which would otherwise cause the apparatus to become jammed.

While I have shown herein what I consider a preferable embodiment of the present improvement, it is to be understood that the same is not limited to the construction and arrangement of parts herein shown and described, the present invention involving constructive features which embody principles of operation which form essential elements of a commercially operative mechanism.

Having thus set forth the nature of my invention what I claim herein is,—

1. A conduit threading device comprising a carriage with suitable bearing wheels, constantly acting means for yieldingly maintaining said wheels in driving relation with the conduit walls, and means adapted to be mechanically energized from a source of power distant from the carriage for turning the wheels to propel the carriage.

2. A conduit threading device comprising a carriage with suitable bearing wheels, a reciprocating actuator, connections between said actuator and the bearing wheels whereby the latter receive a turning movement for each movement of the actuator in one direction only, and means for operating said actuator.

3. A conduit threading device comprising a carriage with oppositely projecting bearing wheels, constantly acting means for yieldingly maintaining said wheels in driving relation with the conduit walls, a to-and-fro moving actuator connected with the wire or cord to be threaded, and connections, including one-way acting clutches, intermediate said actuator and a bearing wheel, whereby the propulsion of the carriage is effected.

4. A conduit threading device comprising a carriage with oppositely projecting bearing wheels, constantly acting means for yieldingly maintaining said wheels in driving relation with the conduit walls, a rectilinearly reciprocating actuator connected with the wire or cord to be threaded, and connections, including one-way acting clutches, intermediate said actuator and a bearing wheel or wheels whereby the propulsion of the carriage is effected.

5. A conduit threading device comprising a carriage with oppositely projecting bearing wheels, constantly acting means for yieldingly maintaining said wheels in driving relation with the conduit walls, a rectilinearly reciprocating actuator connected with the wire or cord to be threaded, connections, including one-way acting clutches, intermediate said actuator and a bearing wheel or wheels whereby the propulsion of the carriage is effected, and means independent of said actuator for preventing retrograde movement of said carriage.

6. A conduit threading device comprising a carriage with oppositely projecting bearing wheels, constantly acting means for yieldingly maintaining said wheels in driving relation with the conduit walls, a rectilinearly reciprocating actuator connected with the wire or cord to be threaded, connections, including one-way acting clutches, intermediate said actuator and a bearing wheel or wheels whereby the propulsion of the carriage is effected, and means for locking the bearing wheels thus driven from retrograde movement.

7. A conduit threading device comprising a carriage with a plurality of driving and pressure wheels projecting respectively from opposite sides, constantly acting means for forcing such driving and pressure wheels apart and yieldingly maintaining them respectively in driving relation with the opposite walls of the conduit, means operatively connected with said driving wheels for turning them in one direction, and detaining means applied to both driving and pressure wheels for preventing the retrograde movement of said carriage.

8. A conduit threading device comprising a carriage with a plurality of driving and pressure wheels projecting respectively from opposite sides, constantly acting means for forcing such driving and pressure wheels apart and yieldingly maintaining them respectively in driving relation with the opposite walls of the conduit, sprocket-wheels mounted concentrically with but independently movable in respect of said driving wheels, one-way acting clutches intermediate said driving wheels and their respective sprocket-wheels whereby they are operatively connected together, a reciprocating rack-bar meshing with said sprocket-wheels, and means for preventing the retrograde movement of said carriage.

9. A conduit threading device comprising a carriage with a plurality of driving and pressure wheels projecting respectively from opposite sides, axles upon which said driving wheels are fixed, constantly acting means for yieldingly maintaining said driving and pressure wheels respectively in driving relation with the opposite walls of the conduit, sprocket-wheels loosely mounted upon the driving wheel axles, ratchet wheels attached to and rotating with said sprocket-wheels, a spring-pressed pawl carried by a driving wheel upon each said axle and adapted to engage its respective ratchet-wheel, a reciprocating rack-bar meshing with said sprocket-wheels, and means for preventing the retrograde movement of said carriage.

10. A conduit threading device comprising a carriage with a plurality of driving and pressure wheels projecting respectively from opposite sides, axles upon which said driving and pressure wheels are respectively fixed, constantly acting means for yieldingly maintaining said driving and pressure wheels respectively in driving relation with the opposite-walls of the conduit, sprocket-wheels loosely mounted upon the driving wheel axles, ratchet-wheels attached to and rotating with said sprocket-wheels, a spring-pressed pawl carried by a driving wheel upon each said axle and adapted to engage its respective ratchet-wheel, a reciprocating rack-bar meshing with said sprocket-wheels, detent ratchet-wheels connected with and rotated by said driving and pressure wheels,

and detent pawls mounted upon fixed pivoted supports upon said carriage and engaging said detent-ratchet wheels.

11. A conduit threading device comprising a carriage, means for advancing the same through the conduit, detaining means for preventing the retrograde movement of said carriage, and means adapted to be tripped into action by encounter of an obstruction in the conduit for rendering said detaining means inoperative.

12. A conduit threading device comprising a carriage with oppositely projecting bearing wheels, constantly acting means for yieldingly maintaining rolling contact relation between said bearing wheels and the walls of said conduit, means for propelling said carriage through the conduit, a detent ratchet-wheel or wheels connected with one or more of said bearing wheels, a pawl or pawls mounted upon a fixed pivotal support upon said carriage and normally in engagement with said detent ratchet-wheel or wheels, and means adapted to be tripped into action by encounter of an obstruction in the conduit for lifting said pawl or pawls from the respective ratchet-wheel or wheels.

13. A conduit threading device comprising a carriage with a series of bearing wheels projecting alternately from opposite sides, constantly acting means for yieldingly maintaining rolling contact relation between said bearing wheels and the conduit walls, means for propelling said carriage through the conduit, a detent ratchet-wheel or wheels connected with one or more of said bearing wheels, a pawl or pawls having the hub mounted upon a fixed pivotal support upon said carriage and normally maintained in engagement with said detent ratchet-wheel or wheels, a laterally projecting tappet finger upon the hub of each said pawl or pawls, and a reciprocating rod actuated by encounter of an obstruction in the conduit and provided with means for engaging said tappet finger to raise said pawl from its respective ratchet-wheel.

14. A conduit threading device comprising a carriage with a series of bearing wheels projecting alternately from opposite sides, constantly acting means for yieldingly maintaining rolling contact relation between said bearing wheels and the conduit walls, means for propelling said carriage through the conduit, detent ratchet-wheels rigidly connected with each of said bearing wheels, oppositely disposed pawls having their hubs mounted upon common pivotal studs intermediate each pair of oppositely projecting bearing wheels, laterally projecting tappet fingers upon the hubs of said pawls, oppositely moving reciprocating rods having lateral pins each adapted to engage a tappet finger of its respective series of similarly disposed pawls, a rocking connection between said rods for

communicating the movements of one to the other in the reverse direction, and means actuated by engagement with an obstruction to the moving carriage for shifting said rods to simultaneously raise the said pawls.

15. A conduit threading device comprising a carriage with a series of bearing wheels projecting alternately from opposite sides, constantly acting means for yieldingly maintaining rolling contact relation between said bearing wheels and the conduit walls, means for propelling said carriage through the conduit, a detent ratchet-wheel rigidly connected with each of said bearing wheels, oppositely disposed pawls having their hubs mounted upon common pivotal studs intermediate each pair of oppositely projecting bearing wheels, laterally projecting tappet fingers upon the hubs of said pawls, oppositely moving reciprocating rods having lateral pins each adapted to engage a tappet finger of its respective series of similarly disposed pawls, a rocking connection between said rods for communicating the movements of one to the other in the reverse direction, means actuated by engagement with an obstruction to the moving carriage for shifting said rods to simultaneously raise the said pawls, and means whereby said rods may be locked in operative engagement with said tappet fingers to maintain said pawls raised.

16. A conduit threading device comprising a carriage with means including a reciprocating actuating member for propelling the same through the conduit, and a brush carried by said reciprocating member and maintained in operative relation with the bottom of said conduit.

17. A conduit threading device comprising a carriage with bearing wheels yieldingly maintained in rolling contact with the opposite walls of the conduit, sprocket-wheels concentrically and loosely mounted in respect of certain of said bearing wheels, one-way acting clutches intermediate said sprocket-wheels and their respective bearing wheels, a reciprocating rack-bar meshing with said sprocket-wheels, and a brush carried by said rack-bar in advance of said bearing wheels and maintained in operative relation with the bottom of said conduit.

18. A conduit threading device comprising a carriage with means including a reciprocating actuating member for propelling the same through the conduit, a brush carried by said reciprocating member in operative relation with the bottom of said conduit, and a scraper mounted in advance of said brush upon a rigid part of said carriage and also maintained in operative relation with the bottom of said carriage.

19. A conduit threading device comprising a carriage with oppositely projecting driving and bearing wheels maintained in yielding rolling contact relation with the

walls of the conduit, sprocket-wheels concentrically and independently movable in respect of said bearing wheels, one-way acting clutches intermediate said sprocket-wheels and their respective bearing wheels, a rack-bar meshing with said sprocket-wheels, a pair of thrust-rods projecting forwardly from the body of the carriage, a block to which the forward ends of said thrust rods are secured, a power storage spring intermediate said block and one end of the rack-bar, and means provided at the opposite end of the rack-bar for attachment of the cord or wire to be threaded.

20. A conduit threading device comprising a carriage with oppositely projecting driving and bearing wheels maintained in yielding rolling contact relation with the walls of the conduit, sprocket-wheels concentrically and independently movable in respect of said bearing wheels, one-way acting clutches intermediate said sprocket-wheels and their respective bearing wheels, a rack-bar meshing with said sprocket-wheels, a pair of thrust-rods projecting forwardly from the body of the carriage, a block to which the forward ends of said thrust-rods are adjustably secured, a power storage spring intermediate said block and one end of the rack-bar, and means provided at the opposite end of the rack-bar for attachment of the cord or wire to be threaded.

21. A conduit threading device comprising a carriage with oppositely projecting driving and bearing wheels maintained in yielding rolling contact relation with the walls of the conduit, sprocket-wheels concentrically and independently movable in respect of said bearing wheels, one-way acting clutches intermediate said sprocket-wheels and their respective bearing wheels, a rack-bar meshing with said sprocket-wheels, a pair of thrust-rods projecting forwardly from the body of the carriage with transverse notches disposed in alinement, a block provided with apertures entered by said rods and a transverse hole intersecting the same, a locking pin or rod inserted in said transverse hole in the block and passing through one of the transverse notches in each of said thrust-rods to lock the latter in the block, a power storage spring intermediate said block and one end of the rack-bar, and means provided at the opposite end of the rack-bar for attachment of the cord or wire to be threaded.

22. A conduit threading device comprising a carriage with oppositely projecting driving and bearing wheels maintained in yielding rolling contact relation with the walls of the conduit, sprocket-wheels concentrically and independently movable in respect of said bearing wheels, one-way acting clutches intermediate said sprocket-wheels and their respective bearing wheels, a rack-bar meshing with said sprocket-wheels, a pair of

thrust-rods projecting forwardly from the body of the carriage with transverse notches disposed in alinement, a block forked or recessed at its forward end and provided with apertures entered by said rods and a transverse hole intersecting the same, a locking pin or rod inserted in said transverse hole in the block and passing through one of the transverse notches in each of said thrust-rods to lock the latter in the block, a guide-roller mounted upon said locking pin or rod within the forked or recessed end of said block, a power storage spring intermediate said block and one end of the rack-bar, and means provided at the opposite end of the rack-bar for attachment of the cord or wire to be threaded.

23. A conduit threading device comprising a carriage frame with means including a longitudinally reciprocating actuating member for propelling the same through the conduit, a thrust-rod or -rods detachably secured to said carriage frame and projecting in advance of the same, a power storage spring connected at the forward end with said thrust-rod or -rods and at the opposite end with said reciprocating actuating member, means provided at the rear end of said actuating member for attachment of the cord or wire to be threaded, and means for preventing the retrograde movement of the carriage.

24. A conduit threading device comprising a carriage frame with means including a longitudinally reciprocating actuating member for propelling the same through the conduit, a thrust-rod or -rods detachably secured to and having a horizontal pivotal connection with said carriage frame and projecting in advance of the same, a forked or recessed block to which the forward ends of said thrust-rod or -rods is or are secured, a bearing wheel journaled within the fork or recess in said block, a power storage spring connected at the forward end with said block and at the opposite end with said reciprocating actuating member, means provided at the rear end of said actuating member for attachment of the cord or wire to be threaded, and means for preventing the retrograde movement of the carriage.

25. A conduit threading device comprising a carriage having a series of bearing wheels maintained continuously in yielding contact relation with the upper and lower walls of the conduit, means for propelling said carriage, detent means for preventing the retrograde movement of said carriage, means, including a longitudinally movable thrust-plate substantially conforming in shape and dimensions with the conduit for engaging obstructions in the conduit and thereby rendering inoperative said detent means, and laterally projecting steady rollers mounted upon said carriage adjacent

said thrust-plate and adapted to maintain the edges of the same normally spaced from the conduit side walls.

26. A conduit threading device comprising
5 a carriage with suitable bearing wheels, a reciprocatory actuator, connections between said actuator and the bearing wheels whereby the latter receive a turning movement for each movement of the actuator in one di-
10 rection only, and fastening means carried by said actuator to receive an end of the wire or

cord to be threaded and to retain the same under intermittent pulls thereon whereby mechanical power is communicated to said actuator for propulsion of the carriage.

15

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

ALBERT H. DE VOE.

Witnesses:

HENRY J. MILLER,

HENRY A. KORNEMANN.