3 Sheets--Sheet 1.

B. F. COVEL, R. L. CHACE & J. M. WEAVER.

Extensible Fire Ladder.

Patented May 25, 1875.

No. 163,580.

FIG. I.

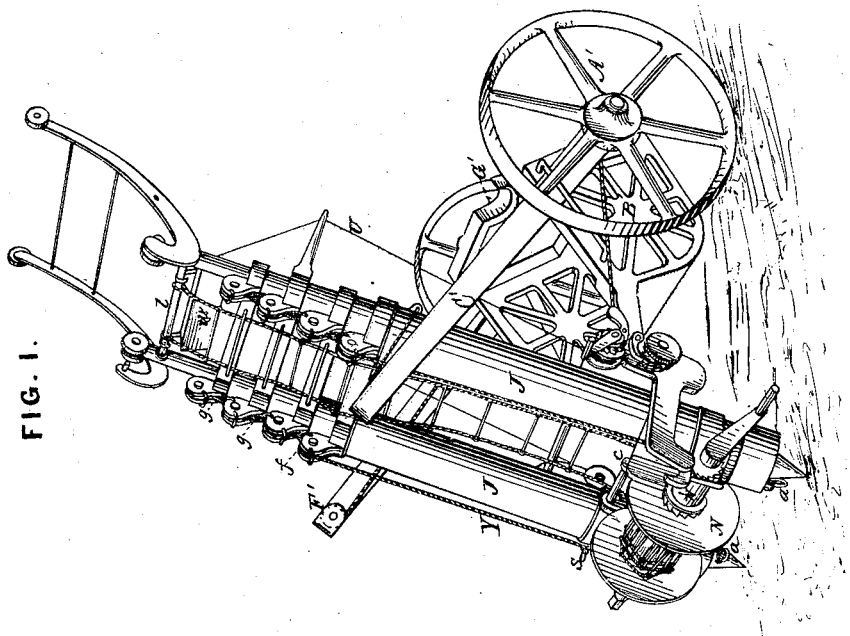

FIG. II.

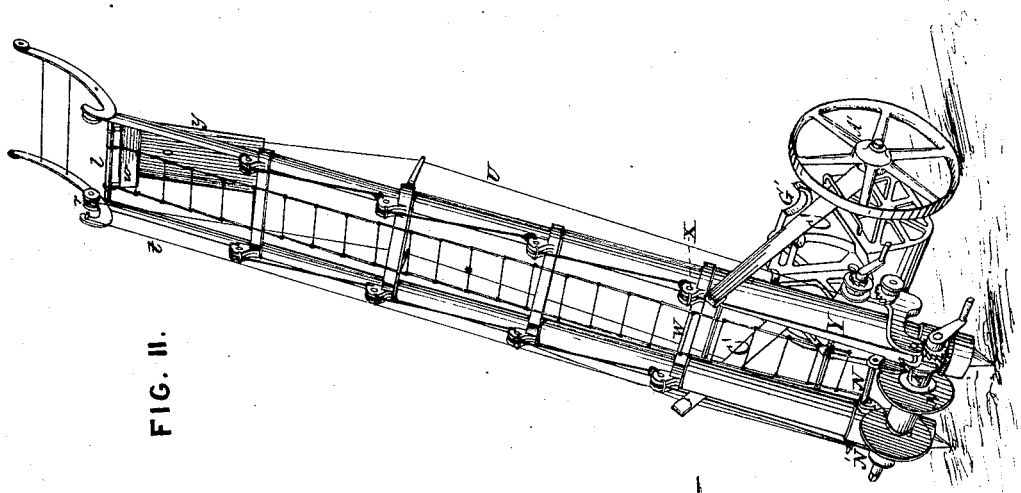

FIG. VI.

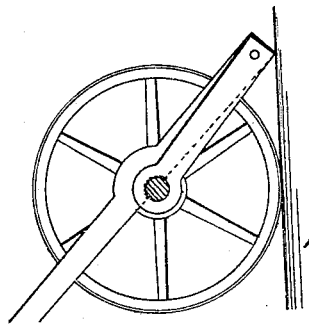

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FIG. III.

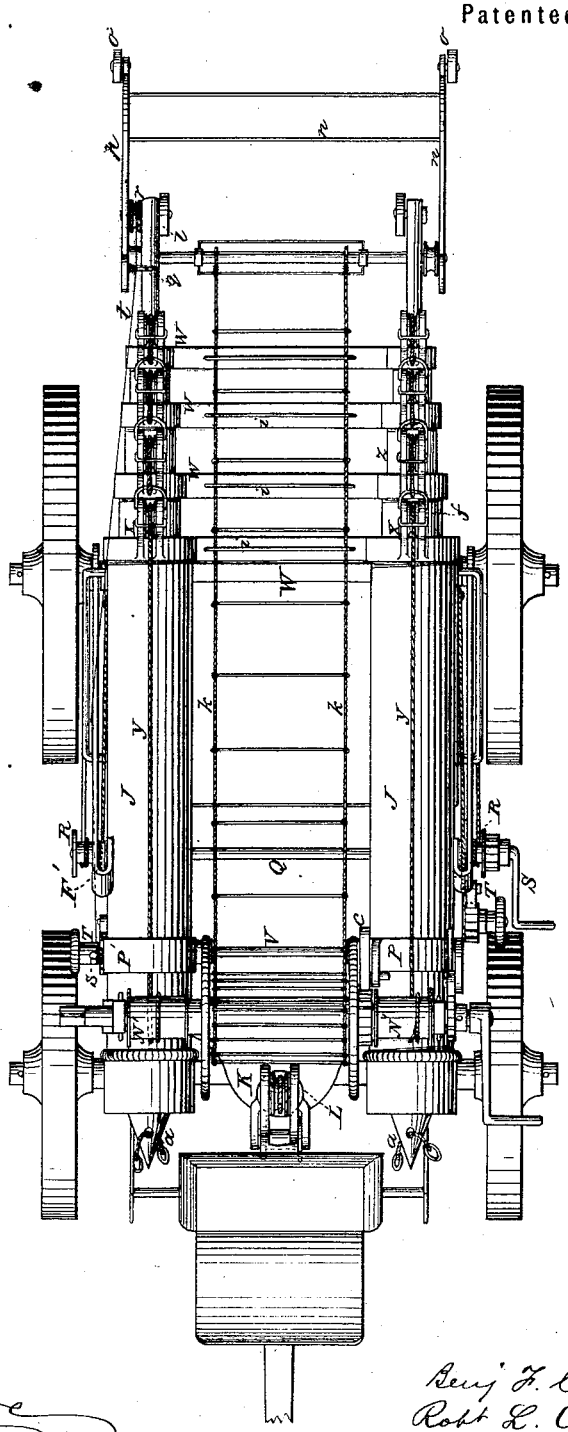
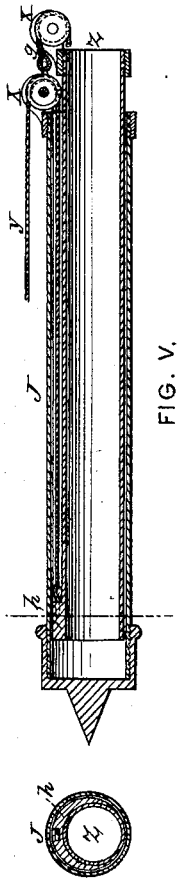


FIG. V.



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3 Sheets--Sheet 3.

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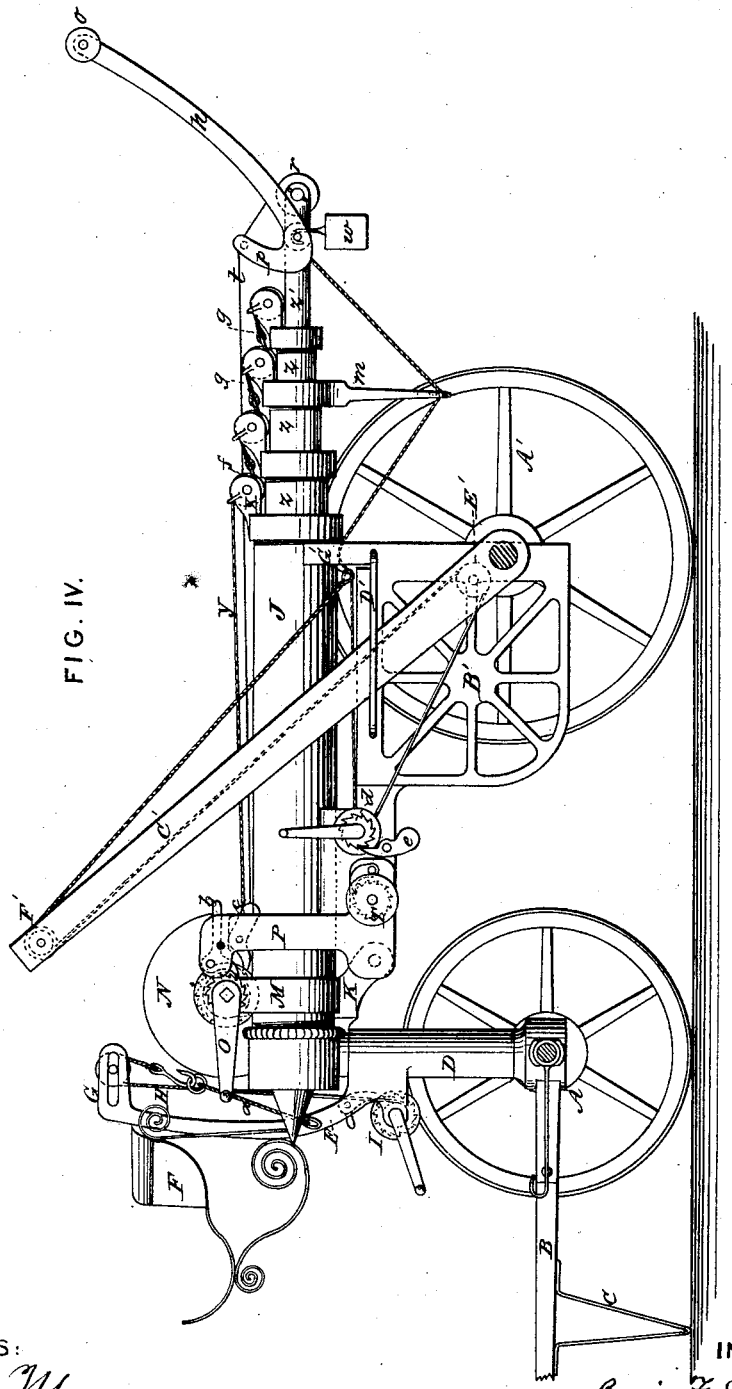

FIG. IV.

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UNITED STATES PATENT OFFICE.

BENJAMIN F. COVEL, ROBERT L. CHACE, AND J. MYRON WEAVER, OF FALL RIVER, MASSACHUSETTS.

IMPROVEMENT IN EXTENSIBLE FIRE-LADDERS.

Specification forming part of Letters Patent No. **163,580**, dated May 25, 1875; application filed December 29, 1874.

To all whom it may concern:

Be it known that we, BENJ. F. COVEL, ROBT. L. CHACE, and J. MYRON WEAVER, of Fall River, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Truck-Ladders; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings making a part of this application.

Our invention relates to a novel construction of truck-ladders, adapted for use more especially at fires. It has for its objects the speedy and successful elevation of a wire or other flexible ladder directly from the truck employed for transporting the same; and to provide devices for successfully adjusting the latter to different inclinations, vertically and horizontally, and providing an adjustable shield for the protection of the fireman directing the hose from the heat, and in other respects rendering a truck-ladder complete and effective, as will be hereinafter more fully explained.

To enable others skilled to more readily understand our invention, we will describe its construction and operation, referring by letters to the accompanying drawings, in which—

Figure 1 is a perspective view of our apparatus, with the forward wheels removed, and ready to be elevated. Fig. 2 is a similar view, with the elevation completed and the latter in position for use. Fig. 3 is a top view of the apparatus "limbered up" and ready for transportation when the horses are attached. Fig. 4 is a side elevation, and Fig. 5 is a detail longitudinal and transverse section of the telescopic side pieces of the elevating-frame.

Similar letters indicate like parts in the several figures.

A is the forward axle, to which is secured an ordinary tongue, B, with a "prop," C, to sustain it in a horizontal position when the horses are released. D is a vertical pillar, mounted upon the axle A, and provided with a suitable hole to receive a king coupling-pin, by which the rear portion of the truck is secured. The pillar D is so attached to the axle as to have a horizontal bearing-surface thereon, and permitting the axle to freely turn thereunder. E is an extension of the pillar D, to which is secured the driver's seat F, and extended rearward, so as to form a slotted bearing, G, for a pulley, over which runs an elevating-rope, H, one end of which is secured to a drum or windlass, I, secured in suitable bearings on the pillar D, and provided with an ordinary crank and ratchet and pawl. The other end of the rope H terminates with a suitable hook for securing it to rings in the ends of two ropes, *a a*, secured to the bottom ends of the elevating-frame, and by this means, and with the windlass I, the forward and bottom end of the truck may be lifted off the pillar D, and lowered to the ground, and, when desired, may be again lifted to position by engaging the hook and rings, as before described. J J are the two lower or main portions of the elevating-frame, secured in parallel position by a suitable cross-frame, K, extending centrally toward the forward portion of the truck, and through which the king-bolt L passes into the pillar D, and thus unites the two parts of the truck. The bands M of the frame K embrace the elevating-frame J J, and extend slightly upward, forming bearings for the shaft of the ladder-drum N and rope-spools N′. O is the crank by which the spools N′ are rotated for driving up the side frames. P is a frame, cast with or secured to one of the frames J, and, extending upward, forms a bearing for a dog or pawl, *b*, which engages with the ratchet on the spool-shaft and holds it fast, thus securing the side frames against collapsing. The ladder-drum N has a hollow shaft, through which the spool-shaft passes, and upon which the drum rotates, the ends or disks of the drum being milled or provided with suitable handholds for readily rotating it to wind up the latter as the side frames are lowered and collapsed. The drum N is held by a ratchet on its shaft, and a pawl, *c*, on the casting P. A similar casting, P′, is made with or secured to the other portion J of the side frames, and projecting downwardly, corresponding with P, as seen clearly in Fig. 4, forms bearings for a shaft, Q, provided on each end with a drum, R, and on one or both ends with a crank, S, ratchet *d*, and weighted pawl *e*, (see Figs. 3 and 4,) for the purposes presently explained.

Bearings are also formed for two other ratcheted drums, T T, around which are coiled, and by which, at the proper time, are tightened, the brace-ropes U, as will be presently explained. The castings P P′ are secured together by a tie-rod, V, (which may also rotate and guide the ladder,) which, with the frame K, securely maintains the elevating-frames J J in proper relation at their base ends, and they are secured in the same relation at their top ends by a connection, W, embracing the ends thereof. Cast with the brace W is a bifurcated bearing, X, in which is mounted or journaled friction and lifting pulleys *f*, over which pass the ropes Y that lift the succeeding telescopic portions of the side frames when the spools N′ are rotated. Z Z, &c., are a series of side frames, moving one within another in an obvious manner, and secured at their top ends by similar braces, as brace W of the side frames J, and each also provided with pulleys similar to *f*, and journaled in the same way, ropes *g* extending from the top of each pulley, bearing over the pulleys down between the tubes or frames J Z, and secured to an eye in an eccentric filling or guide band, *h*, as clearly seen in Fig. 5. The object of this eccentric is to keep the sliding frames in the proper relation to each other, and afford space between them for the passage of the lifting-ropes. The pulleys *f*, bearing slightly against the succeeding tubes, maintain the proper relations at the top ends. Each of the connecting-braces is provided with a guide-rod or broad staple, *i*, through which the wire or other elastic or flexible ladder *k* runs. The final or smallest pair of side pieces Z′ are secured together at their top ends by a rod, *l*, to which is fastened the top end of the ladder *k*, and to which is also secured the end of the brace-ropes U, which pass through eyes in a boom, *m*, cast with or secured to one of the intermediate cross-pieces W, and then around the drums T T, with which they are tightened, as before described, forming in this way a perfect truss for the ladder-frame when elevated. Mounted upon the ends of the connecting-rod *l* is a suitable frame, *n*, adapted to vibrate upon the rod *l*, and having suitable frictional wheels *o* at its extremity. This frame *n* is turned up at *p*, so as to form a lever, at the top end of which is a hole or a pin, *q*, to which is secured a rope, *t*, which passes in one direction over a pulley, *r*, down parallel with the other end to a cleat, *s*. It will thus be seen that, by pulling upon one or the other ends of the rope *t*, the frame or working platform *n* may be from the ground thrown into the positions seen in the drawing, and secured by tying the rope *t* around the cleat *s*. *v v* are rollers similar to the rollers *o o*. The connecting-rod may also serve to sustain a hanging box, *w*, in which any necessary tools may be kept.

We have also shown a shield, *y*, secured by hooks to this rod to protect the firemen from the heat. We contemplate securing this shield to a halliard running over a pulley at the top of the frame, so that it may be raised and lowered to any point. We have omitted this in the drawing simply to avoid any confusion of ropes and lines. We have shown the shield as perforated with a hole for the passage of the nozzle of the hose, which may be lifted up by the said shield, or the shield may have permanently affixed thereto a nozzle, and the hose coupled thereto when desirable.

A′ is the axle of the rear portion of the truck, to which is hung a cage-like box, B′, for carrying any necessary or desirable tools, or in which operatives may be seated. This box B′ at its top surface is V-shaped, and slightly rounded at its point, in which there is a horizontal or longitudinal hole or recess, through which passes a round connecting-bolt, T-shaped, and journaled at its T-head to lugs or ears on the under side of the casting K. A suitable securing pin or bolt passing through the protruding end of the connecting-bolt safely secures in an adjustable manner the box B′ to the said casting K, thus allowing the hind wheels and axle to adjust to any unevenness of the surface over which they may pass, or upon which they may rest when the ladder is being elevated. C′ C′ are derricks or braces, secured to the rear axle A, as shown in Figs. 1, 2, 3, 4, 5, or they may extend below and beyond the axle, and anchored thereto, as shown at Fig. 6, which needs no special description, the construction and operation being obvious. In the necessary movement of these derrick-arms they are retained in their proper parallel relation to the sides of the box B′ by stationary loop guide-rods D′. Journaled to these derrick-arms, just above the axle A′, are pulleys E′, and at the top ends are two other pulleys, F′, secured as clearly seen at Figs. 1, 2, and 3. A lifting-rope, G′, is made fast to the top end of the elevating-frames J on the under side, and passing up and over the pulleys F′, then down and around the pulleys E′, is carried slightly upward, and firmly secured to the drums R. The box B′, as clearly seen at Figs. 1, 2, and 4, extends upwardly at its rear side, and is formed with curved recesses G′, into which the upper ends of the elevating-frame pieces J J snugly lie.

The operation is as follows: The apparatus having been conveyed by the draft power to the place where it is desired to elevate the ladder, the pawl of the ratchet-drum I is released, when a turn or two is given to the crank, which coils the rope H and lifts the frame K, with its king-bolt, off from the pillar D. The rope is then uncoiled, and the feet of the pieces J gradually descend to the ground. The rope H is now unhooked from the rings and the ropes *a a*, and the forward portion of the apparatus carried off. The feet of the latter, being pointed and adapted to be adjusted to the inequalities of the surface, are adjusted and the rear wheels chocked. The crank S is turned, which coils the ropes upon the drum R, the rope pulling over the pulleys E′ F′, lifting the top ends of the frames J J, and the derrick-arms automatically adjusting them-

selves. When the proper angle has been acquired all the ratchets, except those to the drums R, are released, and the crank O is turned, which coils the ropes Y upon the drums N′, and hauls up the first pair of the series of frames Z Z, they in turn hauling up the next succeeding pair, and so on until the elevating-frame, as a whole, is raised to the proper height when the pawls secure the drums N′. The flexible ladder *k* being fast at its upper end to the cross-rod *l* has been lifted up, its drum freely turning to permit it. The ladder is now stretched by turning the drum N in the reverse direction, and allowing the pawl *c* to drop into the ratchet to secure the same. The drums T T are also now turned in the reverse direction to that imparted to them by the elevation of the frame, and the stay or brace ropes U are coiled up and stretched through the eyes in the booms *m*, thus forming a perfect truss, and preventing any deflections of the frame. The platform-frame *n* may now be adjusted to any position through the medium of the rope *t*, and a fire-shield may be in an obvious manner raised to any given point, carrying with it the hose and nozzle.

Having described the construction and operation of our apparatus, what we claim as new, and desire to secure by Letters Patent, is—

1. In combination with the telescopic frames moved simultaneously, the flexible ladder and ladder-drum, whereby the ladder is raised with the frames and tightened at any altitude, substantially as hereinbefore set forth.

2. In combination with the forward end of the truck, the drum and ropes for lifting the frames off and onto the pillar of the front axle, substantially as hereinbefore set forth.

3. The box B′, secured to the casting K by a T-shaped bolt, whereby the rear portion of the truck is enabled to adapt itself to inequalities of surface, and whereby the telescopic frame may be raised to any required angle, substantially as hereinbefore set forth.

4. The combination of the rear truck, and derrick-arms pivoted thereto, with the coiling-ropes and drums, arranged as described, so that the coiling of the ropes will automatically elevate the derrick-arms to the proper altitude, and then the telescopic frames, substantially as hereinbefore set forth.

5. The derrick-arms C C′, pivoted to the axle of the rear truck, and adapted to be elevated and sustained in position without the aid of a prop, substantially as hereinbefore set forth.

6. The box B′, constructed as described, with the recesses G′, in which the ends of the frames J J rest when ready for transportation.

Witness our hands and seals this 23d day of December, 1874.

BENJ. F. COVEL. [L. S.]
ROBERT L. CHACE. [L. S.]
J. MYRON WEAVER. [L. S.]

In presence of—
GEORGE E. BAMFORD,
BENJAMIN EARL.

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