A. H. MEECH.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED MAR. 30, 1908.

962,037. Patented June 21, 1910.

3 SHEETS—SHEET 1.

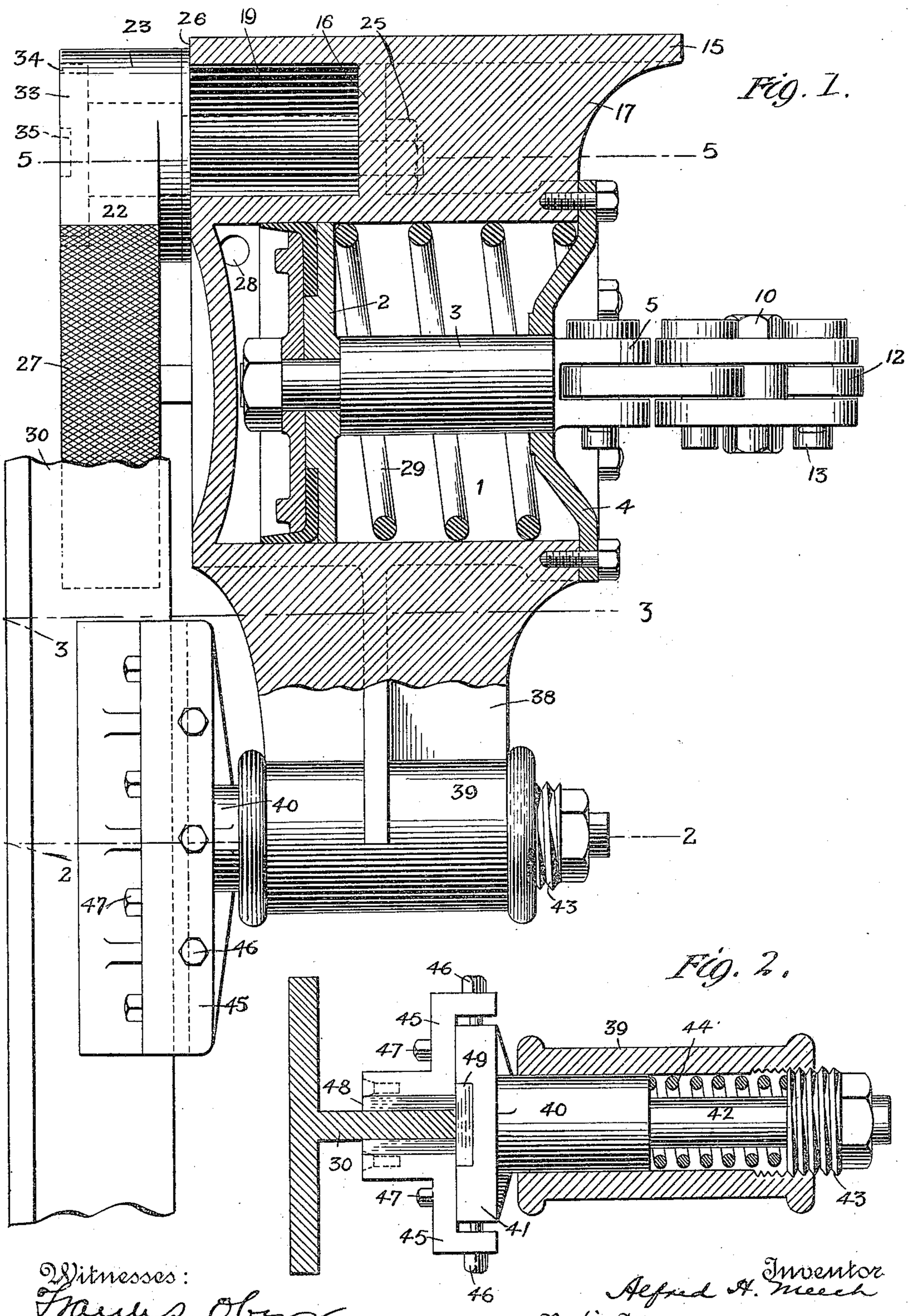

Fig. 1.

Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 3

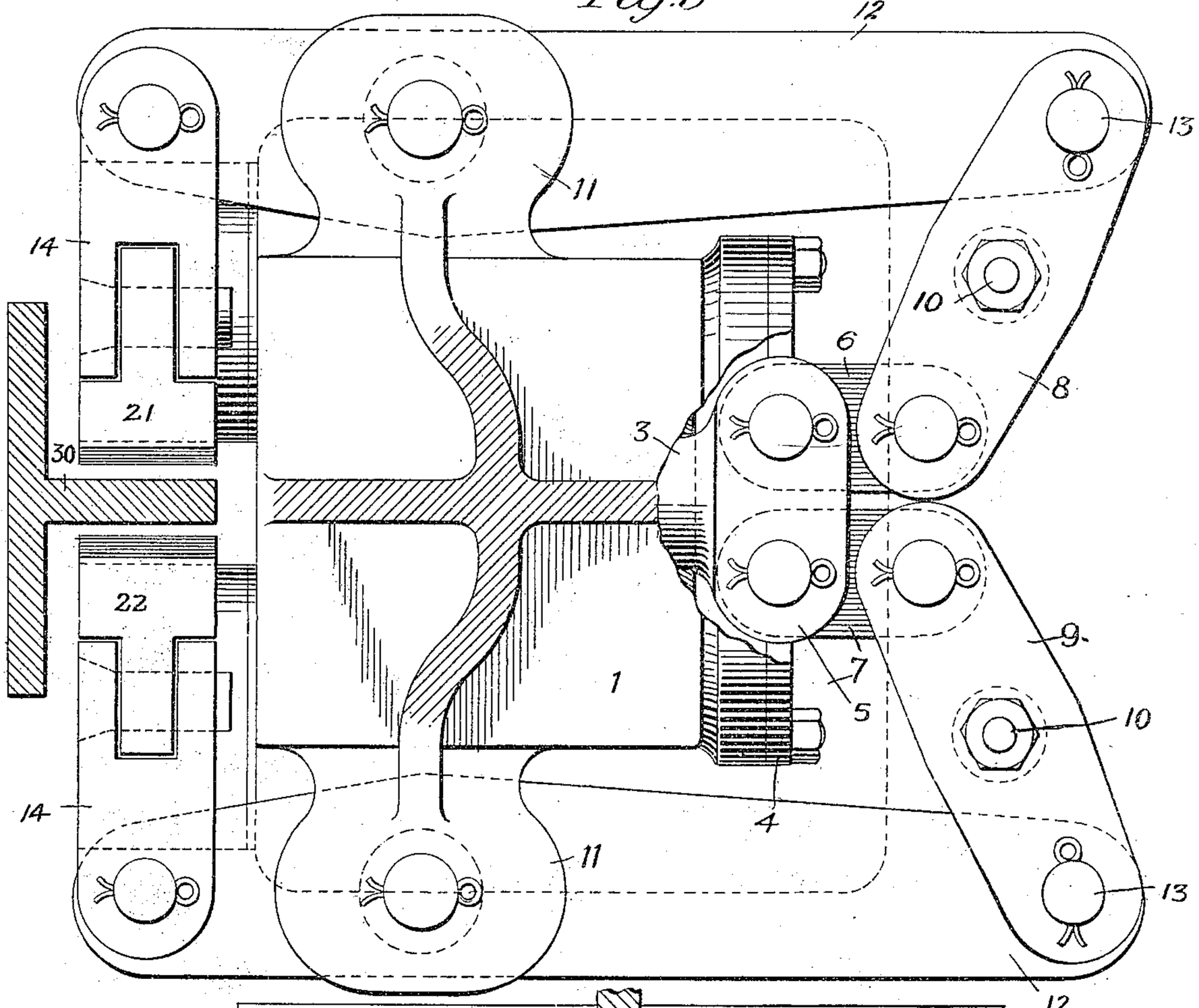

Fig. 4

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3 SHEETS—SHEET 3.

Fig. 5.

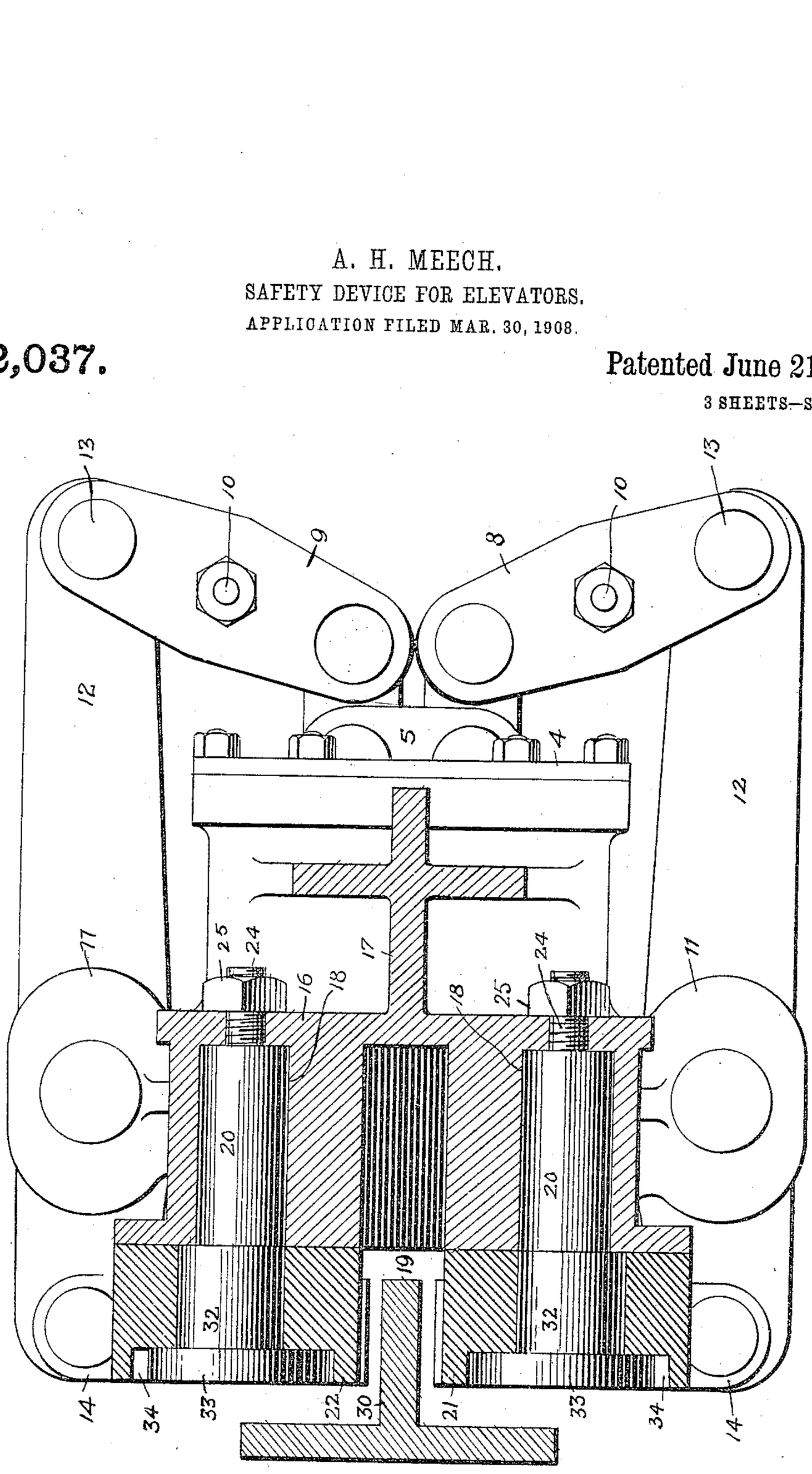
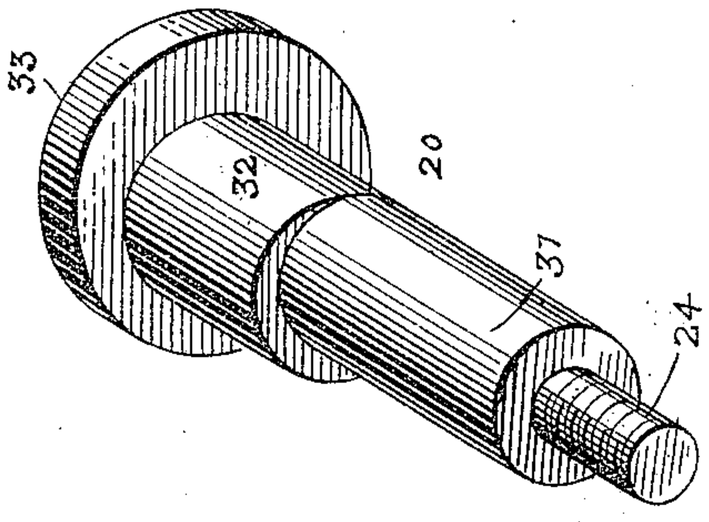


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR ELEVATORS.

962,037. Specification of Letters Patent. Patented June 21, 1910.

Application filed March 30, 1908. Serial No. 424,024.

To all whom it may concern:

Be it known that I, ALFRED H. MEECH, a citizen of the United States, residing at Chatham, in the county of Columbia and State of New York, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a full, clear, and exact description.

This invention relates to air brakes and safety devices for elevators.

In my Patent No. 722,736, issued March 17, 1903, there is disclosed an air cylinder and piston adapted to actuate a pair of levers which apply a compressing force to a pair of brake shoes acting upon a vertical rail arranged in the elevator shaft. In this patented construction the brake shoes are hung upon a plate or plates fastened to the car independently of the brake cylinder and its lever connections, and it has been found in practice that in mounting these two structures upon the car in some installations, it is difficult to adjust them or place them with respect to each other so that they will accurately coöperate in the performance of the functions for which they are designed. For instance, if the base plate upon which the brake shoes are hung is not adjusted to the car properly with respect to the base plate on which the cylinder is carried, there will be a distortion of the shoes that will result in an unequal application of their working surfaces against the rail. In addition to this the actuating forces will be applied unequally through the various pivots of the levers employed, resulting in excessive wear and strain on the parts. As shown in my patent above referred to, the cylinder is mounted against the bottom of the car while the brake shoes are pivoted upon a plate secured to the side of the car. It is found that it often occurs that the space between the side of the car and the wall of the shaft is insufficient to accommodate the plate and pivot studs on the side of the car and that this location is therefore an undesirable one for the mounting of the brake shoes.

The primary object of my present invention, therefore, is to provide a structure comprising an air cylinder, piston, and a pair of brake or gripping shoes with the necessary system of leverage connecting them together for coöperation, all so mounted with respect to each other, and so bound together that the entire apparatus can be at once applied to the elevator car without the exercise of much skill in the adjustment, and in a manner to insure the proper and accurate operation of the various parts in service, avoiding friction and unbalanced operation.

A further object is to so construct these various parts as to bring them close together in a compact structure to avoid long leverages and consequent springing of parts, as also to provide that the brake shoes shall project as little as possible beyond the side of the car.

Another feature of my invention relates to the guide that is usually applied to an elevator car in a position to embrace the vertical guide rail to prevent swaying of the car while traversing the shaft. My improvement in this particular consists in attaching such a guide to the air cylinder above referred to, so that it becomes one structure with the other parts mentioned, and can be applied in one operation to the elevator. As a specific improvement in the guide I construct its jaws which embrace the guide rail so that they are adjustable in a manner to take up all the wear and play of the parts. By thus mounting the guide on the same frame that carries the brake shoes and power devices, the car is continuously held in proper position for the brake shoes to grip the stationary rails in the most effective manner.

A further object of the invention is to provide novel means for adjusting the position of the brake shoes with respect to the guide rail, in order to provide for variations in the width of said rail, to compensate for wear of the contacting parts or to cause said shoes to grip the rail with a greater or less degree of friction.

The invention will be described with reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of the device; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a section on the line 3—3 of Fig. 1, looking upwardly, with parts

broken away; Fig. 4 is an elevation, showing the mounting of the brake shoes, the guide rail with which said shoes coöperate being shown in section; Fig. 5 is a section on the line 5—5 of Fig. 1; and Fig. 6 is a detail perspective view of one of the bolts on which the brake shoes are mounted.

Referring to the drawings by numerals, 1 indicates a power cylinder, being as ordinarily used by me, an air cylinder, containing a piston 2, to which a piston rod 3 is connected and leads outward through the removable head 4 of the cylinder, where the rod is formed with a flattened head 5 to which are pivoted two links 6 and 7 respectively, in turn pivoted to the links 8 and 9 respectively, each of the latter links being double, and its parts secured together by shoulder bolts 10. On each side of the cylinder are integrally formed two ears 11, on each of which is pivoted a compression lever 12. These levers at one end connect with the outer ends of links 8 and 9 respectively by means of pivotal joints 13, and their other ends extend beyond the rear head of the cylinder and pivotally connect with short links 14, extending inward across the rear head of the cylinder. For the purpose of supporting this air cylinder upon the bottom of an elevator car, the upper side of the cylinder has formed integrally upon it a base comprising a flat horizontal plate 15, spaced some distance from the curved wall of the cylinder, but connected therewith by two webs 16 and 17 arranged at right angles to each other, one web 16 being at right angles to the axis of the cylinder, while the other is in the same plane as the axis, but extending only half the length of the cylinder. The space between the plate 15 and the wall of the cylinder at the rear is formed into two cylindrical sockets 18 one on each side of the vertical center line, and with their curved walls connecting the plate 15 with the wall of the cylinder 1. Between these cylindrical sockets is an open space 19, left to lighten the casting and provide a space for a fastening bolt. These cylindrical sockets furnish the bearings for large studs 20 carrying the two brake shoes 21 and 22. The shoes have heavy, strong hubs 23, in which the studs are secured and shouldered against the faced ends of the sockets, and the studs are held in place in the sockets by their threaded ends 24, which pass through the web 16, and upon which are screwed the nuts 25, to hold the hubs up against the face of the casting as shown at 26. The shoes have working faces 27 opposed to each other, which may be roughened or otherwise formed to give the required gripping or frictional contact; they also have back webs to which the links 14 are respectively pivoted. It will be seen that with this organization, the outward movement of the piston, which may be accomplished by admitting air or fluid under pressure through the pipe 28 causes the links 8 and 9 to be thrown outwardly, like a toggle, thereby separating the forward ends of levers 12 and throwing inward the rear ends of said levers, which motion is communicated through links 14 to the brake shoes which are forced toward each other to grip any element that may be interposed between them. The reverse of these motions may be accomplished by admitting air on the opposite side of the piston, or by means of the spring 29 interposed between the piston and the head 4 of the cylinder, to release the shoes. This spring also serves to take up all lost motion in the system of levers, to prevent rattling or loose movement of the brake shoes and to hold the latter away from the rail so as to avoid abrading. It will be seen that with this organization of levers the compression levers are levers of the first class, the power being applied at one end, the fulcrum in the middle and the load at the other end, thus making it possible to obtain the greatest brake stresses in the most compact form of apparatus. Attention is also called to the fact that by pivoting the brake shoes in the same frame with the power cylinder and other parts, the strain that occurs when the brake is applied will not tend to displace the various parts of the mechanism with respect to one another, but all must move together if any motion is created; furthermore the strain upon the pivots of the shoes comes directly under the car instead of at the side and is applied to the strongest part of the supporting frame in such a manner that there is no tendency to tear off the supporting plate, as is the case in the prior patent referred to. And by reason of the fact that the links 8 and 9 are pivoted to the links 6 and 7, instead of directly to the head 5 of the piston rod, all unequal stresses upon opposite sides of the lever system will be compensated for. That is to say, notwithstanding any unevenness in the guide rail 30, or inaccurate adjustment of the cylinder 1 and the parts connected therewith with respect to said guide rail, when the brake-actuating mechanism is thrown into operation, by forcing the piston 2 outwardly, both of the brake shoes 21 and 22 will be caused to grip the guide rail 30 with equal force on opposite sides thereof.

The bolts 20 upon which the brake shoes are respectively mounted are each formed with a cylindrical portion 31 which fits within the socket 18 on the web 16, with a cylindrical portion 32 eccentric therewith and with a head 33 concentric with the cylindrical portion 31. The cylindrical por-

tion 32 is located wholly outside the socket 18, and is the part on which the hub 23 of the brake shoe is mounted to turn. The head 33 lies within a countersunk recess 34 in the surface of the brake shoe and is itself provided with a key-way 35 by means of which and a key inserted therein the bolt as a whole may be turned. Assuming the normal positions of these parts to be as shown in Fig. 4 of the drawing,—that is, with the axes of the cylindrical portions 32 directly above the axes of the cylindrical portions 31,—it will be obvious that the throw of the brake shoes may be adjusted toward or away from the guide rail 30, to compensate for wear or for any other purpose, by merely turning the bolts 20 in their sockets 18. This may be done by loosening the nuts 25, applying a suitable key to the key-ways 35 and turning the key in one direction or the other. In so doing the axis of rotation of each brake shoe on the cylindrical portion 32 of the bolt 20 is moved either toward or away from the guide rail, according to adjustment desired. When the proper positions have been determined the bolts 20 are re-locked against turning movement by tightening up the nuts 25. To assist in determining the extent of the adjustment, a graduated scale 36 is placed or formed on each of the brake shoes, and an index or pointer 37 on the head 33 of each of the bolts 20.

38 indicates a bracket cast integrally with the cylinder 1 and other frame portions and arranged centrally below the cylinder. It is formed with a cylindrical casing 39 whose axis is parallel to that of the cylinder 1 and is open at both ends. This casing contains a plunger 40 carrying a head 41 and a stem 42, the latter projecting forward through a plug 43. Between the plug and the plunger is a spring 44 tending to force the plunger rearward. The head 41 carries two angle plates 45, 45, which may be adjusted toward or away from each other by turning the screws 46, and locked at any adjustment by setting up the screws 47. These plates, with the head 41 constitute the guides for the car and may be provided with removable bearing plates 48 and 49.

The guide rail 30 which coöperates with the guide plates 45 and gripping shoes 21 and 22 to guide and retard or stop the car, has been shown as an ordinary T-rail of sufficient strength for the purpose. In applying my improved structure to the car, it will be seen that when the base plate 15 is properly positioned and bolted to the car, all of the attached parts are at once in correct operative position, the guides and the brake shoes being properly lined up for joint action upon the rail and the lever system occupying its proper relation with the shoes. This not only insures efficient action, but durability, compactness and economy of installation. The guiding jaws which embrace the rail are adjusted to hug it rather closely to prevent swaying of the car and to maintain the brake shoes 21 and 22 equidistant from the rail. In this way the pressure of both brake shoes upon the rail will be the same in any application of the brakes and the retardation is more effective and positive.

What I claim as my invention is:—

1. A safety or brake appliance for elevators comprising an air cylinder, a pair of brake shoes pivoted at points above said cylinder to the frame thereof, a piston for said cylinder, a pair of levers fulcrumed to said cylinder on opposite sides thereof, and links connecting the opposite ends of said levers to said brake shoes and piston respectively.

2. A safety or brake appliance for elevators comprising an air cylinder, a base integral therewith provided with two cylindrical chambers having their axes parallel to the axis of the cylinder and one arranged on each side thereof, a pair of brake shoes and pivot studs therefor having their bearings in said chambers respectively, said shoes being adapted to be actuated by the power developed in said air cylinder.

3. A safety or brake appliance for elevators comprising a power cylinder, brake shoes and guiding jaws arranged one above the other, and a single unitary frame upon which said shoes and jaws are directly supported.

4. A safety or brake appliance for elevators comprising a vertical rail, a power cylinder, a pair of brake shoes and a pair of guiding jaws arranged one above the other and a single unitary frame to which the cylinder shoes and jaws are directly connected.

5. A safety or brake appliance for elevators comprising a frame, a power cylinder formed in or upon said frame, a pair of brake shoes pivoted to the frame at a point above the cylinder, and guiding jaws carried by the frame at a point below the cylinder.

6. A safety or brake appliance for elevators, comprising a single supporting frame, a power cylinder and brake shoes mounted in said frame, a piston in said cylinder, a pair of compression levers pivoted intermediate of their ends in said frame, one on each side of said cylinder, a piston rod, links connecting the end of the rod with the ends of the respective compression levers and links connecting the opposite ends of said compression levers with the respective brake shoes, substantially as described.

7. In a safety or brake appliance for ele-

vators, a frame having a cylindrical socket therein and an opening leading from one end of said socket, a bolt fitting within said socket having a screw-threaded extension therein projecting through said opening, and having an eccentric cylindrical portion, a brake shoe or jaw pivotally supported on said eccentric portion, and a nut on said screw-threaded extension for locking said bolt against turning movement in said socket in any position to which it may be moved.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

ALFRED H. MEECH.

Witnesses:
WM. M. STOCKBRIDGE,
WALDO M. CHAPIN.