(No Model.) 4 Sheets—Sheet 1.

J. B. BRAY.

PORTABLE FIRE ESCAPE.

No. 342,820. Patented June 1, 1886.

Fig. 1.

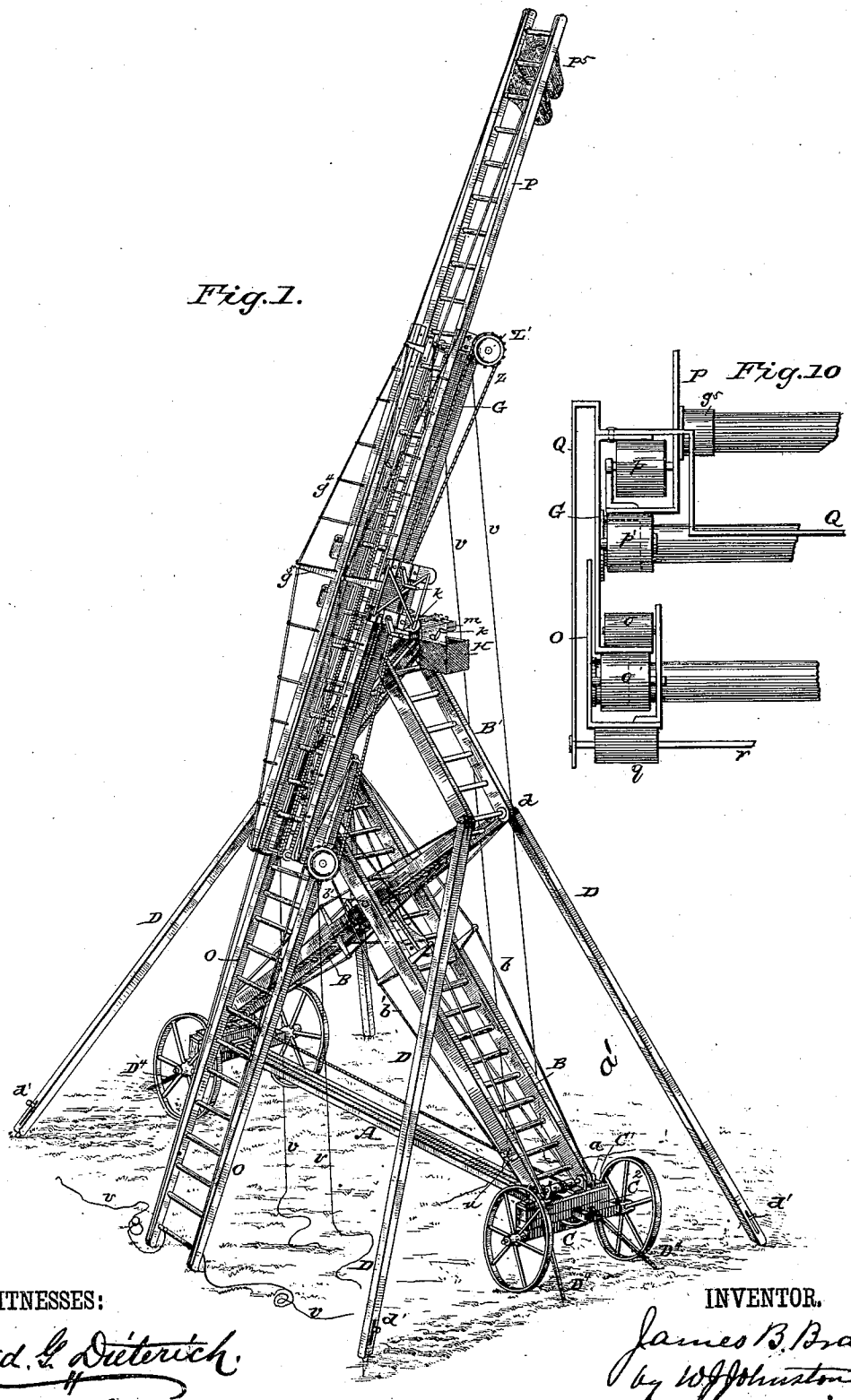


Fig. 10

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PORTABLE FIRE ESCAPE.

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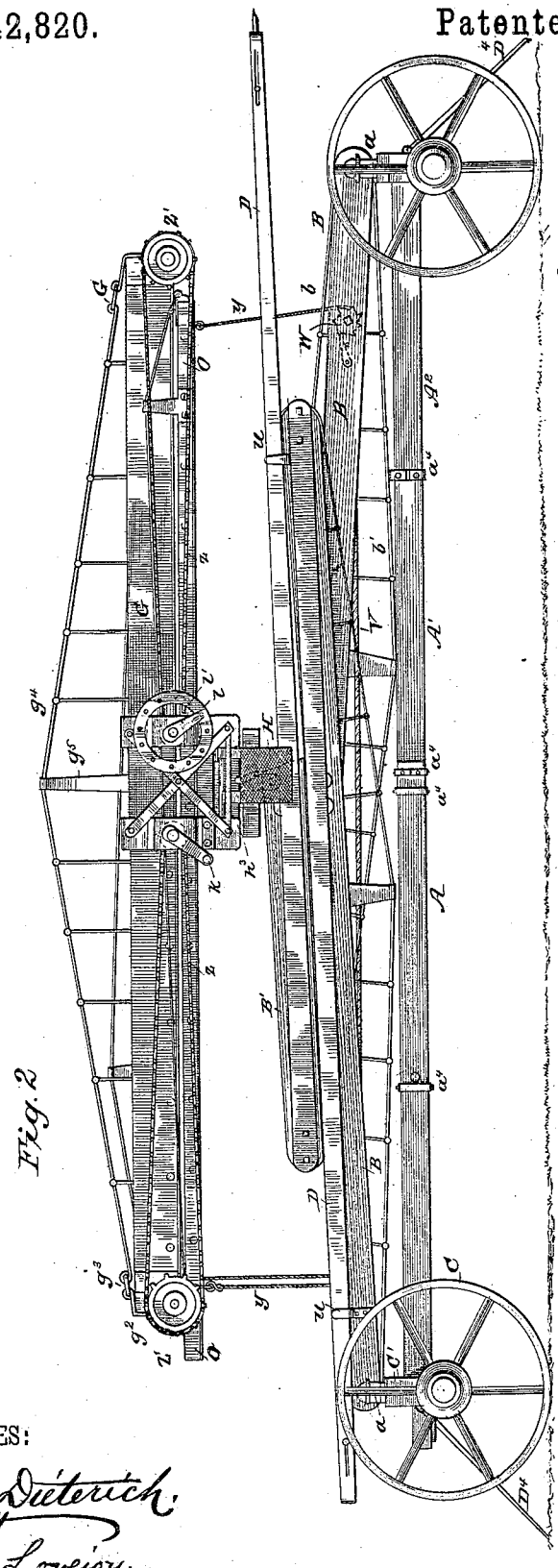


Fig. 2

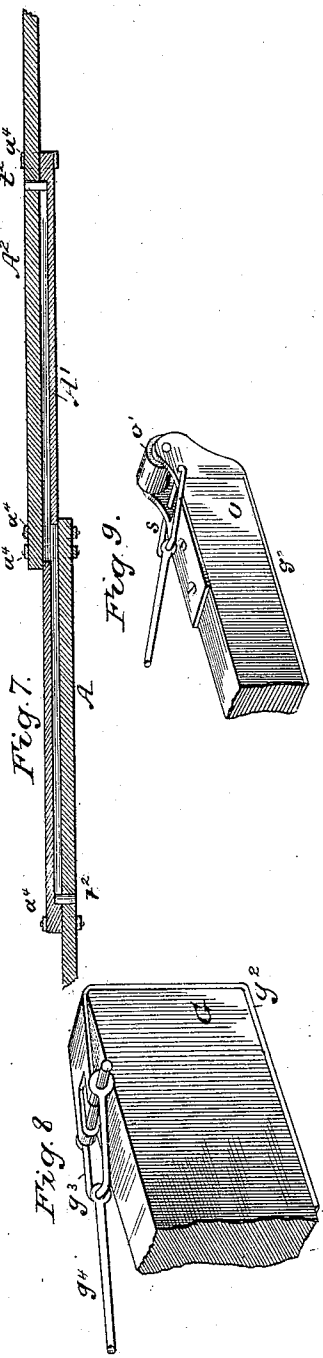


Fig. 7

Fig. 9.

Fig. 8

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PORTABLE FIRE ESCAPE.

No. 342,820. Patented June 1, 1886.

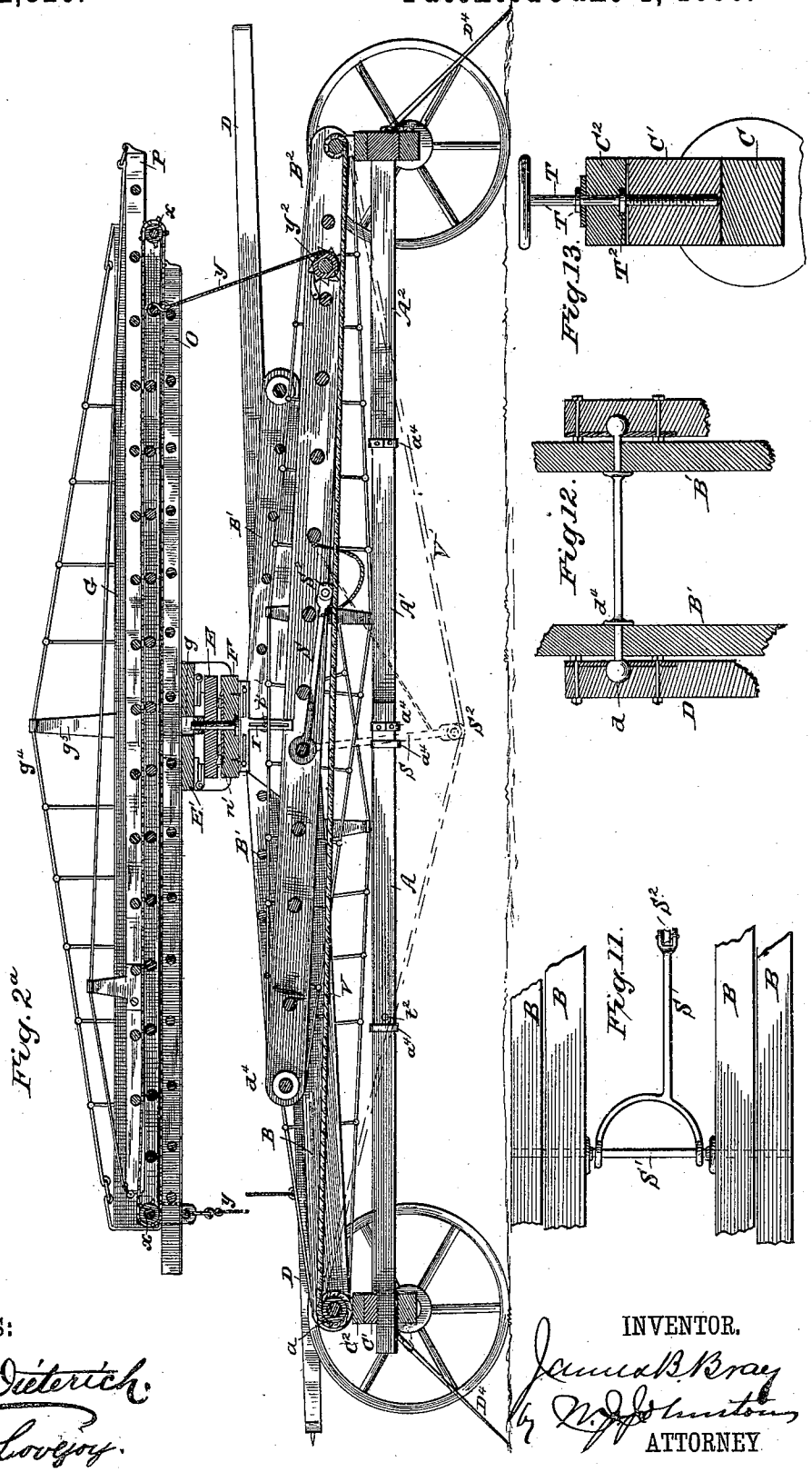


Fig. 2a

Fig. 13.

Fig. 12.

Fig. 11.

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(No Model.) 4 Sheets—Sheet 4.

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PORTABLE FIRE ESCAPE.

No. 342,820. Patented June 1, 1886.

Fig. 3.

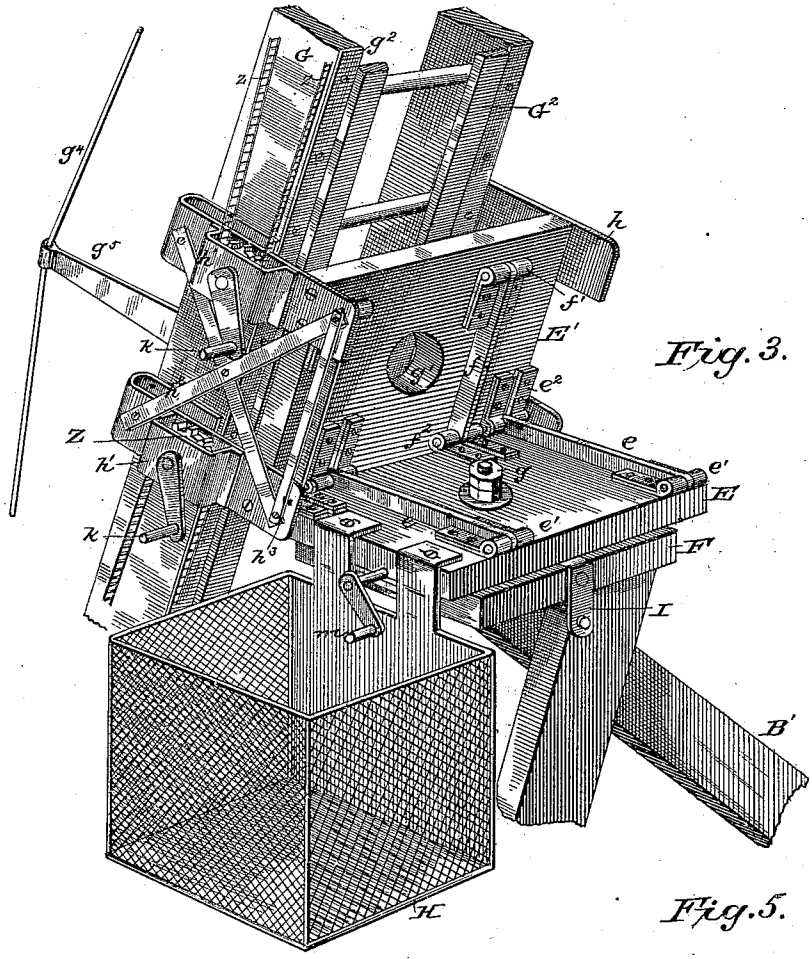


Fig. 5.

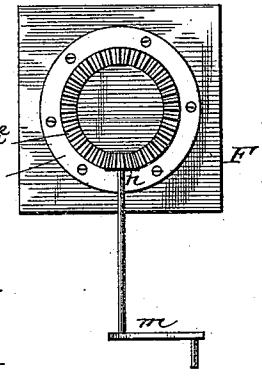


Fig. 6.

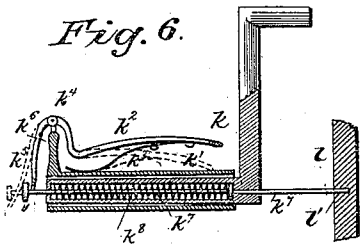
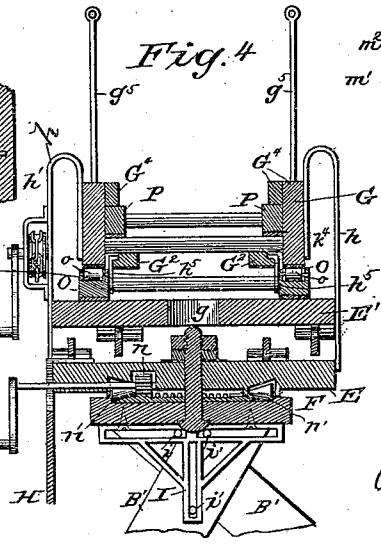


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES B. BRAY, OF WAVERLY, NEW YORK.

PORTABLE FIRE-ESCAPE.

SPECIFICATION forming part of Letters Patent No. 342,820, dated June 1, 1886.

Application filed June 27, 1885. Serial No. 169,982. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. BRAY, a citizen of the United States, residing at Waverly, in the county of Tioga and State of New York, have invented certain new and useful Improvements in Portable Fire-Escape Ladders, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to portable and adjustable fire-escape ladders; and it consists in certain details of construction and operation of the several parts, as will be hereinafter more fully set forth in the specification and pointed out in the accompanying drawings, in which—

Figure 1 is a perspective view of my ladder when set up. Fig. 2 is a side elevation of same when folded for transportation. Fig. 2^a is a longitudinal vertical section of the ladder when folded for transportation; Fig. 3, a detail perspective view of the ladder-table; Fig. 4, a vertical section of same; Fig. 5, a plan view of the plate upon which the table is mounted and the means for turning the table; Fig. 6, a detail section of the locking attachment secured to the cranks of the center sprocket-wheels; Fig. 7, a longitudinal section of the truck-reach; Fig. 8, a detail perspective view of the device which secures the truss-braces to the end of the central ladder section; Fig. 9, a detail view of the end of the sliding ladder-sections; Fig. 10, an end view of the ladder-sections, showing the friction-rollers for the several sections of the ladder; Fig. 11, a detail plan view of the guard and lever for retaining the hoisting-rope in position while the ladder is being hoisted; Fig. 12, a vertical section of the coupling device for the main supporting frame, and Fig. 13 a vertical section of the adjusting means for the truck-bolsters.

The coupling or reach consists of three pieces united by bands a^4.

Each interior section is slotted on its interior side to receive a pin, t^2, one of which is located on the inner side of each exterior section, and which form guides and stops for the sections when moving, as shown in Fig. 7.

The main or lifting body of the ladder-frames B is supported on the bolsters of the truck, and each ladder-frame B is pivoted to a bolster at its outer end. They are also pivotally secured together near the center, so that they may fold down on each other, as shown in Figs. 2 and 2^a. These ladder-frames are provided with trussed strengthening-rods *b b'* above and below. The upper ends of these supporting ladder-frames have pivoted to them similar auxiliary frames, B', by bolts *d*, which pass through the ends of the frames B B' and terminate in a ball which fits in sockets provided in the ends of swinging supports D, to form a ball-and-socket joint, so as to allow a universal movement or adjustment of said swinging supports. The frames B' are pivotally united near their inner ends by a bolt, and secured to bolts *i'* by suitable clamps, I, is a bed-plate, F, which supports a table upon which the extension-ladder sections are mounted. Clamp I may be so modified as to use only one sliding way in each clamp, the perpendicular slot and braces being dispensed with. The upper part of clamp I, being fastened to table F, is then secured to the inner timbers of frame B' by a bolt which slides in the clamp or sliding way, and the outer timbers of frame B' are secured to bed-plate F by strap and bolts, as shown at I in Fig. 3. This bed-plate has a table, E, pivotally secured to it, and the table has a leaf, E', united by double hinges, consisting of two sets of arms of equal or unequal lengths, and constructed as follows: At one side of table E are secured two long or short eye-pieces, *e'*, located side by side and near together, having the eyes at the outer end, and between these pieces are pivoted, by a bolt passing through the eyes, long central arms extending across to the opposite side of the table, where their opposite ends terminate in eyes, and are pivoted between two corresponding long or short eye-pieces, e^2, secured to the under side of the leaf E'. On the lower side of the leaf E' are similar hinges, composed of the eye-pieces *f'*, and the long central arm, *f*, extending across the leaf from the opposite direction to similar eye-pieces, f^2, on the upper side of the table E, between which its end is pivoted. The table is secured to the plate F by a central bolt, *g*, which permits it to revolve around said bolt as a pivot. An opening, *g'*, in the upper leaf corresponds to the position of the bolt and permits the leaves to be folded together. On the top of the plate F is a turn-table, *m'*, provided with

a beveled gear-track, m^2, in which meshes a beveled pinion, n, operated by a crank, m. The under side of the table E is cut away, so that friction-rollers n' can be journaled therein and travel upon the beveled edge of the turn-table. This turn-table permits the table and the ladders mounted thereon to be rotated horizontally. By means of this turn-table the ladder may be made to describe a circle from the ground upward and sidewise. When the ladder is so placed that the center or main ladder end will just pass a building, it can then be moved laterally or vertically. If the street be narrow, only one sliding section need be extended, and yet still have the use of a full sweep or length of ladder. This would not be the case if the turn-table were placed low down or near the ground. The table should be placed at a point nearly one half the height of the ladder when extended up from the ground. Thus it will be seen that the ladder is not only centrally balanced, but it will admit of either end being raised without rotating the table. By reason of the table and leaf being hinged, as described, the ladders may be stood up perpendicularly, for they are thrown to one side of the lazy-tongs support. This could not be accomplished with any other kind of rocking pivot, which would not throw from the center to one side, as the pivot-center would have to be carried up so high that it would be impracticable to give ladders firm support without great weight of the several parts in order to obtain the required strength. By means of the leaf hinged so as to tip in either direction, as described, I am enabled to get the proper motion and throw of the ladders. The main ladder G being attached to leaf E', which in turn being attached to table E by the double set of hinges, allows the ladder to be placed nearer the turn-table or pivot center of bed-plate F than could be done did leaf E' not throw to one side of bed-plate F, and which allows the ladders to be placed in a strictly vertical position, and carries the balancing-point of the ladders low down or near the turn-table, and this is most important, as it then occupies but little space vertically. A basket or platform, H, is secured to the table E to hold the operator when turning the table or extending the ladders. An extension-ladder consisting of the sections G O P is mounted above leaf E' of the table and firmly secured thereto by means of metallic plates h, bolted to each side of the leaf E' and to the main section G of the ladder near its center. The plates h securing the ladder to the table are braced diagonally and laterally by the braces h^2 h^3. Flanged or U-shaped plates h' are secured to the outside or inside of the securing-plates h, and form bearings for sprocket-wheels Z, operated by crank-levers k. Similar sprocket-wheels, Z', are journaled at each end of the main section G, or all can be journaled at one end of main ladder G, and sprocket-chains z pass over these sprocket-wheels and the end sprocket-wheels, z', on each side. The sections O P of the ladder are movably secured to the main section G, and are extended or withdrawn by means of these chains. The upper movable section, P, is provided at its ends with friction-rollers p, and the lower movable section, O, is provided with a friction-wheel, o'. The movable sections turn on the friction-rollers o and p' of the rigid section G. The movable sections are forced outward or drawn back by means of the sprocket-wheels Z Z' through the intervention of the crank-arms and the sprocket-chains. The lower section, O, is provided at the back end with hooks or friction-rollers h^5, which slide or roll in grooves on the inside of a guide-bar, G^2, and is thereby supported. The rigid central section of the ladder is provided with trusses g^5 and truss-rods g^4, for the purpose of giving additional strength to the ladder. These truss-rods are secured to the steel plate g^2 on the under side of the central section by means of the clevis g^3, as shown in Fig. 8. The end of lower section, O, which is provided with a friction-roller, o', has its truss-rod secured to the end of said section by a clevis, s, as shown in Fig. 9.

When the ladder-sections are made of steel, they are supported as shown in Fig. 10. In this instance a steel supporting bar or plate, Q, extends across the ends of the ladder and has bolted to it the rigid section G. The lower ends have a bar, r, extending across the ladder, and journaled thereon are rollers q, upon which the section O moves. Lower movable section, O, has friction-rollers o' journaled therein. Rigid central section, G, has the friction-rollers o and p' journaled in it, and the upper movable section, P, has the friction-rollers p journaled in it, so that the movable sections can move in and out with friction reduced to a minimum. In the steel ladder wooden rounds are secured in sockets q^5 of the sections, as shown in Fig. 10.

In connection with the flange-plate h', I prefer to use the circular plate l, with the perforations l', as shown in Fig. 2. This circular plate, in connection with the holding device shown in Fig. 6, enables me to hold the sections extended in any desired position, as follows: On the hand-grasp of crank k is a collar, k', having a post, k^6, to the upper end, k^4, of which is pivoted a lever, k^2, having secured on its under side a bent spring, k^3, the free end of which is in frictional contact with the sleeve. The outer end, k^5, of said lever engages with a rod, k^7, which passes through the hand-grasp, and has encircled thereon a spiral spring, k^8. The inner end of this rod engages with the perforations in the ring l. In drawing out or in the sections, by means of the crank-arm, the lever k^2 is depressed, and this throws out the rod k^7 from engagement with the ring l. When the sections have reached any desired position, the lever k^2 is released from the grasp, and its spring k^3 tends to throw it up, and at the same time the spring k^8 tends, by its resiliency, to force the rod k^7 into the

openings in the ring *l*, and thus hold the ladders locked in position. The trucks C have secured to them the bolsters C' C², which can be adjusted for inequalities of the ground by means of the screw-bolt T, provided with the collars T' T². The lower part of the bolster C' is screw-threaded to receive the threaded end of the screw-bolt T. The upper portion, C², is not screw-threaded, and may be raised or lowered from the piece C' by simply screwing up or down the screw-bolts, which are placed on each end of the bolsters for this purpose.

I have provided a drawing or raising rope or chain, V, which is wound upon a drum or shaft or differential pulleys, *a'*, journaled in the bearings *a* on the bolster, and by means of which the frame B is raised. It will be noted that this frame is secured to and turns on the shafts on the bolsters.

In order to give a steady bearing and direct pull on the shaft when the latter is being raised, I have journaled a lever, S, at the intersection of the two parts B of the main frame. This lever or hoist at its lower end has a friction-roller for the cord or chain to run upon. When the ladder is raised, the hand-cords *v*, secured to the ends of the ladder sections and extending to the ground, permit the ladder to be drawn or moved, as required, by persons on the ground; or a tackle can be attached to one end of ladder G and secured to the truck to lift heavy loads at outer end of ladder P.

When the ladder is folded down upon the truck for transportation, as shown in Figs. 2 and 2ª, I have provided holding cords or chains *y*. At one end of the frame B one of the cords or chains is secured to a winding-shaft, W, and the other end is hooked to a round of the main ladder G. At the opposite end of the frame B are two cords or chains hooked into eyes, or otherwise fastened in frame B, and extending therefrom (crossing each other) to and hooking into eyes fastened to main ladder G. This prevents any tilting or turning of the upper sections and holds the entire ladder in a steady position for transportation.

Having described the detail of mechanical construction of the device, I will now proceed to describe its operation and general purpose. Suppose the ladder to be in its folded position, as shown in Figs. 2 and 2ª, and it is required to raise it for use. Two of the outer swinging supports, D, are detached from their rests *u*, and their free ends allowed to rest on the ground. The cords *y* are then detached, and the lever or hoist S is detached and allowed to hang vertically, and the raising chain or cord V is then placed beneath its roller. Then the rope or cord V is drawn taut by the winch or differential pulleys *a'*, thereby drawing the trucks toward each other, and at the same time causing the frame B to rise upward, hoisting the ladder to the required position. The swinging supports are then spread out, so as to brace the device, and in order to prevent them from slipping the points *d'* are driven into the ground.

As an additional means for bracing the truck in position when the ladder is elevated, short braces may be pivoted to each bolster, adapted to be swung outwardly to the ground when the device is in position to be operated, and to be folded back in place during transportation. As soon as this frame has reached its desired height, the upper sliding sections are ready to be drawn out. An operator or operators can now ascend the frame B by means of the rounds. An operator in the basket H can now, by means of the crank *k* and the sprocket wheels and chains, extend the movable sections of the ladder. The latter sections being shod on their under side with the steel plates *g*², there is but little friction, and this friction is reduced to a minimum by means of the friction-rollers on the ends of the sections, as shown in Fig. 10. The ladder-sections being extended to any desired length, (or to their full length,) they are held in position by means of the spring-bolt *k'*, Fig. 6. The ladder can now be turned so as to stand in a vertical position or can be inclined to any angle by means of the pivotal table E and hinged leaf E', and at the same time can be rotated in a horizontal plane by means of the pivot of the table E. In fact, the ladder-sections are capable of a compound motion—that is to say, that at the same time the sections are being extended and inclined they can be turned horizontally. The advantages of this are that while the operator is extending the sections another one can turn them to the exact position, thus saving much valuable time. Again, after a person has been placed in one of the receptacles P⁵, (which are made of non-combustible material, such as asbestus cloth,) the ladder can be swung around to the opposite direction, and the person rescued landed in a window on the opposite side of the street or lowered to the ground. The opposite end of the movable ladder can then be turned to the position occupied by the end just moved, or can be dropped to the ground. Thus it will be seen that either end of the ladder is capable of being raised to any angle from the vertical, and can be turned around in a complete circle, and this, too, while the sections are being extended, and while they are being raised or lowered, thus making it possible to touch any point within the circle described by the end of the ladder.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A portable fire-escape having a main supporting ladder-frame, consisting of two parts pivoted to each other centrally, the lower ends being secured to shafts or bolsters attached to the axles of the truck, the upper ends having pivoted thereto an auxiliary supporting-frame for a table, upon which ladder-extension sections are secured, substantially as and for the purpose set forth.

2. A portable fire-escape, the main supporting-frame of which consists of two parts, B,

passing through each other and pivoted centrally at b', the lower ends being pivotally secured to revolving shafts on the axle-bolsters, the upper ends having pivoted thereto an auxiliary supporting-frame, B', for a turn-table, and braces adapted to swing outwardly from the point of connection of the main auxiliary frame to the ground, substantially as set forth.

3. A portable fire-escape consisting of a main and auxiliary frame having a bed-plate secured thereto and supporting a turn table having a double-hinged leaf to which the ladder-extensions are mounted, so that the extensions supported thereby can be rotated in a horizontal plane, and also turned or rocked in a vertical plane on either side of the pivot, substantially as and for the purpose set forth.

4. In a fire-escape ladder, a turn-table for supporting the upper sections of the ladder, provided with a double-hinged leaf adapted to fold upon the table and to be turned or rocked in a vertical plane on either side of the pivot of said turn-table, substantially as and for the purpose set forth.

5. In a fire-escape ladder, a turn-table having a hinged leaf, to which the upper sections of the ladder are secured, adapted to turn about a central pivot, and the hinged leaf having a central opening for the projecting end of the table pivot-pin, substantially as and for the purpose set forth.

6. In a fire-escape, a table for the upper ladder-sections, consisting of two hinged leaves, as described, the upper leaf having the fixed guide-section secured thereto by braced metallic straps, said straps forming journal-seats for the central sprocket-wheels, substantially as and for the purpose set forth.

7. In a fire-escape, a turn-table for the upper ladder-sections pivoted to and supported by a bed-plate attached to the main supporting-frame, said table having a double-hinged leaf, and a basket or receptacle, H, secured thereto, substantially as and for the purpose set forth.

8. In a fire-escape ladder, a leaf for supporting the upper extension-sections, said leaf being hinged to and adapted to turn over on two sides of a centrally-pivoted table, said table adapted to turn in a horizontal plane about its central pivot, as set forth.

9. In a fire-escape ladder, the combination of the centrally-pivoted table and leaf hinged thereto and turning on two sides of said table, said leaf supporting the upper extension-sections, with a plate or bed, F, upon which the table turns, as set forth.

10. The combination, with the turn table provided with meshing gear m^2, of a pinion, n, friction-rollers n', and a crank to rotate or turn said table in a horizontal plane, substantially as and for the purpose set forth.

11. In a fire-escape ladder, the combination, with a centrally-pivoted table and the hinged and tilting leaf adapted to turn on opposite sides of said pivot, of the supporting bed or plate F, a central pivot passing through said bed and lower leaf, a turn-table, and means for operating it, as set forth.

12. In a fire-escape ladder, the combination, with an upper rigidly-fixed section, G, secured to a hinged leaf adapted to turn over the central pivot of a table, E, whereby either end of the ladder may be raised vertically, of the movable sections, said movable sections sliding within and moving with the fixed section, as set forth.

13. In a fire-escape ladder, the combination, with an upper fixed section, G, rigidly attached to a double-hinged leaf of a centrally-pivoted table, of the movable sections, and the end friction-rollers on the fixed and movable sections, as set forth.

14. In a fire-escape ladder, the combination, with an upper fixed section secured to a hinged leaf of a revolving table and having two central and two or three end sprocket-wheels at one end, of the movable sections sliding within said fixed sections and actuated by said sprocket-wheels through the intervention of suitable mechanism, substantially as and for the purpose set forth.

15. In a fire-escape ladder, an upper fixed section, the upper side of which is provided with a metallic plate terminating in a clevis on top of and at each end of said section, the clevises having secured thereto trussed braces g^4, substantially as and for the purpose set forth.

16. In a portable fire-escape ladder, the combination, with the supporting-frame B and means for raising it, of a brace or lever, S, adapted to hold the elevating-rope and to throw the center pivot-point in the frame B upward when the ladder is to be raised, substantially as and for the purpose set forth.

17. In a portable fire-escape ladder, a truck connected by a reach consisting of three or more pieces adapted to slide upon each other when extended or closed, the inner piece having grooves for guide-pins and metallic bands to hold the posts together, substantially as and for the purpose set forth.

18. In a portable fire-escape ladder, the combination, with the axles, of the bolster C', screw-threaded at its lower end, the non-screw-threaded bolster C^2 of the screw-bolt T, passing vertically through the bolsters and provided with the collars T' T^2, as and for the purpose set forth.

19. In a portable ladder, the combination, with the frames B', pivotally united near their inner ends, of a plate, F, upon which the extension-ladder sections are mounted, said plate being secured in position by bolts and a clamp, I, substantially as and for the purpose set forth.

20. The combination, with the turn-table, of the metallic plates h, secured to leaf E' and main section G, as to form a passage-way for the truss-rods on the stationary ladder-section, substantially as and for the purpose set forth.

21. The combination of the ladder and table secured together by the plates h, and braced

diagonally and laterally, said securing-plate having auxiliary plates h' attached thereto to form bearings for sprocket-wheels Z, substantially as and for the purpose set forth.

22. A ladder consisting of two or more movable sections, the lower section being provided with hooks h^3, which slide in grooves on the inside of a guide-bar, and said lower section supported thereby, substantially as and for the purpose set forth.

23. In a ladder consisting of a rigid and two or more movable sections, the supporting bar or plate Q, extending across the ends of the ladder and provided with friction-rollers upon which the lower movable section moves, substantially as and for the purpose set forth.

24. The combination, with the movable sections, of suitable sprocket wheels and chains, a crank, a perforated plate, 1, and a crank provided with a pin or rod adapted to automatically enter the perforation in said plate and hold the ladder locked in any desired position, substantially as and for the purpose set forth.

25. The combination, with the movable sections, of means for moving them and a hollow crank, k, the handle-grasp of which is provided with means for automatically holding the sections in a fixed position or releasing same, so as to be moved in either direction, substantially as and for the purpose set forth.

26. The combination, with the movable sections, of sprocket or actuating wheels and chains and a crank for actuating said wheels, said crank having a spring-lever, k^2, held by the hand and adapted to draw out or release a rod, k^7, which engages with a perforated plate, and thus hold or release the sprocket-wheels, substantially as and for the purpose set forth.

27. In a portable ladder, the combination, with the axles and adjustable bolsters, of the braces D^4, secured to the lower bolsters, substantially as and for the purpose set forth.

28. In a fire-escape ladder, an upper centrally-balanced ladder, G, provided with movable sections sliding therein, said ladder being hinged on two sides to a rotating pivoted table and adapted to turn on either hinged side of the table-pivot, so as to bring either end of the ladder upward, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES B. BRAY.

Witnesses:

NEWTON B. LOVEJOY,

E. J. UNDERWOOD.