(No Model.) 2 Sheets—Sheet 1.

J. BOYD.

HOISTING MACHINE.

No. 271,681. Patented Feb. 6, 1883.

FIG. 1

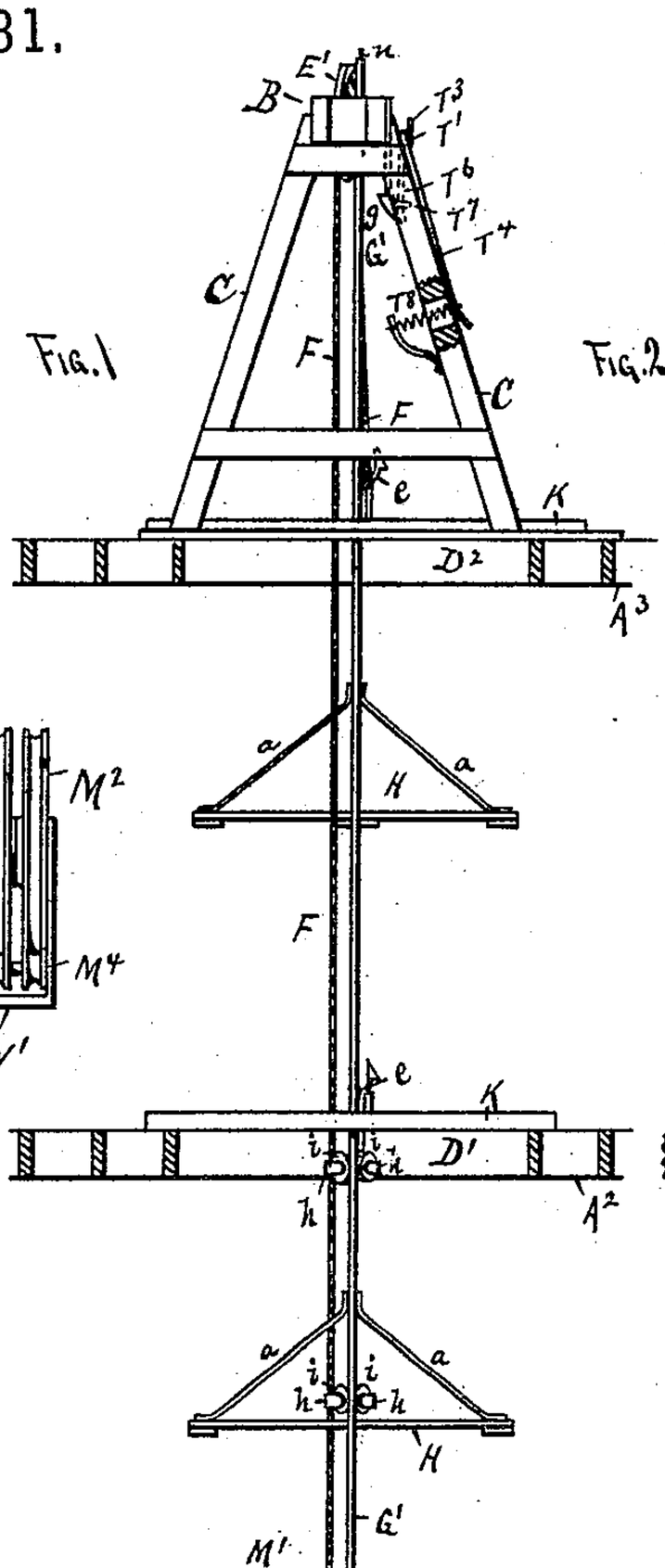


FIG. 2

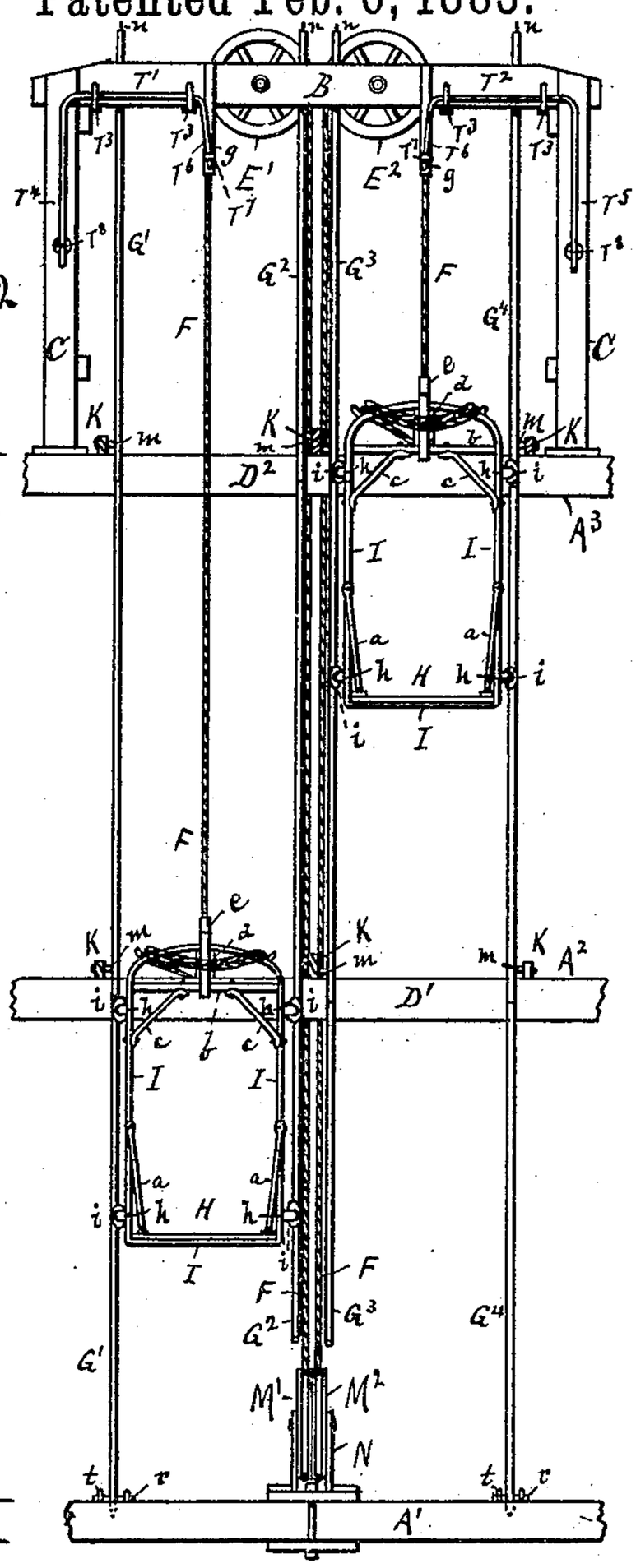


FIG. 13

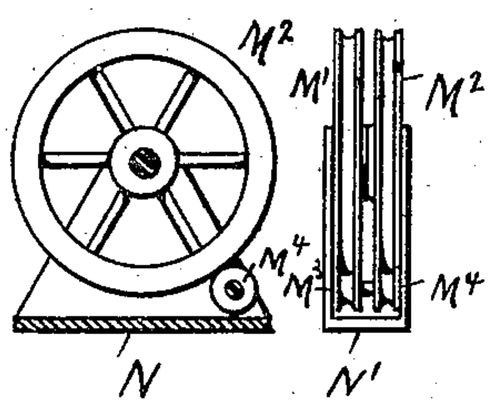


FIG. 3

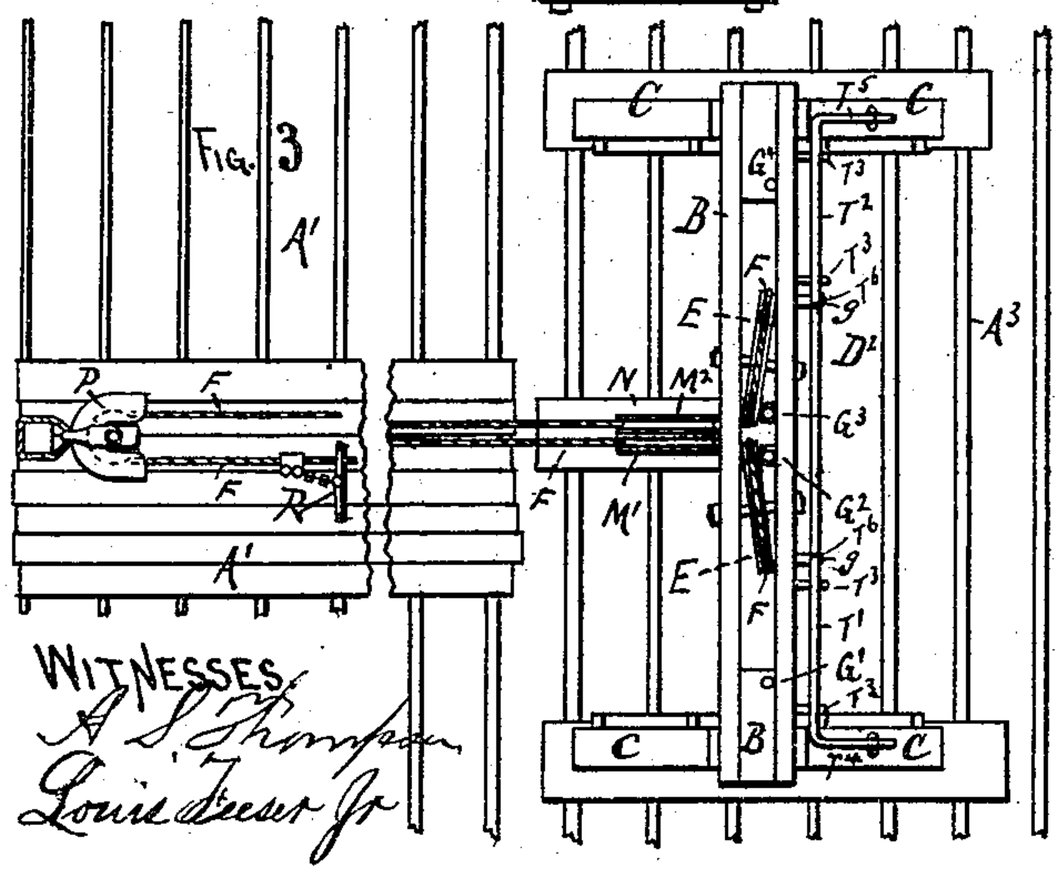


FIG. 4

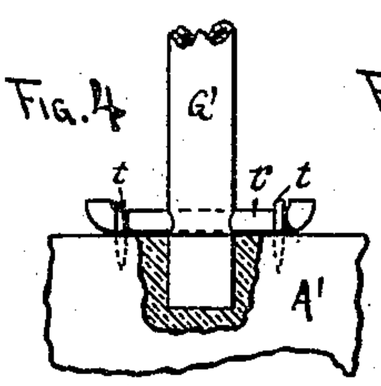


FIG. 5

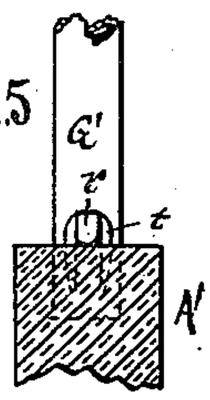
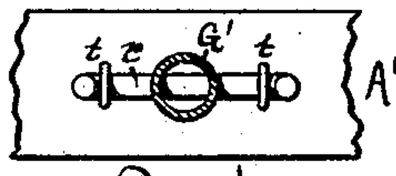


FIG. 6



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(No Model.) 2 Sheets—Sheet 2.

J. BOYD.

HOISTING MACHINE.

No. 271,681. Patented Feb. 6, 1883.

Fig. 7

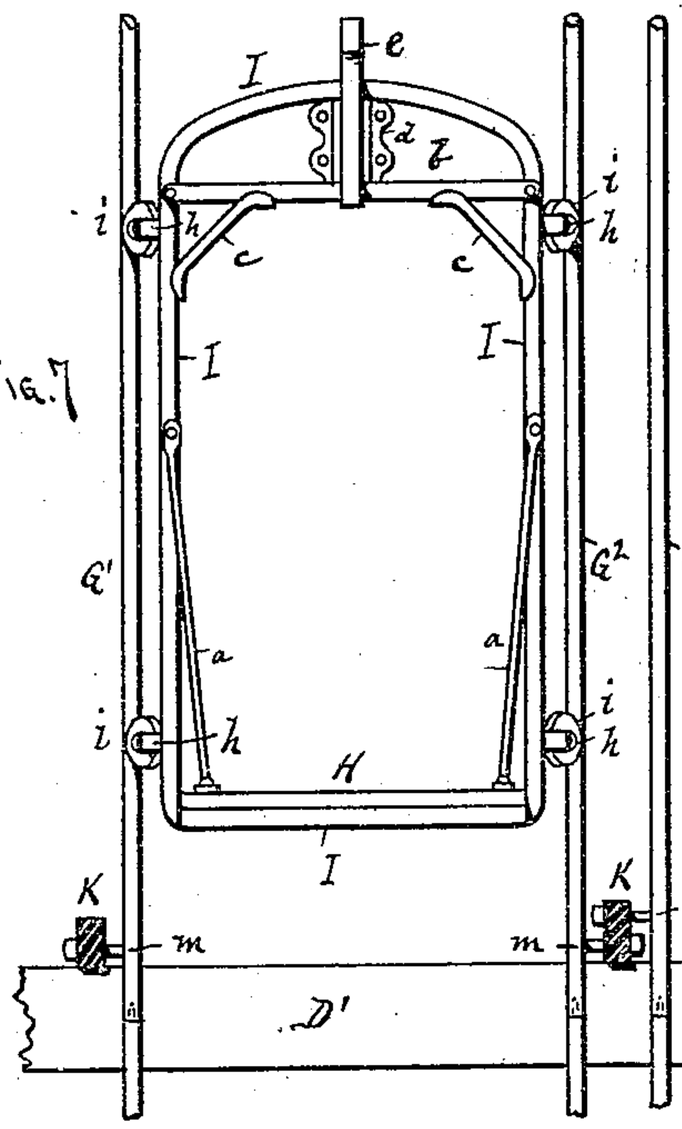


Fig. 8

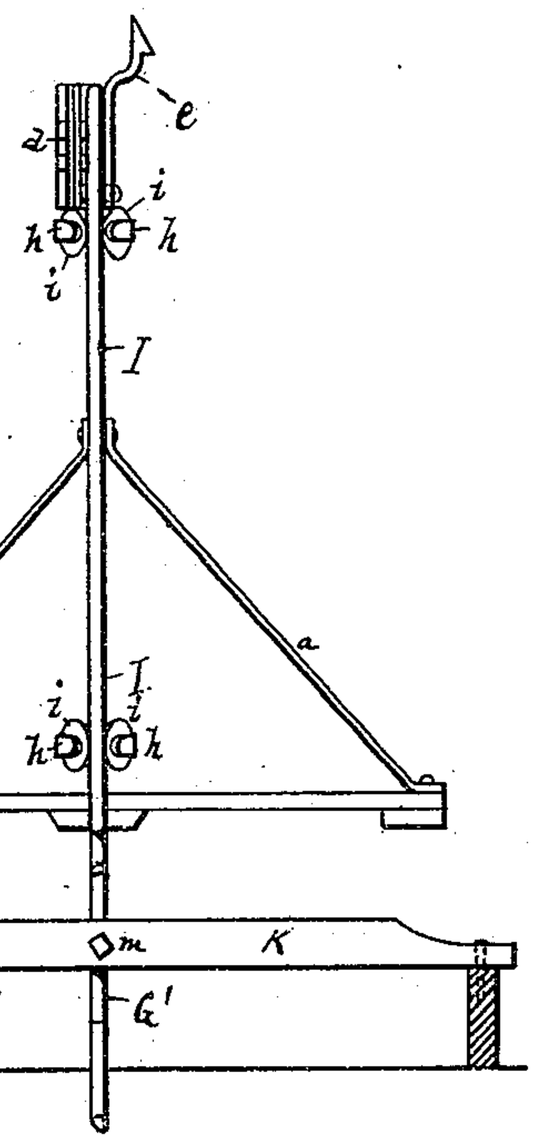


Fig. 9

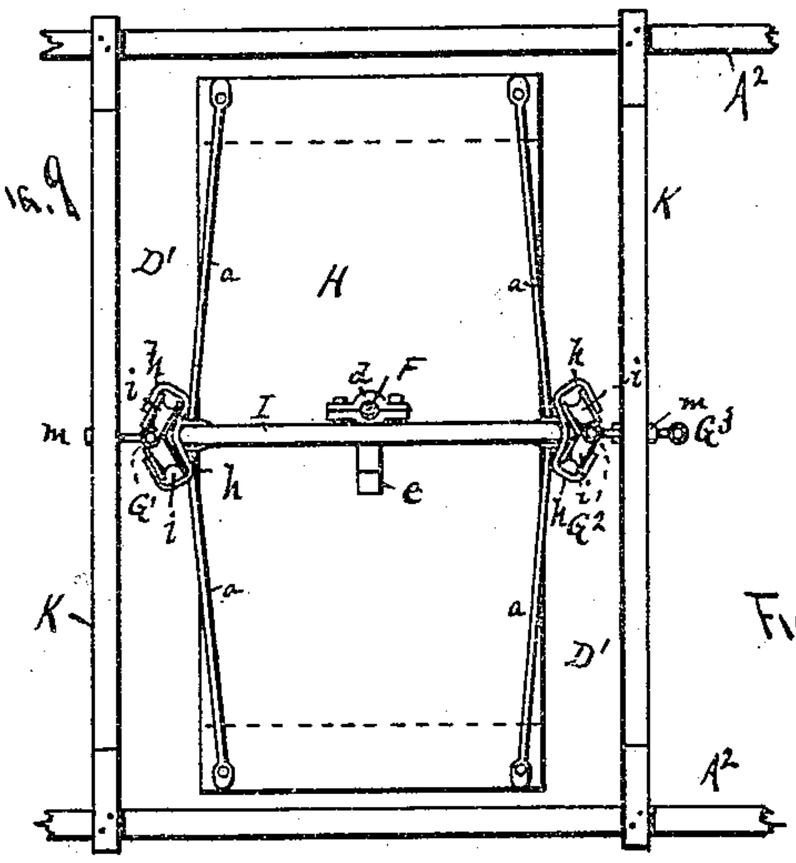


Fig. 10

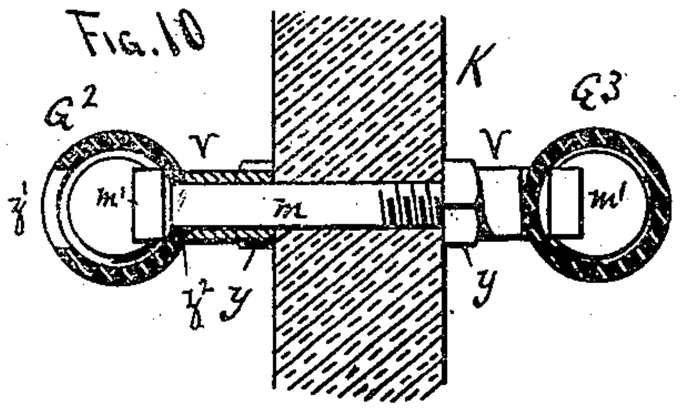


Fig. 11

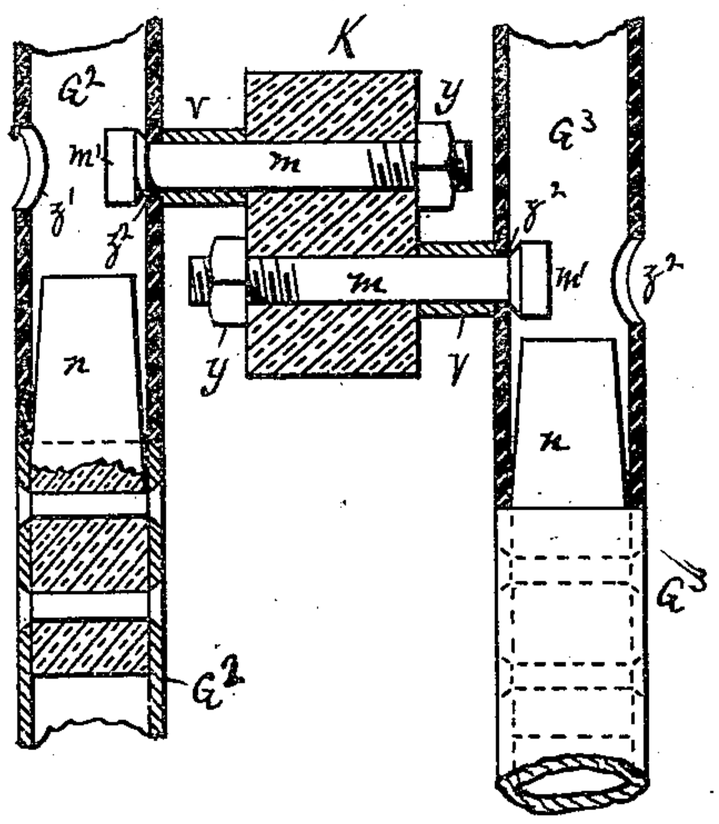
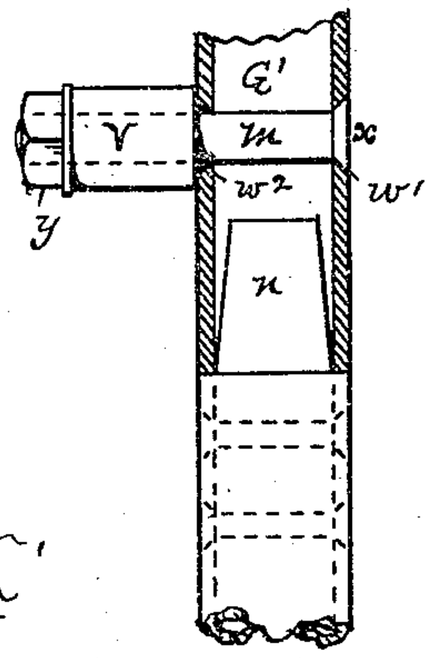


Fig. 12



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UNITED STATES PATENT OFFICE.

JAMES BOYD, OF ST. PAUL, MINNESOTA.

HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 271,681, dated February 6, 1883.

Application filed November 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES BOYD, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Hoisting-Machines, of which the following specification is a full, clear, and exact description, reference being also had to the accompanying drawings, in which—

Figure 1 is a sectional side view, Fig. 2 is a sectional front view, and Fig. 3 is a plan view, of portions of the floors of a building with my hoisting apparatus arranged therein. Figs. 4, 5, and 6 are detached detail views of the lower end of one of the tubular guide-rods, illustrating the manner of securing it in place. Fig. 7 is an enlarged front view, Fig. 8 is an enlarged side view, and Fig. 9 is an enlarged plan view, of one of the elevator "cages" or "platforms" and portions of the tubular guides, illustrating their construction. Figs. 10, 11, and 12 are enlarged details of portions of the tubular guides, illustrating the manner of coupling them to each other and bracing them to the building being erected. Fig. 13 is an enlarged detached view of the lower guide-pulleys, illustrating their construction.

This invention relates to hoisting-machines; and it consists in the construction and the combination of parts hereinafter particularly described, and then sought to be specifically defined by the claims.

This apparatus is intended to be used principally in elevating bricks, mortar, stone, and other building material to the workmen in erecting buildings, but may be used for many other purposes. The apparatus will only be used after the commencement of the second floor of the building, and will be extended from floor to floor as fast as new floor-joists are set in place; or the apparatus may be erected outside of the building upon temporary staging erected for that purpose.

In the drawings three floors, A' A^2 A^3, are shown, with a horse or frame for carrying the elevator-cables and guides, consisting of a head, B, and legs C, set over the hatchways D' D^2 in the floors A^2 A^3. No hatchway will be necessary ordinarily in the lower floor, A', unless material is to be hoisted from the cellar.

Pivoted in the head B of the horse are two grooved pulleys, E' E^2, over which the hoisting-cable F runs, and passing up through the same head, B, are four tubes or rods, G' G^2 G^3 G^4, the space between the two inner rods, G^2 G^3, being about six inches, and the space between the rods G' and G^2 and the space between the rods G^3 G^4 each a little less than four feet, the larger spaces being wide enough to allow the cages or platforms upon which the material to be elevated is placed to run up and down between them. These distances may of course be varied under different circumstances, but will be found suitable for an ordinary hoisting-machine constructed as shown. The outer rims of the pulleys E' E^2 will be in a line above the centers of the spaces between the rods G' G^2 and G^3 G^4, respectively, so that the cable F, being attached to the center of the elevator-platforms, will draw directly up or down, and not cramp the rods or platforms. The inner rims of the pulleys E' E^2 will be opposite the space between the rods G^2 G^3, as shown, so that the cable from the platforms, after passing over the pulleys E' E^2, may be carried down within or opposite to said space, as hereinafter shown.

The cages or platforms above referred to consist of floors or beds H, lying across inside one of the short sides of perpendicular rectangular frames I, each frame being formed of one single piece of gas-pipe, with its ends coupled together beneath said floors or beds H.

The central parts of the beds H are secured to the frames I in any suitable manner by bolts or straps, while the outer ends are supported by braces *a*, connecting them to the upright sides of the frames I. The upper parts of the frames I are curved and strengthened by cross-braces *b* and diagonal braces *c*, as shown, the whole thus forming light strong cages or platforms for carrying the wheelbarrows or other vehicles for holding the material to be elevated.

Attached to the backs of the curved tops of the frames I, and also to the cross-braces *b*, are couplings or clamps *d* for holding the ropes or cables F, and on the opposite sides of the frames from these clamps are secured barbed catches *e*, adapted to engage with oppositely-barbed spring-catches *g*, attached to the beam B of the horse, when the cages are elevated, to form automatic couplings to hold the cages

upward when they are raised, as hereinafter described.

Near the upper and lower parts of the upright sides of the frames I are secured by hangers *h* small angularly-set grooved pulleys *i*, adapted to partially inclasp the rods G′ G² G³ G⁴, to support the cages and cause them to run up and down between the guide rods or tubes with greater ease and with less friction than if fixed stops or guides were used, the pulleys thus acting as anti-friction guides to the cages. The anti-friction pulleys *i*, as above stated, are set at an angle, so as to only partially inclasp the guide-rods G′ G² G³ G⁴, thereby leaving an open space between the outer rims of each pair of the pulleys, so that stay-bolts *m* may be secured in the rods at intervals without interfering with the running of the cages up and down, these stays to be hereinafter described. The guides G′ G² G³ G⁴, as before stated, are constructed of gas-pipe, (one-inch pipe being commonly used,) and will be formed in sections, the lower sections long enough to reach from the lower floor up through the beam B of the horse, and the next sections long enough to reach from the upper ends of the first sections up through the beam B, when the horse shall have been elevated up to the next floor, and so on, each section being long enough to extend the apparatus one floor or more as the building progresses.

Any suitable coupling may be used to connect the ends of the tubes to each other; but I have found that a single pin, *n*, (see Figs. 10, 11, and 12,) secured in one end of one section and projecting upward to enable the end of the next section to set down over it, is a safe, simple, and very effective coupling, the weight of the tube alone being sufficient to hold them in place endwise, while the pins *n* prevent any side movement.

Any suitable means may be used for securing the feet of the lower sections of the tubes G′ G² G³ G⁴ in place; but I have found the device shown in Figs. 4, 5, and 6 very simple and effective. This consists in boring into one of the joists in the lower floor, A′, when they come in the right place, or into a timber or plank secured across the joist, a series of holes at the proper points to receive the lower ends of the four guide-tubes. The tubes will be provided with small holes through them near their bottoms, and after they have been set into holes in the joist or timber above referred to small bolts *r* are passed through the holes in the tubes, and their outer ends secured to the joist or timber, in which the tubes are stepped by staples or other fastenings, *t*. By this simple means the lower ends of the guide-tubes are firmly held in place, and at the same time they may be easily and quickly attached or detached when the apparatus is to be set up or removed.

As before stated, the tubes G′ G² G³ G⁴ will be supported at each floor by stay-bolts *m*, which are formed and applied as follows: Each section of the tubing G has bored through each of its sides, near one end, small holes *w′ w²*, and their outer edges countersunk, and countersunk heads *x* upon the bolts *m* adapted to fit into said countersunk holes, so that when the bolt *m* is passed through the holes *w′ w²* in the tubes the outer surface of the heads *x* will not project beyond the outer surface of the tubes G′ G² G³ G⁴. A ferrule, V, of gas-pipe or wood, will then be placed over that part of the bolt *m* that projects beyond the tube on the opposite side from the head *x*, and a nut, *y*, screwed upon the bolt *m* to firmly secure the bolt in place, the ferrule forming a base against which one end of two or more braces may set, and the other ends attached to the nearest joist or other part of the building to support the guides G′ G² G³ G⁴ at suitable intervals. By this arrangement no obstruction occurs on the inside of the guides G′ G² G³ G⁴ to interfere with the passage of the cages for carrying the material, and by arranging the friction-rollers *i* in the angular position shown they pass the stay-bolts *m* and the ferrules V in running up and down and do not touch them.

In Figs. 10 and 11 a slight variation is shown in the manner of constructing and applying the stay-bolts *m*, consisting in boring two different-sized holes, *z′ z²*, through the tubes G′ G² G³ G⁴, opposite each other, and forming the bolts *m* with a head, *m′*, adapted to pass through the larger hole, *z²*, but not large enough to pass through the small hole *z′*. By this means, if the bolt *m* be passed through the holes *z′ z²*, the heads *m′* will be entirely concealed within the tubes, as shown. Then, if the ferrule V and nut *y* be placed in position, the bolt *m* will be firmly held in place.

If desired, a long wooden bar, K, may be arranged upon the bolt *m*, between the ferrule V and nut *y*, and adapted to be secured across the nearest adjacent joist, as shown in Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9; or a wooden block may be used instead of the long brace K, to which additional braces may be attached to connect it to the nearest joist or other part of the building when the joists do not come at the proper point to use the braces K. Iron hooks may also be used in place of the braces K, if desired.

Secured to the joist of the lower floor, A′, opposite the space between the guides G² G³, is a frame, N, carrying two grooved wheels or pulleys, M′ M², close together—one adapted to receive the cable F from one pulley, E′, and the other adapted to receive the cable F from the pulley E². From these pulleys M′ M² the cable F passes back around a stationary "snatch-block" or pulley, P, at some distance from the pulleys M′ M².

Pivoted in the frame N, partially beneath the pulleys M′ M², and in line with them, are two small grooved guide-pulleys, M³ M⁴, adapted to hold the cables F into place in the grooves of the pulleys M′ M² when the ropes are slacked up, and thus prevent the ropes running off from the pulleys M′ M² when the apparatus is

being changed from floor to floor. The cable F is all in one piece, and must be long enough to elevate the cages to the upper floor of the building. Hence when the elevator is first used on the second floor the large extra unused length of rope is disposed of by coiling about the upper parts of one or both of the frames I. When the machine is first set up the cable F is drawn through the snatch-block P, one end passed under the pulley M′, up over the pulley E′, and down to the clamp *d* on the cage-frame I beneath it, where it is secured and the surplus rope wrapped around the frames I, as shown in Fig. 1. The other end of the cable F is run beneath the pulley M^2, up over the pulley E^2, and down to the other clamp *d* on the other cage-frame I. One of the cages will be drawn up until the catches *e g* engage with each other, and then the rope F is drawn taut and secured at that point by the clamp *d*, so that the rope runs tightly from the clamp *d* of one cage at the lowest point, or on the first floor, A′, up over the pulley E′, down beneath one of the pulleys, M′, back around the pulley P, returns under the remaining pulley, M^2, up over the pulley E^2, and down to the clamp *d* on the other cage, which is at its highest point, so that one cage is always up when the other is down.

The single-tree R, to which the horse or horses for operating the device are attached, is connected to one of the lengths of the cable between the pulleys M′, M^2, and P, as shown in Fig. 3, and by reason of one cage being always up when the other is down it will be readily seen that when the horse or horses travel in one direction the lower cage will be drawn upward and the upper cage run downward, and then when the horse is turned about and travels back again the cages will be run in the opposite direction.

T′ T^2 are two horizontal rods lying loosely in hooks T^3 on the side of the beam B. The outer ends of these rods are bent downward at right angles in the form of handles T^4 T^5, while their inner ends, T^6, are similarly bent downward and passed through small eyes or lugs T^7 on the lower ends of the spring-bar bed-catches *g*. By this means, if the handles T^4 T^5 be drawn outward, the ends T^6 will also draw the spring-catches *g* outward and release the cage that happens to be upward when it is desired to elevate the load.

The catches *e g* serve to hold the cages upward when elevated and remove the strain from the cable F, so that no danger exists of the cages falling from the breakage of the cables when the operator steps upon the platforms H to remove the load.

Small coiled or other springs, T^8, may be arranged upon the handles T^4T^5, to assist in holding them downward and assist the spring-catches *g* in holding the barbed trips *e*, or insure the action of the catches *g* in event of their spring-power becoming weakened. By this construction no part of the apparatus comes below the lower floor, A′; hence the platforms H rest directly upon the lower floor-joist, and no necessity exists for building up an inclined runway for the wheelbarrows, but they may be run directly upon the platforms.

In all the hoisting-machines of this class with which I am acquainted the pulleys that serve the same purpose as the pulleys M′ M^2 in my device are arranged below the centers of the platforms H H; hence the latter cannot come nearer to the floor A′ than the diameter of said pulleys, thus necessitating the erection of inclined runways, up which to run the wheelbarrows. By my arrangement I dispense with these runways, thereby gaining a great advantage, besides simplifying the device greatly and producing the same result with much less rope and machinery. My device is also constructed with fewer parts, and is more quickly set up and extended from story to story as the building is extended.

The horses B C will be made to be taken apart and put together again for convenience of transportation.

Having described my invention and set forth its merits, what I claim is—

1. The combination of the guide-rods, the platforms, the elevating-chains, and the pulleys E′ E^2, set as described, substantially as and for the purposes set forth.

2. The combination of the guide-rods, the platforms, pulleys E′ E^2, set at the top of the supporting-horse, pulleys M′ M^2 at the base of the structure, a snatch-block, P, and cable F, secured to the top of one of the platforms, then passing above pulley E′, thence downward and around pulley M′, thence forward and around the snatch-block, thence backward and around pulley M^2, thence upward and over pulley E^2, and thence downward and connected to the other platform, substantially as set forth.

3. The combination of the guide-rods, the platforms, cable F, pulleys M′ M^2, and guide-pulleys M^3 M^4, for holding the cable to pulleys M′ M^2, substantially as and for the purpose set forth.

4. The combination of the guide-rods, the platforms, the angularly-set friction-rollers *i*, the stay-bolts, with their heads fitting into the guide-rods and secured to suitable brace-pieces, and the elevating-cable, substantially as set forth.

5. The combination of the guide-rods, the platforms, the elevating-cable, friction-rollers on the platform bearing against the guide-rods, and stay rods or bolts for bracing the rods between their ends, substantially as set forth.

6. The combination of the guide-rods, the platforms, the elevating-cable, and the stay-bolts, provided with the ferrules and connected to the rods, and suitable brace-pieces for bracing the rods, substantially as and for the purpose set forth.

7. The combination of the guide-rods, the bolts *r*, passed through the rods, and fastenings for securing the bolts to a base-piece, substantially as and for the purpose set forth.

8. The combination of the guide-rods set into holes in a base piece, and stay-bolts or rods for bracing the guide-rods, substantially as and for the purpose set forth.

9. The combination of the guide-rods, the platforms, the elevating-cable, the pulleys for the same to run over, the catches *e g*, and the rod T′, constructed as shown and described, for operating the cables, the several parts operating substantially as and for the purposes set forth.

10. The combination of the guide-rods, the platforms, the elevating-cable, the pulleys for the same to run over, the catches *e g*, the rod T′, constructed and applied as set forth, and the spring for holding the arm of the rod, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES BOYD.

Witnesses:
C. H. WOODWARD,
LOUIS FEESER, Jr.