No. 661,318. Patented Nov. 6, 1900.

W. H. NELSON.

STEADYING DEVICE FOR ROPE HOISTS.

(Application filed June 4, 1900.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

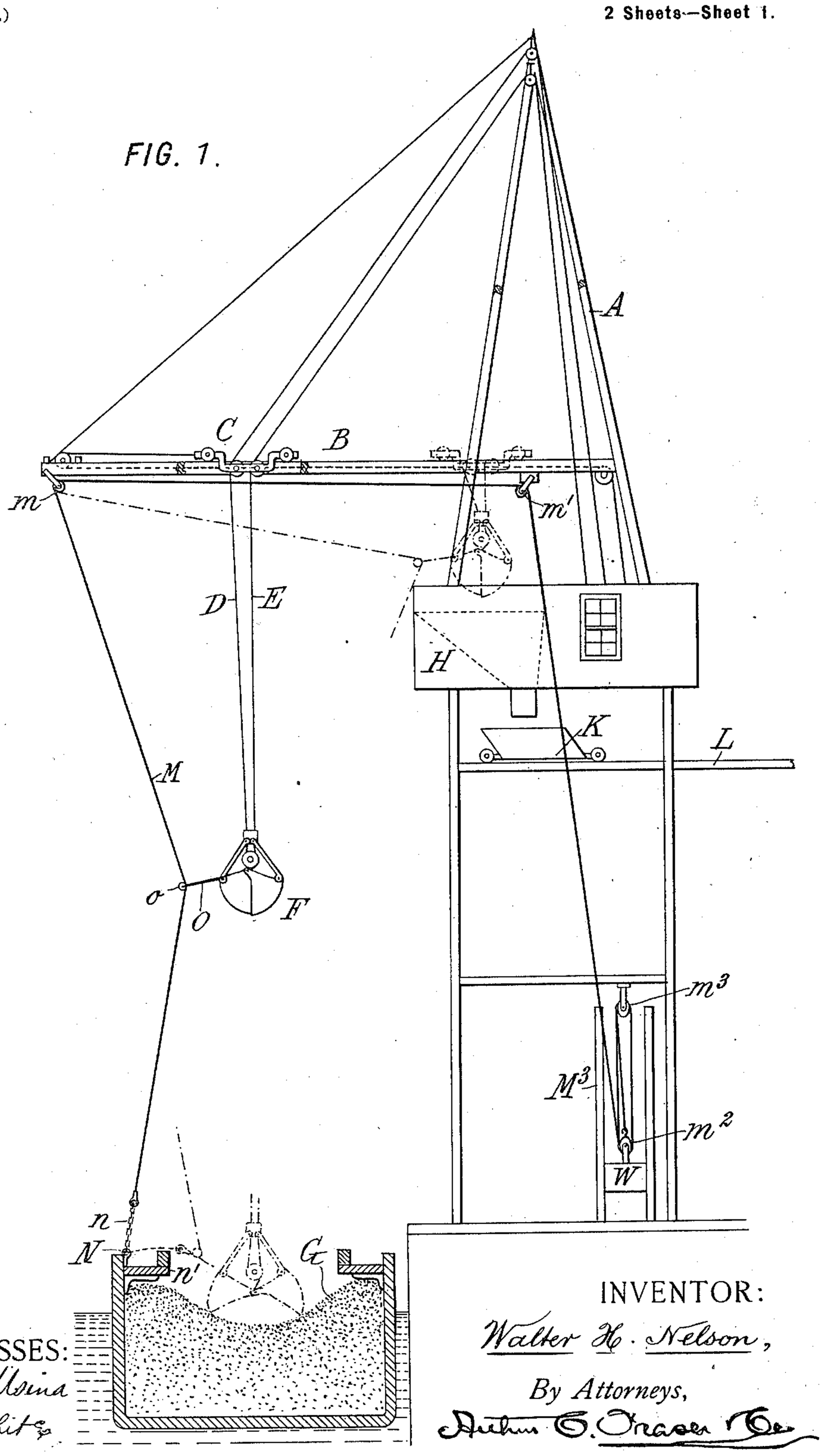

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FIG. 2.

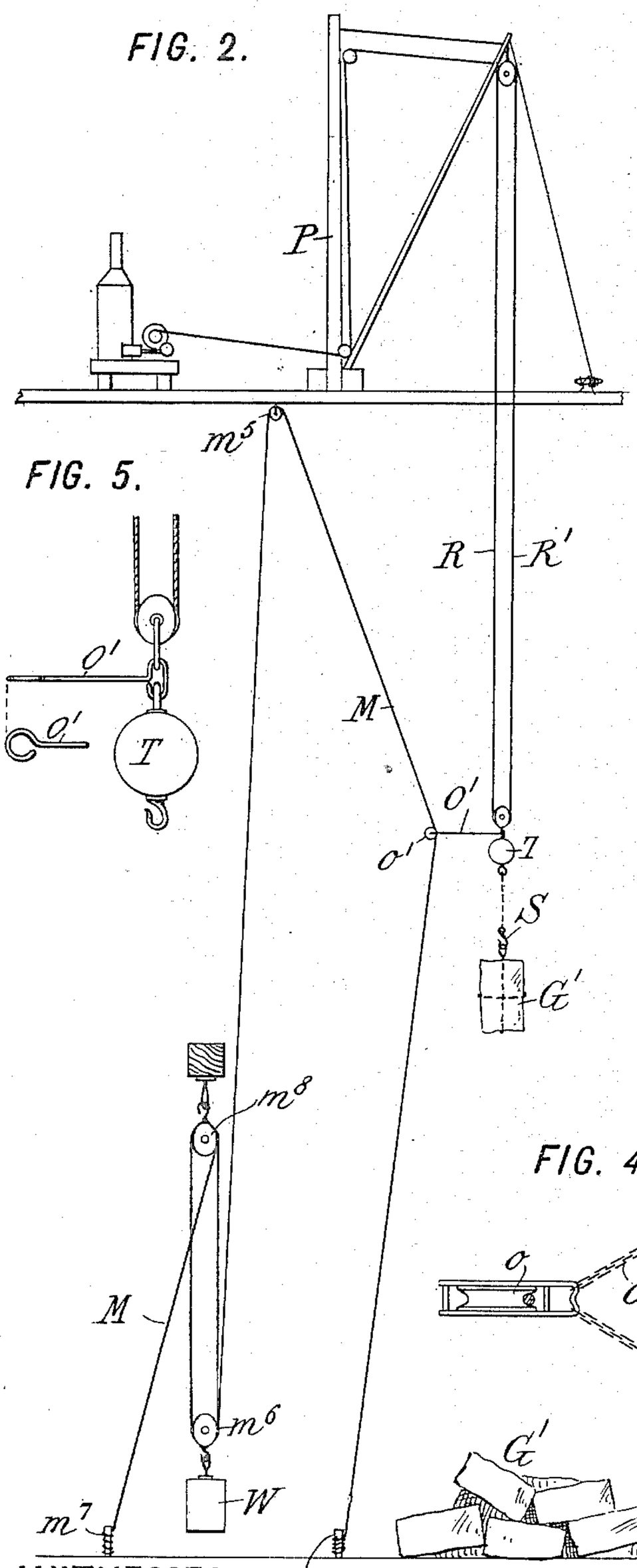
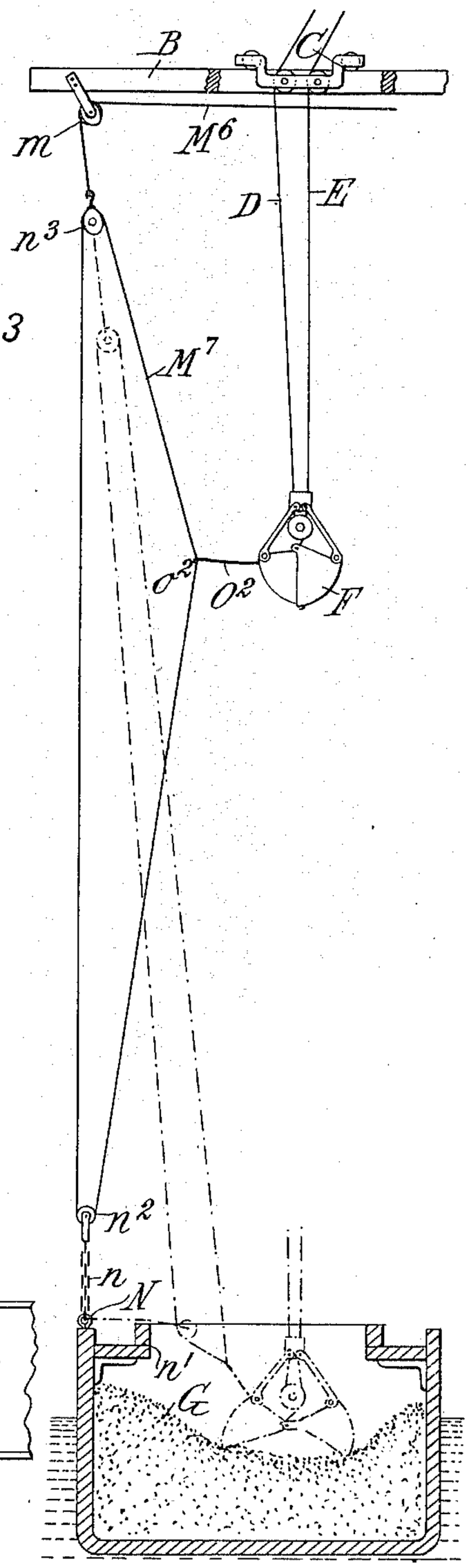


FIG. 5.

FIG. 4.

FIG. 3



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STEADYING DEVICE FOR ROPE HOISTS.

SPECIFICATION forming part of Letters Patent No. 661,318, dated November 6, 1900.

Application filed June 4, 1900. Serial No. 18,946. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. NELSON, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Steadying Devices for Rope Hoists, of which the following is a specification.

My invention aims to provide an improved means for steadying the load on a rope hoist during its movement.

The improved steadying device of my invention exerts a sidewise draft on the load which is substantially constant throughout the hoisting movement. It is simple and capable of ready application to existing hoists. The draft exerted is substantially horizontal throughout the hoisting and lowering operations, so as to be equally effective at all points of the load.

Various other points of advantage will be apparent from the following specification.

The term "rope hoist" is used herein to indicate any hoist employing a connection between the engine and the load which requires to be steadied by a lateral force during its movement. The figures of the drawings show the most familiar types of such hoists.

In Figure 1 is shown the application of my steadying device to the well-known form of power-shovel when unloading coal or the like from a vessel. In Fig. 2 is shown the application of the same to a stationary derrick operated by a steam-engine, such as is common in quarries, excavations, or the building of high structures. Fig. 3 shows a modification adapted to the power-shovel of Fig. 1. Fig. 4 is a plan showing the guy in detail. Fig. 5 is an elevation of the modified form of guy used with the apparatus of Fig. 2.

The ordinary type of power-shovel for unloading purposes comprises a frame A, carrying a boom or arm B, on which travels a trolley C, Fig. 1. The movement of the trolley on the boom is controlled from the engine-house by mechanism well known and not shown in the present drawings. The cables D and E serve to hoist and also to open and close the clam-shell bucket F. These ropes are controlled from the same engine-house as the trolleying-ropes. In operation the shovel or bucket F is lowered, as shown by dotted lines in the lower part of Fig. 1, to the material G to be hoisted, opened and closed to fill with material, hoisted and trollied back over the hopper H to the position shown in dotted lines in the upper part of Fig. 1, where it is opened, dumping the material into cars K, which are run off on tracks L.

Where the length of the hoist is considerable, there is a constant tendency of the ropes D E to twist, so as to foul each other and impede their movement. In order to prevent this twisting of the ropes, a guy-line has been attached to the bucket at one side and held by a man stationed generally on the ground or about on a level with the material to be hoisted. The efficiency of such a method is evidently greatest when the shovel is horizontally opposite the man holding the guy-line—that is, at approximately its lowest point. As the bucket rises the lateral effect of the guy-line becomes less and less. A guide has also been used, fixed at its upper end to a point over the load and held at its lower end by a man, a guy extending from the load to this guide and having a sliding engagement therewith. This system is preferable to the single rope above described, but is utterly inadequate to the control of high-speed hoists. Attempts have been made to eliminate the defects of these systems of manual control by running the guy-line from the side of the bucket to a fixed point on the boom and passing it at that point over a pulley and to a weight or system of weights. This, however, is defective in much the same respect as the single guy-rope under man control, except that it is automatic. The efficiency also is greatest at one point—that is, when the bucket is horizontally opposite the fixed point of the guy-line—and decreases as the bucket descends by reason of the lessened lateral effect of the pull on the guy-line. In fact this defect is more serious in the automatic mechanism than in the man-controlled guy-line, since the tendency to twist is greater as the length of the ropes D E increases.

My invention aims to produce an automatic steadying device which exerts a substantially equal lateral force at all elevations of the bucket, which pulls in a substantially horizontal direction at all times and which responds with sufficient force and suddenness

to the stresses brought on it, so as to steady the load perfectly. The principal elements of such a steadying device are a guide running substantially vertical or parallel with the direction of the hoist held in such position by a strong and quickly-acting automatic tension device and engaging the load, as by a guy connected with said load, the parts being so arranged that as the bucket rises and falls the guy remains substantially horizontal either by the simultaneous movement of the guide or the traveling of the guy along the guide.

In the form shown in Fig. 1 I provide a guide M, attached at one end to a fixed point N, adjacent to the load to be hoisted, which in this case is shown as a load of coal in a ship. The upper end of the guide M runs over a pulley m at a point on the boom B, preferably its outer end, and thence passes to a tension device. It is shown passing over a second pulley m' at the opposite end of the boom, and thence down to a point where it receives the pull of a weight W. I prefer to suspend this weight through a multiplying-tackle, as shown, where the rope passes around a movable pulley-block m^2 and a fixed block m^3. Preferably the weight runs in guides M^3. Attached to the bucket F, at one side thereof, is a guy O, (such as a rope, chain, or rod, or a pair of chains, as in Fig. 5,) carrying at its outer end an eye or pulley O, engaging the guide M. The action of the weight W is to maintain a continuous tension on the guide M, tending always to maintain it taut. The guy O is made so short that the weight of the shovel F, tending to draw it away from the guide M, pulls said guide out of the vertical a distance depending on the force necessary to prevent twisting of the ropes. The lateral force exerted by the guide M at the point o is much less than the lateral force of the heavy bucket F, either empty or full. The bucket F will therefore not be drawn seriously out of its true vertical path even at the top and bottom of its movement, where the lateral force of the weight is most effective.

The dotted-line position in the lower part of Fig. 1 shows the bucket lowered and opened. The chain n is provided at the lower end of the guide M, where it is drawn over the combing n' of the hatch, whereby wear due to the excessive amount of friction at this point is lessened.

The preferred guy for the apparatus of Fig. 1 is that shown in detail in Fig. 4, in which a pair of chains run from the corners of the bucket to the frame of the sheave O.

In the construction shown in Fig. 2 an ordinary stationary derrick P is employed, which by means of an engine Q operates a hoisting-rope R R', at the lower end of which is a hook S and a weight T for the purpose of lowering the hook when unloaded. G' represents the material being hoisted in this case, such as blocks of stone. The guide is similarly arranged to that in Fig. 1, being attached to a stake or similar fixed point of support N', adjacent to the pile of material to be hoisted, running thence to a pulley m^5, attached to any fixed point on an arm or similar member of the overhead structure and thence to a movable pulley m^6, which carries the weight W. The guide M then runs through a fixed pulley-block m^8 and thence to a stake m^7 or other fixed point. As in the previous case, the guide M is fixed and the guy O', attached to one side of the weight T and running thence to the guide, travels up and down the guide M by means of a pulley or eye o', the weight of the load on the hoist drawing the guide somewhat out of the straight line and the weight W tending to pull it into the straight-line position. Fig. 5 shows the preferred form of guy for this apparatus, the same being an integral arm extending laterally from the link intermediate the block and the weight T. It is not essential that the guide-rope should be fixed and the guy slidably connected therewith. Fig. 3 shows an arrangement embodying the same principle. In this construction the guide, though it preserves its alinement in the same manner as in the other constructions shown, is not stationary, but movable, and the guy is connected to the guide. At the lower end of the guide N is a chain n, as in Fig. 1, and to the upper end of this chain is attached a pulley n^2. The cable M^6, running over the pulley m at the end of the boom, is fastened near said pulley to a second pulley n^3. Running about the pulleys n^2 and n^3 is a guide-cable M^7, which is continuous and of a length to extend when doubled from the pulley n^2 to the pulley m when drawn taut. The guy O^2 is attached to the bucket, as in the previous cases, and at o^2 is attached to the guide-cable M^7. As the bucket is hoisted and lowered the point of attachment o^2 of the guy is raised and lowered, the guy remaining substantially horizontal. The action of the weight M^2, which is arranged as shown in Fig. 1, tends to maintain the cable M^7 in a straight line and the weight of the bucket F draws it out of such a straight line, whereby the bucket F is prevented from turning. The dotted lines show the position of the bucket when lowered.

The operation of the steadying device has been sufficiently indicated in the description of the construction of the same.

It is obvious that the fixed point of the guide may be at either the upper or lower end thereof.

Though I have described in detail particular embodiments of my invention, it will be understood that I do not limit myself to the exact construction shown and described. Various modifications thereof are possible to persons skilled in this class of machinery without departure from the spirit of my invention.

What I claim, therefore, and desire to se-

cure by Letters Patent, are the following-defined novel features and combinations, all substantially as described:

1. The combination with a rope hoist, of a steadying device acting in a substantially horizontal direction during the operation of the hoist, said steadying device having an automatic tension device for maintaining its tension.

2. The combination with a rope hoist, of a yielding guide therefor, said guide being substantially parallel to the travel of the load, and an automatic tension device tending to hold said guide taut.

3. The combination with a rope hoist, of a yielding guide therefor, said guide being substantially parallel to the travel of the load, and an automatic tension device tending to hold said guide taut, the load being engaged with said guide by a traveling engagement.

4. The combination with a rope hoist, of a guide therefor, said guide being fixed at one end, and an automatic tension device attached to said guide at the other end.

5. The combination with a rope hoist, of a guide therefor, said guide being fixed at one end, and an automatic tension device attached to said guide at the other end, the load being engaged with said guide by a traveling engagement.

6. The combination with a rope hoist, of a guide therefor, said guide being fixed at one end, an automatic tension device attached to said guide at the other end, and a guy running from the load to said guide and engaged with said guide by a traveling engagement.

7. The combination with a rope hoist, of an automatic steadying device exerting a substantially horizontal force on the load toward the lower end of its travel, said steadying device having an automatic tension device for maintaining such horizontal force substantially constant.

8. The combination with a rope hoist, of a guide therefor, said guide being fixed at its lower end, and an automatic tension device attached to said guide at its upper end, the load being engaged with said guide by a traveling engagement.

9. The combination with a rope hoist, of a support extending over the material to be hoisted, a guide extending from a point on said support to a point adjacent to said material, said guide being fixed at one end and running at its other end over a pulley and thence to a weight, and a guy running from one side of the load to said guide.

10. The combination with a rope hoist, of a support extending over the material to be hoisted, a guide extending from a point on said support to a point adjacent to said material, said guide being fixed at one end and running at its other end over a pulley and thence to an automatic tension device, and a guy running from one side of the load to said guide.

11. The combination with a rope hoist, of a support extending over the material to be hoisted, a guide adapted for attachment at its lower end to a point adjacent to the material to be hoisted and running at its upper end over a pulley on said support and thence to a weight, and a guy running from one side of the load to said guide.

12. The combination with a rope hoist, of a support extending over the material to be hoisted, a guide adapted for attachment at its lower end to a point adjacent to the material to be hoisted and running at its upper end over a pulley on said support and thence to a fixed point, a weight supported by said line intermediate of said pulley and said fixed point, and a guy running from one side of the load to said guide.

13. The combination with a rope hoist, of a support extending over the material to be hoisted, a guide adapted for attachment at its lower end to a point adjacent to the material to be hoisted and running at its upper end over a pulley on said support and thence to a weight, and a guy running from one side of the load and traveling on said guide.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WALTER H. NELSON.

Witnesses:
ARTHUR C. FRASER,
FRED WHITE.