(No Model.)

5 Sheets—Sheet 1.

W. F. AUSTIN.

FIRE TOWER.

No. 524,476. Patented Aug. 14, 1894.

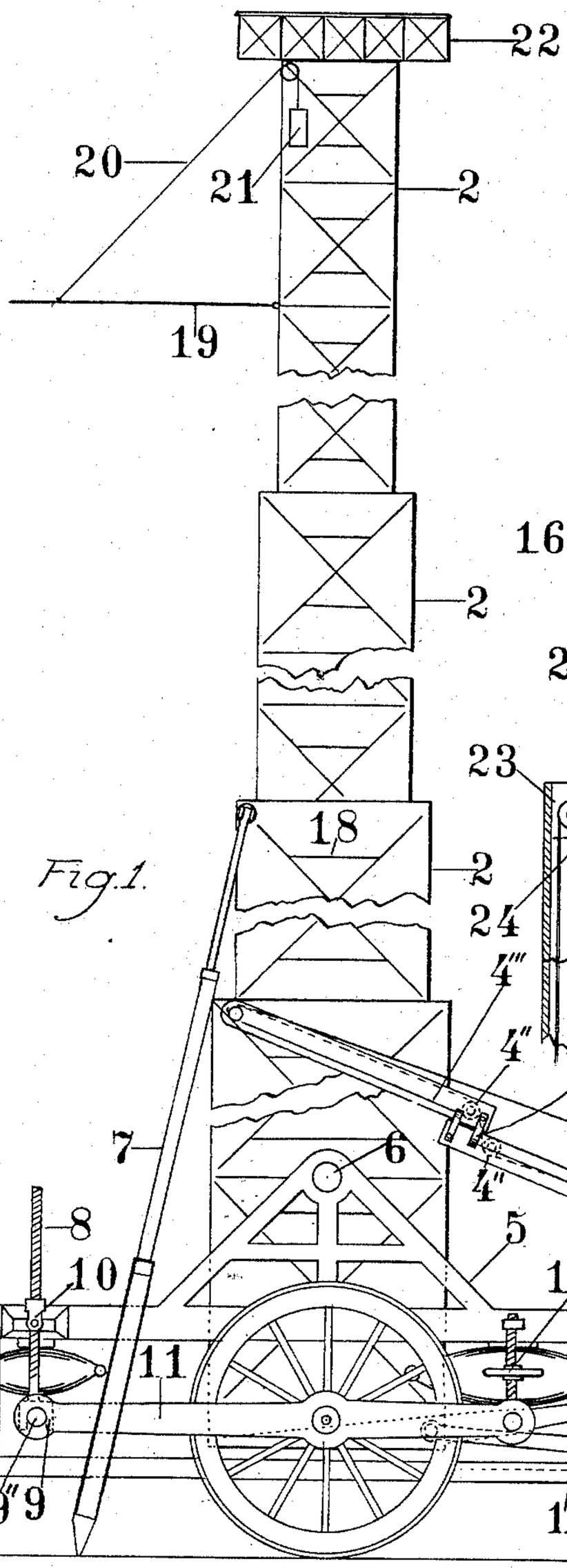

Fig. 1.

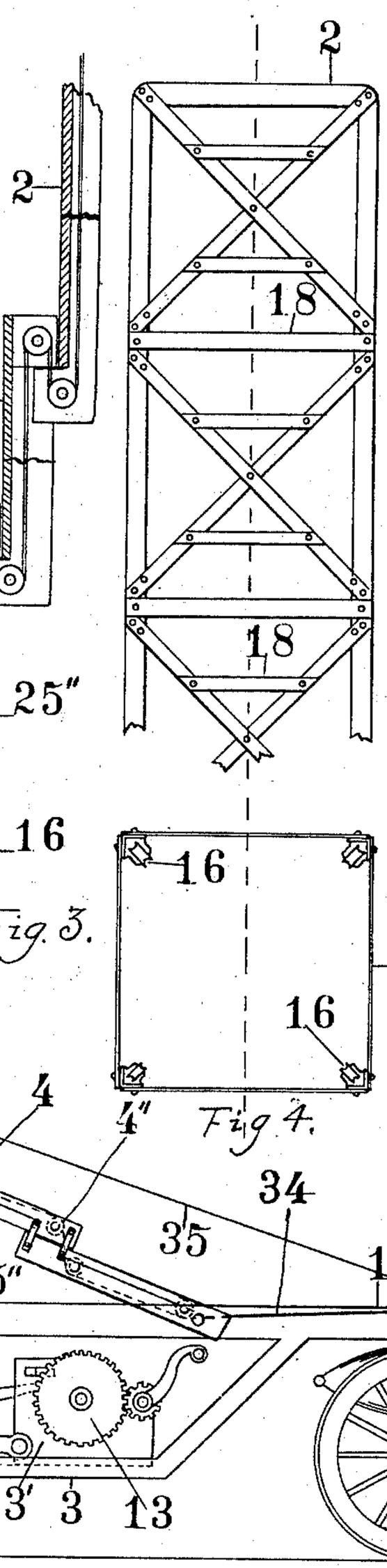

Fig. 2.

Fig. 3.

Fig. 4.

Witnesses,
J. F. Harris.
A. M. Turner.

Inventor;
William F. Austin.
By W. M. Brown,
his Atty.

(No Model.) 5 Sheets—Sheet 2.

W. F. AUSTIN.

FIRE TOWER.

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Fig. 5.

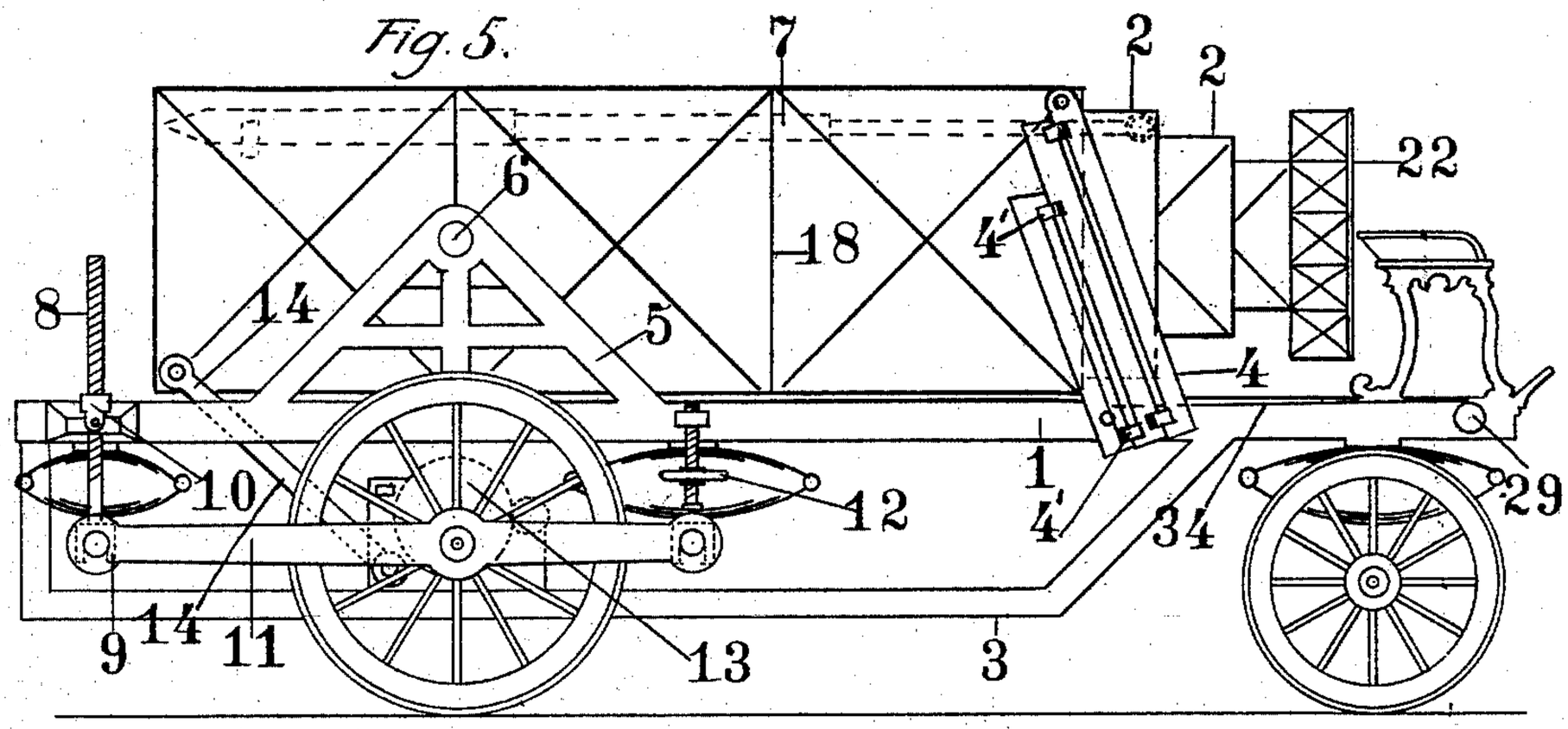


Fig. 6.

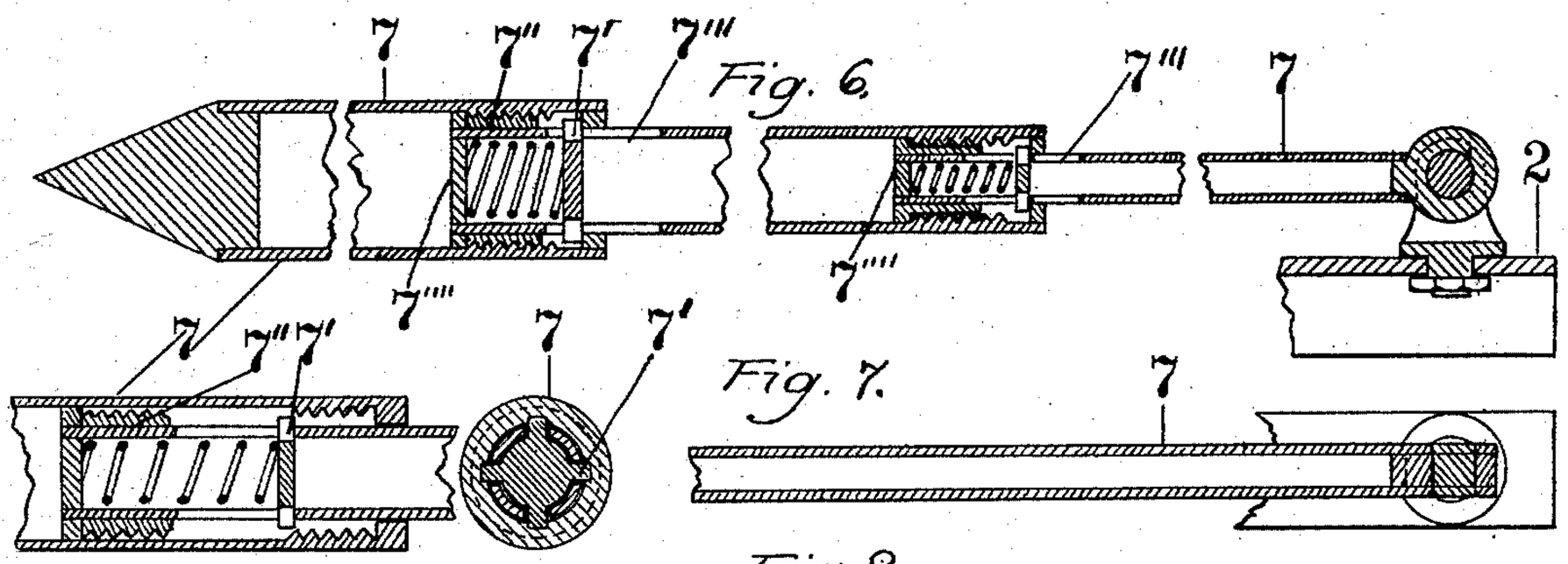
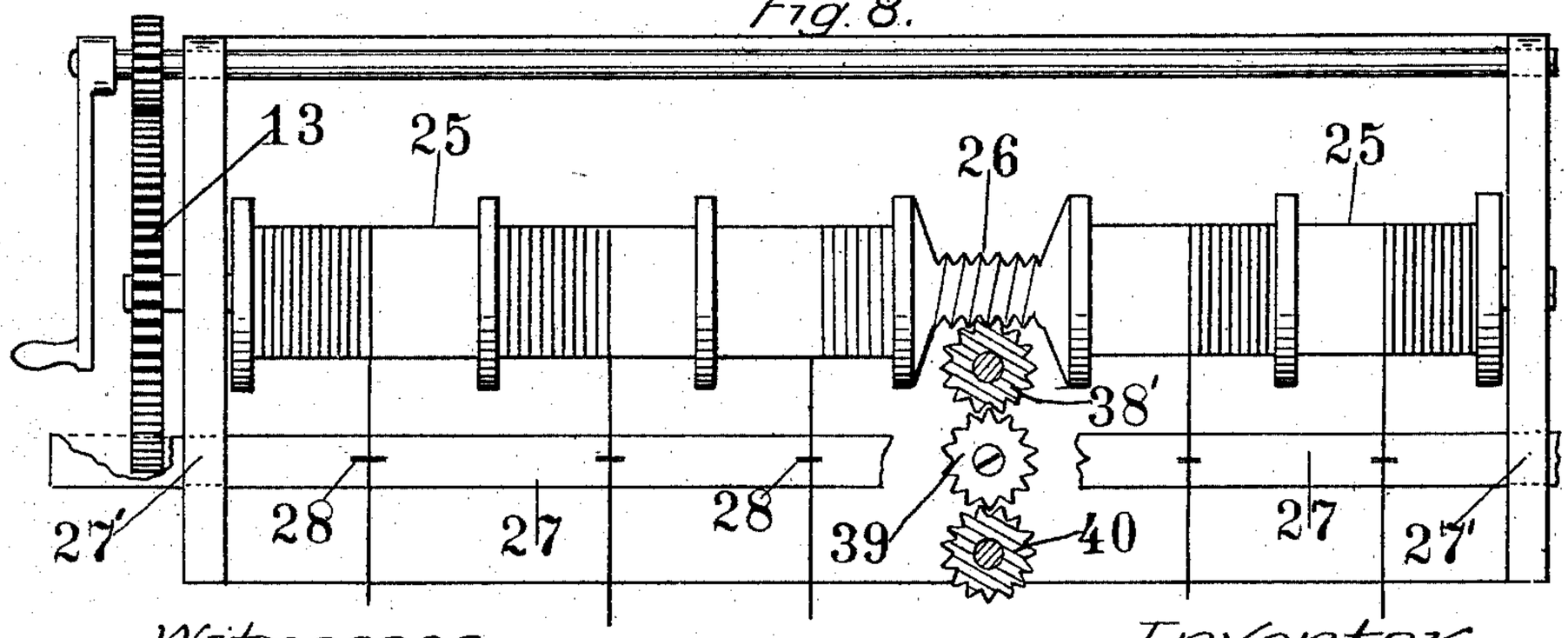


Fig. 7.

Fig. 8.



Witnesses;
J. F. Harris
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his Atty.

(No Model.) 5 Sheets—Sheet 3.

W. F. AUSTIN.

FIRE TOWER.

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Fig. 9.

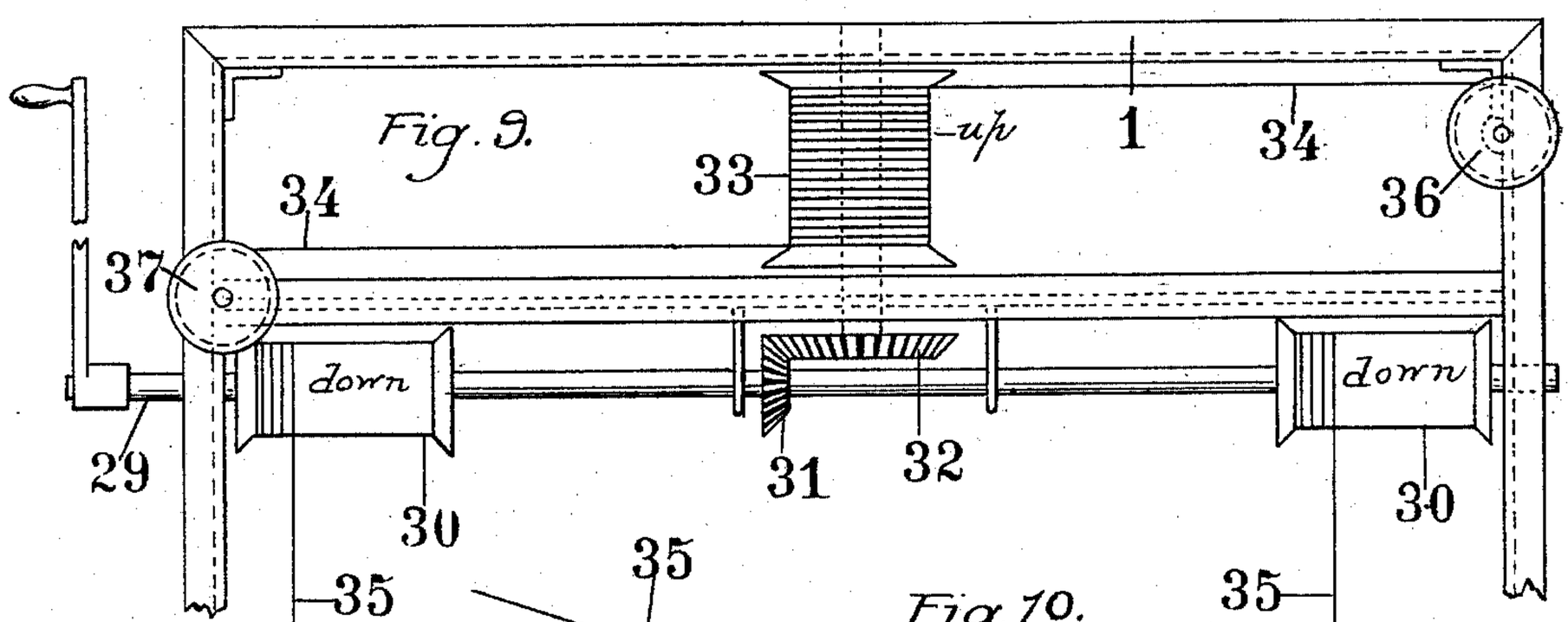


Fig. 10.

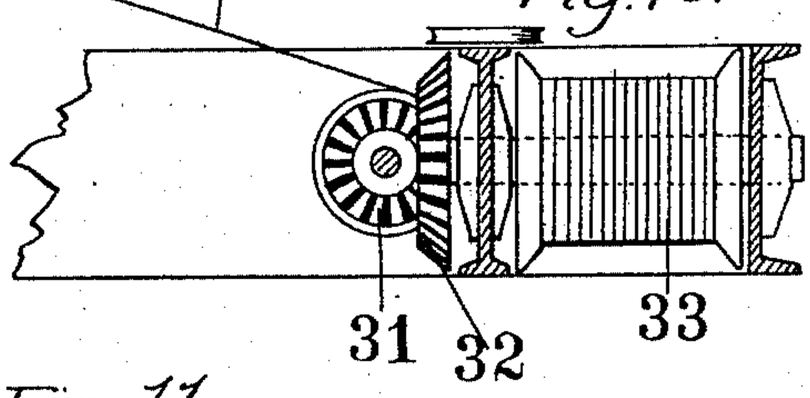
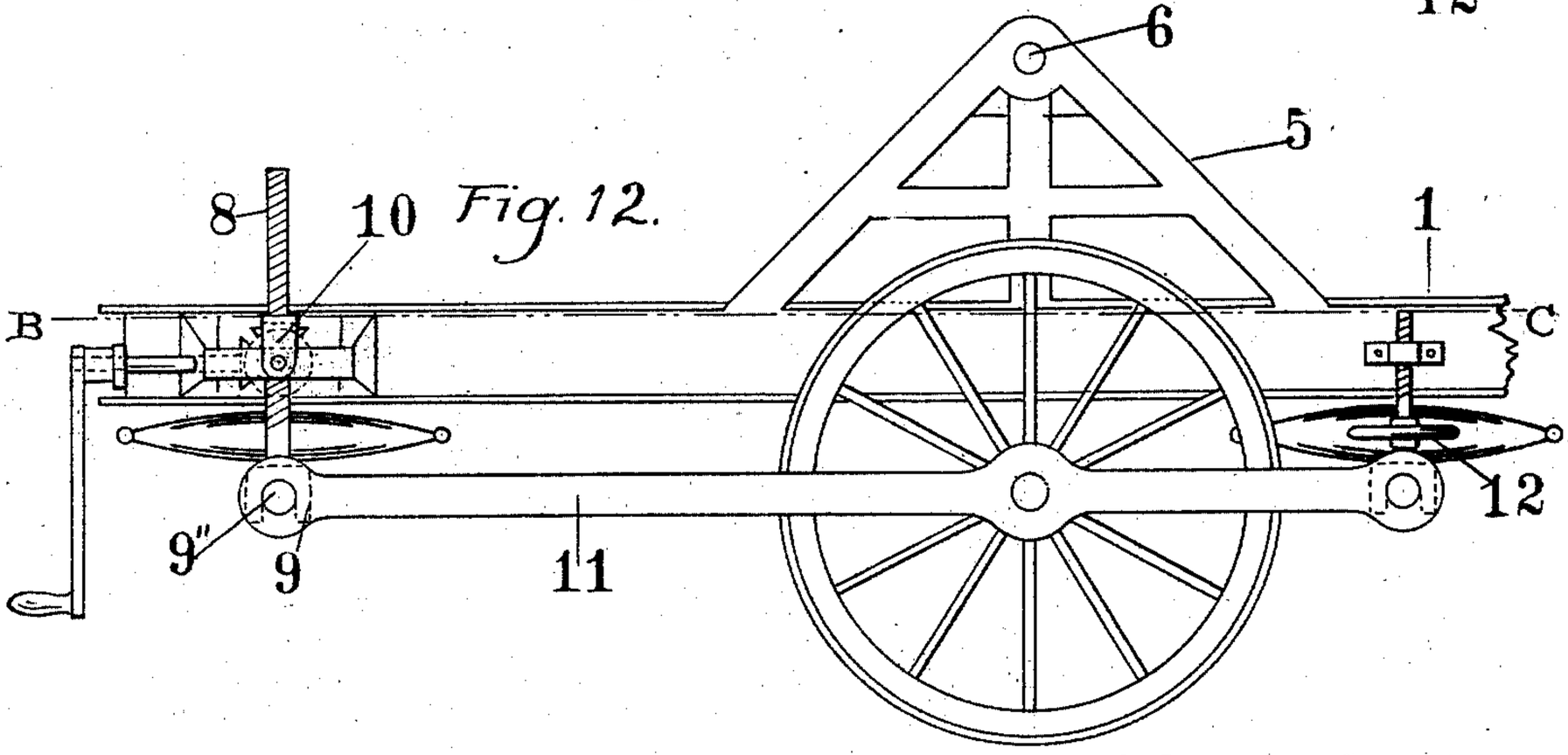


Fig. 11.

Fig. 12.



Witnesses,
J. F. Harris
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(No Model.) 5 Sheets—Sheet 4.

W. F. AUSTIN.

FIRE TOWER.

No. 524,476. Patented Aug. 14, 1894.

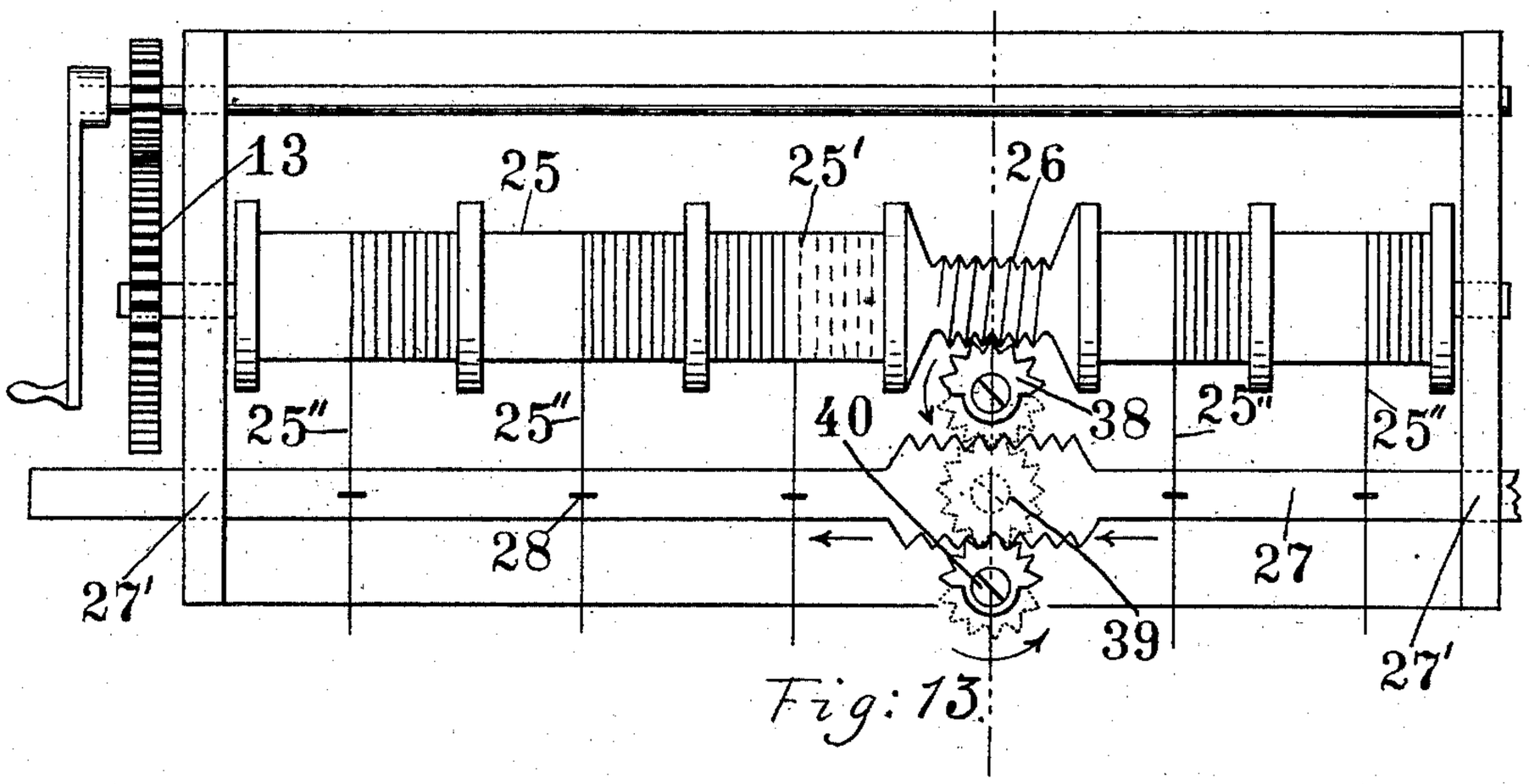

Fig: 13.

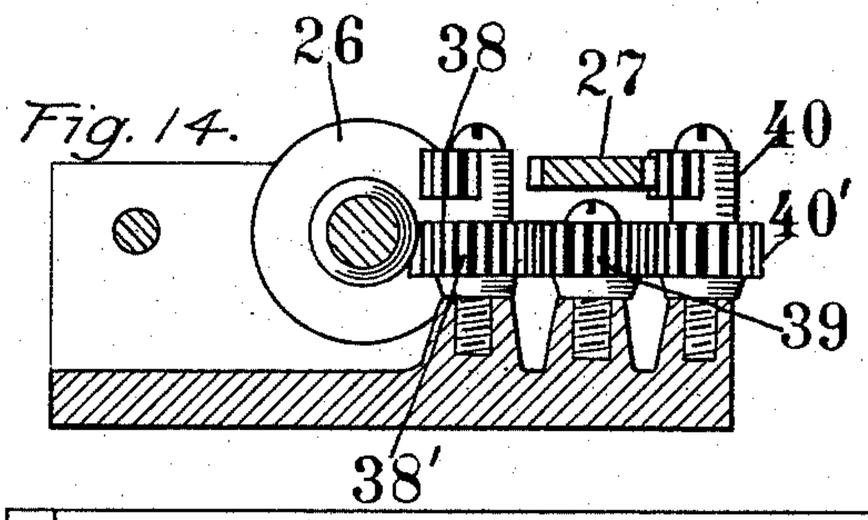

Fig. 14.

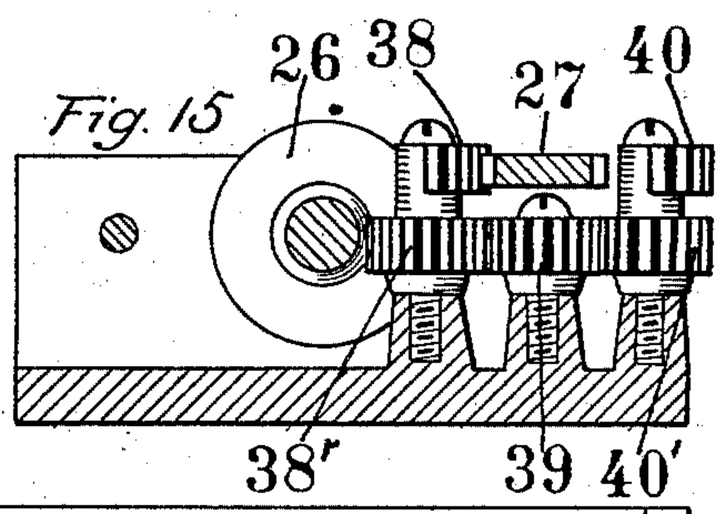

Fig. 15

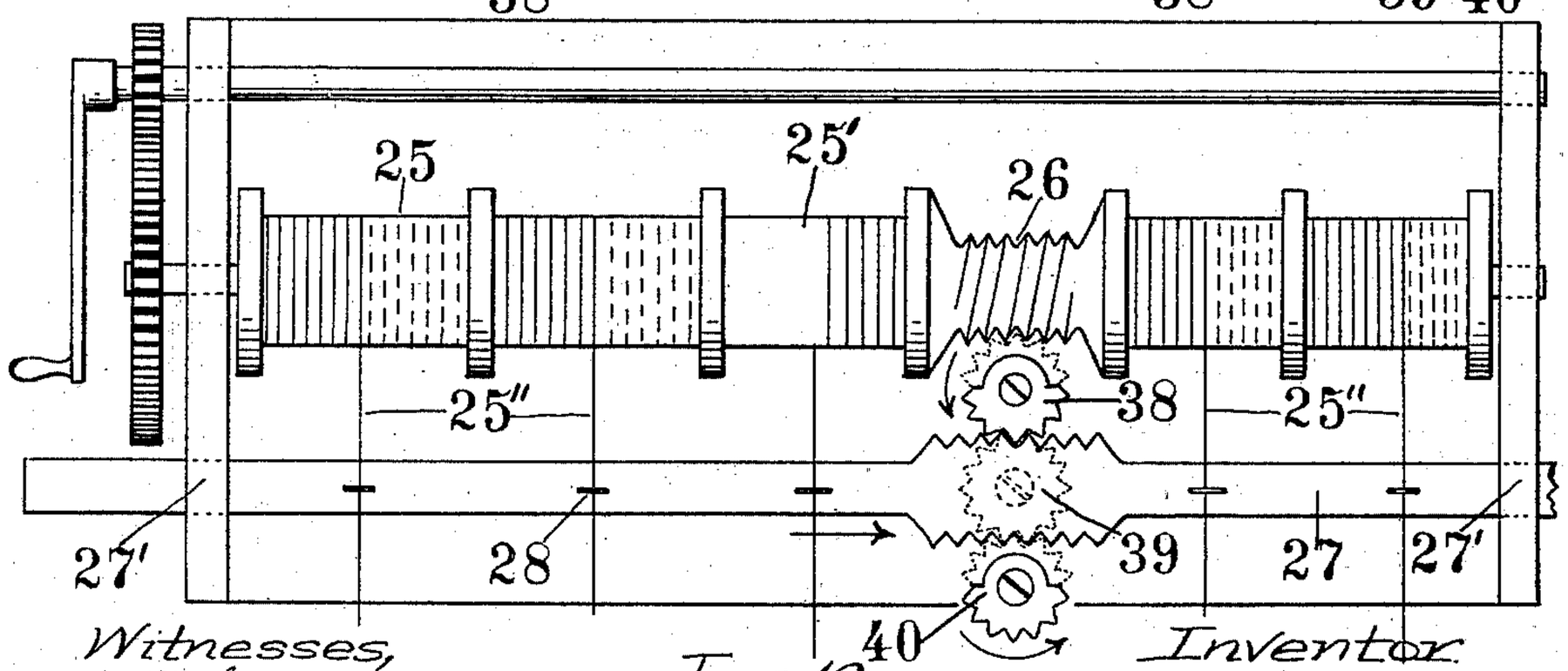

Fig 16.

Witnesses,
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(No Model.) 5 Sheets—Sheet 5.

W. F. AUSTIN.

FIRE TOWER.

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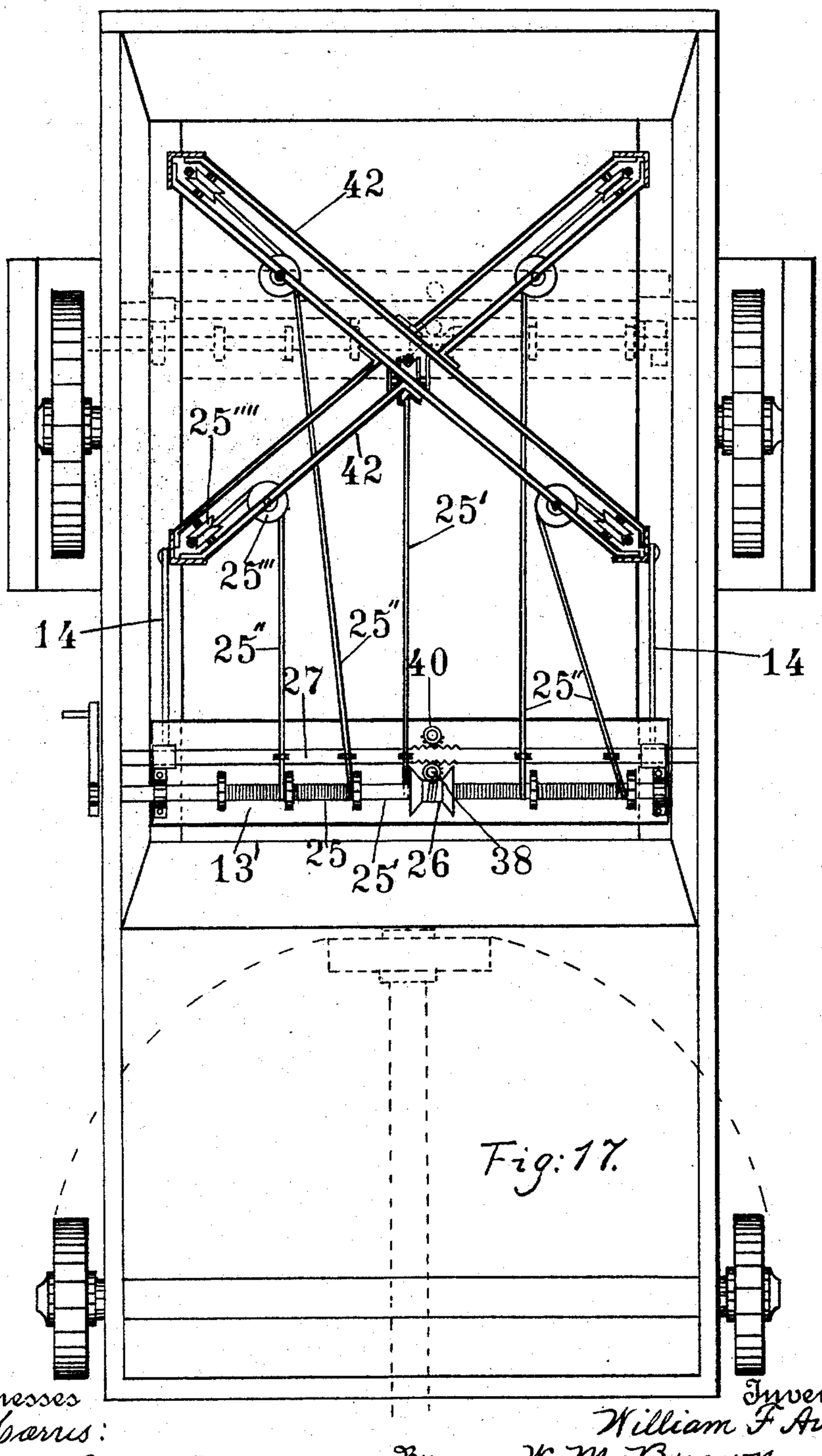

Fig: 17.

Witnesses
J. F. Harris:
G. B. Sylvester.

Inventor.
William F Austin
By W. M. Brown
his Atty.

UNITED STATES PATENT OFFICE.

WILLIAM F. AUSTIN, OF ALBANY, ASSIGNOR OF ONE-HALF TO CHARLES W. CAMPBELL, OF LANSINGBURG, NEW YORK.

FIRE-TOWER.

SPECIFICATION forming part of Letters Patent No. 524,476, dated August 14, 1894.

Application filed February 6, 1894. Serial No. 499,236. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. AUSTIN, a citizen of the United States, residing at Albany, Albany county, New York, have invented certain new and useful Improvements in Fire-Towers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a new and improved fire tower.

In the drawings Figure 1 shows a side elevation of my tower extended; Fig. 2 an enlarged side elevation of a portion of one of the sides of one of the sections; Fig. 3 a vertical sectional view through one of the corners showing the elevating cable and the sheaves over and under which it passes; Fig. 4 a plan view of the top of one of the sections; Fig. 5 a side elevation of my tower as it lies on its truck ready for transportation; Fig. 6 a longitudinal sectional view of one of the supporting braces; Fig. 7 a similar view of details of the brace; Fig. 8 a plan view of the winding drums and the traveling carriage on which they are supported; Fig. 9 a plan view of the mechanism whereby the contracted tower is lifted from a horizontal to a vertical position on the truck preparatory to being extended; Fig. 10 a side elevation of the larger drum and the gearing shown in Fig. 9; Fig. 11 a top view of one side of the truck showing the arrangement of the double axle; Fig. 12 a side elevation of the rear portion of the truck; Fig. 13 a plan view of the winding drums and the cable controlling apparatus; Fig. 14 a side elevation of the actuating mechanism of the cable controlling device with its base shown in longitudinal section; Fig. 15 a similar view thereof showing the gearing in a different position than that shown in Fig. 14; Fig. 16 a plan view of the winding drums showing the cables wound thereon in different position than that shown in Fig. 13; Fig. 17 a plan view of one form of a truck and the base, showing the four corner angle irons in cross section and a plan of the elevating cables and winding drums showing the manner of passing the cables to and up the four corners of the tower.

My device consists principally of a sectional teloscopic tower preferably square or rectangular in cross section, hung upon frame work mounted upon a truck, and arranged to tip over into a horizontal position when the sections are contracted and to be forced into a vertical position preparatory to extending the sections, and having a new and novel mechanism for attaining this end and means whereby the sections, after they have been forced from a horizontal to a vertical position may be raised, one after the other, until the tower is fully extended, the sides of the tower being made in lattice work form affording a convenient ladder whereby persons may mount to the top or descend at will. The body of the tower will be built of angle steel. The tower is mounted upon a new and novel truck having a tilting device whereby the body may be made perfectly level notwithstanding the wheels may stand on sloping ground. A particular description thereof, such as will enable those skilled in the art to make and use the same, is as follows:

The numeral 1 denotes the body of the truck which is preferably made of steel, and beneath the body is a hanging platform or runway 3 extending preferably from the extreme rear end of the truck to about two-thirds the length thereof. This runway 3 is also preferably made of angle steel and has no bottom or flooring preferably, one side of the angle steel frame work forming an interior ledge or offset upon which the carriage carrying the gear wheel 13 slides back and forth when desired, the said carriage being connected to the two front corners of the lower section of the tower by the pivoted bar 14, which bar 14 prevents the carriage from sliding except at such times as the tower is tilted over into a horizontal position, when the said bar 14 draws the carriage backward as seen in Fig. 5, where it will be seen to lie between the two rear truck wheels, and when the tower is forced into a vertical position preparatory to extending the sections, the carriage is forced by bar 14 forward to the position shown in Fig. 1. The cable winding apparatus also

carried by this carriage and actuated by gear wheel 13 will be hereinafter fully described. The rear wheels of the truck are mounted between side bars or wheel frames 11. 11. (see Fig. 11) the axle not extending across the truck. These side bars or wheel frames, 11. 11. are, at their rear ends, connected by a cross bar 9″ and cross bar 9″ carries and rests in a channeled bar 9′ and is held fast thereto, preferably, by keys 9‴ when the truck is used to transport the tower and when it stands on level ground while the tower is in use. Astride cross bar 9″ and near its ends and preferably inside the wheel frames 11. 11. is the yoke 9 at the lower end of the vertical screw 8. This screw 8 meshes with threading in the pivoted nut 10 and is made to rotate by the beveled gears and handle plainly seen in Fig. 12, the nut 10 being attached to the frame work of the truck. If the truck should stand on sloping ground and it was desirable to have the body of the truck level that the tower might stand practically vertical, the keys 9‴ passing through bar 9″ and channeled bar 9′ are knocked out (see Fig. 11) and the handle is operated when the bevel gear will rotate screw 8 and channeled bar 9′ will rise off cross bar 9″ and the lower side of the truck be raised, pivoted nut 10 swinging and giving to the angle, until it is at the same height as the other side, thus making the body of the truck a level foundation for the tower. Before starting the truck the screw 8 is turned down, and keys 9‴ are driven home, when the truck may be started. On the outer side of the center truck spring is a vertical screw with a hand wheel 12. When the tower is about to be raised or extended it is desirable to jack the truck off its springs that the truck may be rigid and unyielding. This is accomplished by operating hand wheel 12 and thus rotating the vertical screw, which will raise the frame work off the springs. It may be lowered at any time to make the springs operative.

Having described the novel features of the truck, I proceed to a description of the tower and its actuating mechanism.

Fig. 5 represents the tower telescoped and lying horizontally on the truck ready for transportation. Its main features are, four (or more) square or rectangular sections, arranged telescopically and they are preferably constructed as follows: The four corners of each section are preferably made of light rolled angle or channel steel (see Fig. 17, where the four corners of the lower tower are shown in cross section at the ends of the tie bars 42). The four corners are stayed and given stiffness by tie bars 18 (see Fig. 1) and these tie bars 18 are preferably arranged and set near enough together to form a ladder on each of the four sides by which persons may ascend and descend the tower. At the base of the lower tower (see Fig. 17) are the tie bars 42, being preferably steel plates or strips, having their ends fastened to the inner surface of the vertical corner angle pieces, in any desired manner, leaving a space between each set of these tie bars. The lower end of each section has similar tie bars. At each end of the vertical corner angle pieces 2 (except at the lower end of the lower or larger section) are offsets 23 and 24 (see Fig. 3), which, as the sections are raised to their greatest elevation, meet and form stops, and on these offsets, preferably, are sheaves 16. At the top of the tower is a platform 22 with a guard or railing (see Fig. 1), and to the top section is attached a counterweighted swinging platform by which ingress and egress may be had to buildings by the windows thereof.

Referring to Fig. 5 where the tower is seen telescoped and lying horizontally on the truck, will be seen forcing bars 4, folded one upon the other by sliding over each other and kept in connection by the claw clips 4′. In Fig. 1 these forcing bars are shown in the position they assume after they have forced the telescoped tower from a horizontal to a vertical position, in readiness to be extended. These bars 4 are made of steel channel bars, preferably, having claw clips 4′ holding them from separating, the claw sliding on an offset 4‴ on the sides of the bars. There is a set of these forcing bars on each side of the lower section of the tower, only one being seen in Fig. 1. In the channels in the channel bars 4 are sheaves 4″, over some and under some of which passes the wire cable 34 the outer end of which is made fast preferably to the rear upper corners of the lower tower. This wire cable 34 and the lower end of the lower channel bar are shown in Fig. 1 as on the outside of the frame of the truck, cable 34 passing to winding drum 29 along the outside of the side of the truck, and it may be so constructed if desired, but in Fig. 9 I have shown a plan of the forward end of the truck and the actuating mechanism for the forcing bars 4, with the cable 34 running inside the truck frame, which latter method of running the cable I deem the better of the two although I use either as occasion may demand.

In Fig. 1 will be seen wire cable 35 run from the upper rear corner of the lower tower to drums in the forward end of the truck (drums not shown in Fig. 1), said drums being shown at 30 in Fig. 9. Two of these cables 35 pass from the opposite rear corners of the lower tower to drums 30. 30. seen in Fig. 9.

When that form of mechanism is used shown in Fig. 9, wire cable 34 which actuates the forcing bars 4 passes from said bars over sheaves 36 and 37 to drum 33, which is marked "up" on the drawings, indicating that by the revolution of drum 33 the tower is forced from a horizontal to a vertical position, preparatory to being extended, while drums 30. 30. are marked "down" indicating that when revolved so as to draw on cables 35. 35. the telescoped tower will be drawn into a horizontal position on the truck, which will be fully explained in the description of the op-

eration of the device. Referring to Fig. 17, the winding apparatus for extending the sections of the tower will be seen. It consists of a shaft 25, having drums thereon and shown as revoluble by means of a simple crank in this figure but in Figs. 8, 13 and 16 it is shown as operated by a crank and gearing 13. Near the center of the shaft 25 is a worm wheel 26, working with vertical gear wheel 38, this wheel meshing with threads on one side of the guide bar and having a vertical gear wheel on the opposite side of the guide bar 27 meshing with threads on said side thereof. From the drums 25 pass wire cables 25″ passing round sheave 25‴ and under sheave 25⁗ and thus on their way up each of the four corners of the tower, as shown in Fig. 3. Cable 25′ (Fig. 17) passes up the center of the tower and is the lowering cable, Fig. 17 showing the winding apparatus in the position it would assume when the tower was fully extended, *i. e.*, cables 25″ fully wound on their respective drums, while cable 25′ is paid out, leaving its drum empty.

Referring to Figs. 13, 14, 15 and 16, the winding apparatus will be fully explained. It is carried on and moves with the carriage 13′ (see Fig. 1) and is actuated by revolving the gear wheel 13. It consists of a base to which are journaled the drums and shaft 25. To one side of the center of the shaft 25 is the worm wheel 26, shown in cross section at 26 in Figs. 14 and 15. This worm 26 meshes with gearing 38′ and 38′ meshes with gearing 39 and 39 with 40′. On the upper ends of the shafts driven by gears 38′ and 40′ are gears 38 and 40 cut part way only round the shaft, and between these fractional gears is the threaded or toothed cable guide bar 27, its threads meshing with the gears 38 and 40 at such times as they respectively present themselves to said threads. By observing Fig. 13 the result will be obvious. Worm 26 when operated keeps gear 38′, 39 and 40′ constantly rotating. Gear 40 is rotating to the left and meshing with the threads or teeth on guide bar 27, pushes it to the left as indicated by the straight arrows. As gear 40 continues to rotate, its last tooth will arrive at a point when it is on the point of leaving the teeth on bar 27 with which it is seen to be meshing, and just as it actually leaves these teeth, gear 38 has just begun to mesh with the teeth on its side of the bar, and bar 27 is forced the other way, sliding in boxes 27′. 27′. Thus a reciprocating or backward and forward movement is maintained, such motion keeping the cables 25′ and 25″ from "piling up" causing them to wind and unwind evenly. Fig. 16 shows the guide bar 27 moving to the right, being the reverse of its motion shown in Fig. 13. In Fig. 8 the fractional gears 38 and 40 have been cast off to show the lower gears 38′ and 40′.

To give more stability to the tower, I provide a telescopic leg or brace, 7 (see Figs. 6 and 7). This brace consists of sections of tubes arranged telescopically. The receiving sections are of such internal diameter as to receive the entering sections together with a collar 7⁗ fastened to their ends. Above this collar is a threaded bushing 7″ or enlargement of the entering section, arranged to mesh with the internal threading. Above the threading on the bush 7″ slots 7‴ are cut through the walls of the entering section and a sliding winged stop 7′ is set therein, the wings or splines 7′ sliding in the slots 7‴, and the open end of receiving section is sufficiently reduced by an internal annular collar to prevent the sections from separating practically as shown. Between the collar 7⁗ and the stop 7′ is a spring. When the leg or brace 7 is telescoped or contracted and the tower is raised, the sections of the leg or brace 7 extend by their own weight, and unless a cushion of some form was adopted, the threading would jam and be injured. I therefore construct them preferably as shown. When the sections 7. 7. are fully extended they are rotated until the screw threads mesh, when a rigid leg or brace is formed.

The operation is as follows:—The tower being in the position shown in Fig. 5, I first force it into a vertical position preparatory to extending the sections. The forcing bars are seen as folded in this figure. By unfolding or forcing them to extend, I force the tower to a vertical position, and this is done as follows: The crank on shaft 29 is turned in a direction to draw on cables 34 (see Figs. 1 and 9). The drum 33 revolves winding the cable 34 both ways as shown, thus causing a uniform pull on both these cables. Looking at Fig. 1 it will be seen that cable 34 passes into the channel bars of the forcing bars 4 and over and under the sheaves therein, and is made fast at the rear upper corner of the lower section of the tower. It is therefore evident, that by drawing on cables 34 the bar 4 will be forced to lengthen and will force the tower into a vertical position. While the drum 33 is winding the cables 34, thus drawing on them, drums 30. 30. are unwinding cable 35. 35. These cables are attached to the rear upper corners of the lower tower and when it is desired to lay the tower horizontal, the crank on journal 29 is turned in the reverse direction, when drum 33 unwinds and drums 30. 30. wind, drawing the tower into a horizontal position, and this winding of one set and the unwinding of the other set of cables is provided for by use of the gearing 31 and 32, the winding and unwinding of the cables progressing in proportion, *i. e.*, they wind and unwind equally. As the tower has assumed the vertical position the carriage 13′ has slid along the ledge on hanging frame 3 until it is in the position shown in Fig. 1. The frame of the truck may now be jacked off its springs by hand wheel 12, and leveled by screw 8 as hereinbefore described, when the tower will be ready to be extended or run up. This is accomplished by revolving the

crank on the gear meshing with gear 13 (see Fig. 1) when the following result will ensue: Looking at Fig. 17 (in which a plain crank instead of gearing is shown) carriage 13 will be seen held in its forward position by pivoted bars 14. The crank being turned wire cables 25'' are drawn upon, and as these cables extend up the corners of the tower (see Fig. 3) over sheaves and their outer ends are made fast to the top section, the second section will begin to extend or rise, carrying with it the third and fourth sections until stops 23 and 24 meet (Fig. 3) when the third section will begin to leave the second and will continue to rise until its stop 24 strikes stop 23 on the section below it, and the top section will now begin to rise until fully extended. While the cables 25'' have been winding up and thus extending the tower, cable 25' has unwound with similar speed. This cable 25' is attached to the frame of the top tower and by reversing the motion of the crank winds up while cables 25'' unwind, thus drawing each section of the tower down causing it to telescope or shut together.

Having now described my invention so that those skilled in the art to which it appertains may make and use the same, what I claim, and desire to secure by Letters Patent, is—

1. A telescopic sectional tower arranged to lie horizontally on a truck when contracted and to be stood vertically at will, and having cables winding upon revoluble drums, said drums being carried by a carriage arranged to recede under the tower when laid horizontally and to be forced from under the same when the tower is stood vertically, substantially as described.

2. A sectional open frame work telescoping tower arranged to lie horizontally on a truck when contracted and to be stood vertically at will, and having cables arranged to lift the sections of the tower and revolving drums upon which they may be wound and unwound, said drums being arranged to slide under the tower when it is being laid horizontally and to slide from under the same when the tower is being brought to a vertical position, and having a winding apparatus for the cables and a reciprocating guide arranged to guide the cables as they wind and mechanism for operating said guide substantially as and for the purposes described.

3. A sectional telescoping tower arranged to lie horizontally on a truck when contracted and to be stood vertically when extended, and having cables arranged to lift the tower in sections and revolving devices upon which the cables may be wound and unwound, said revolving devices being arranged to recede under the tower when it is being laid horizontally and to be forced from under the same when it is being raised to a vertical position, the truck having means to elevate one of its sides in order that it may be made to form a level foundation for the tower when the truck stands on sloping ground substantially as and for the purposes described.

4. A winding apparatus for cables consisting of revoluble drums and a reciprocating guide bar arranged to guide the cables as they wind, said guide bar having teeth or threading and lying between studs having partial gearing and full gearing upon their peripheries, and having a third gear wheel set between the fully geared portions and meshing therewith, and a worm wheel attached to the drum shaft, the worm meshing with the full gears on one of the studs in order that the partially geared portions of the studs may alternately mesh with the teeth in the guide bar and give the bar a reciprocating or back and forth motion, substantially as described.

5. A tubular sectional brace arranged telescopically and having internal threading on the receiving sections and external threading on the entering sections to mesh with the internal threading and a buffer or cushioning device arranged to prevent the said threading from coming violently together and injuring it, substantially as and for the purposes described.

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

WILLIAM F. AUSTIN.

Witnesses:
W. M. BROWN,
J. F. HARRIS.