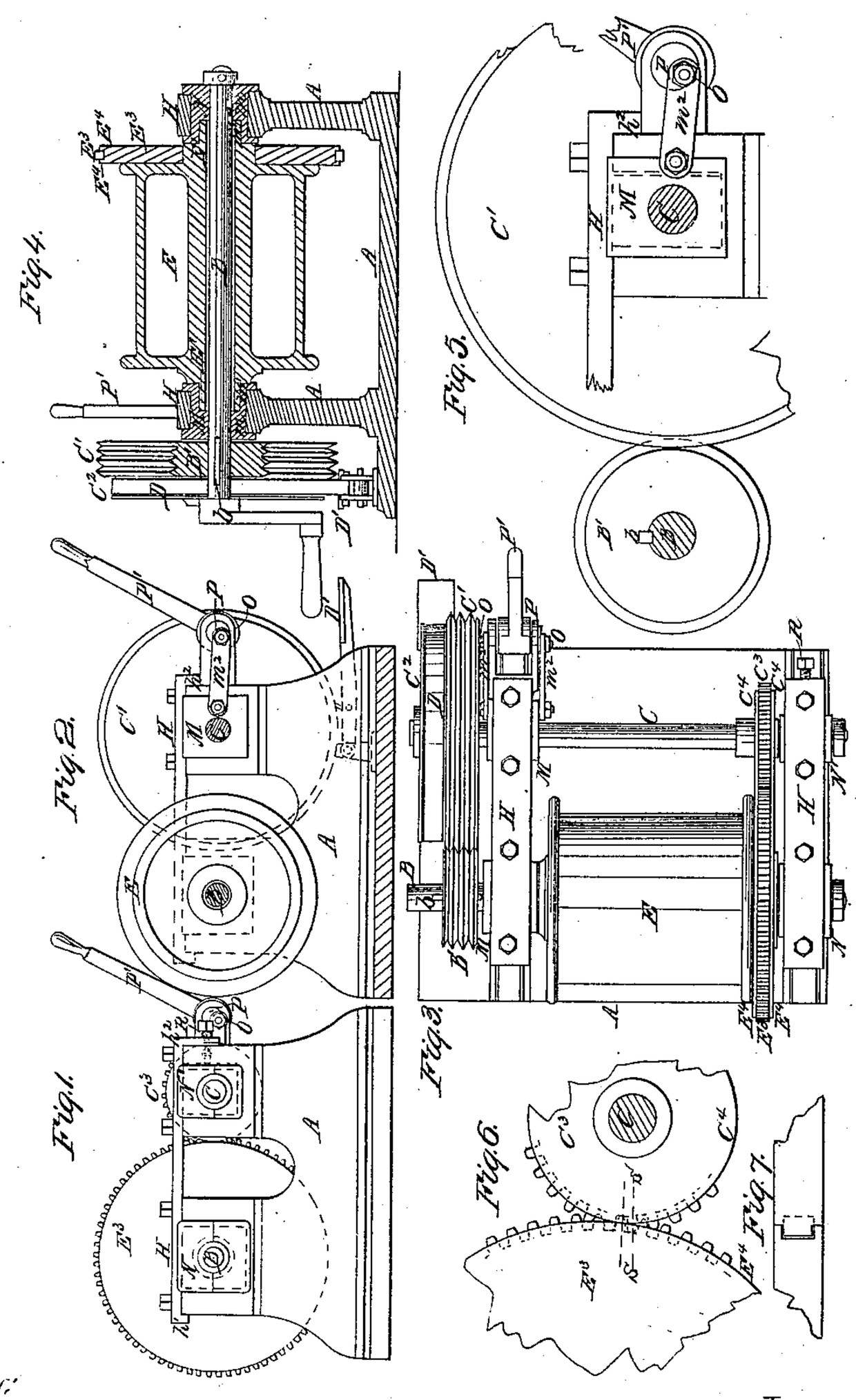
G. H. Reynolds,

Elevator.

No. 81,289. Patented Aug. 18, 1868.



Witnesses:

M. Ley

C. L. Livings.

Inventor:

Geo. H. Reynolds

UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND CORNELIUS H. DELAMATER, OF THE SAME PLACE.

IMPROVEMENT IN HOISTING-MACHINES.

Specification forming part of Letters Patent No. **81,289,** dated August 18, 1868.

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Hoisting-Machines; and that I do hereby declare that the following is a full and exact description thereof.

My invention is adapted for hoisting cargoes into and out of ships, raising and lowering the material and men in mines, and in all analogous situations; but it is more especially intended for those situations where a considerable number of hoisting-machines are to be worked from a single engine, as, for example, at the shafts of mines where the shafts are of such a size that several independent hoisting-ways are provided in the same shaft, or on a dock, where a number of hoisting-engines for loading and unloading coal and the like may be driven by a single line of shafting.

I will first proceed to describe what I consider the best means of carrying out my invention, and will afterward describe the points which I believe to be new therein.

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation. Fig. 2 is a cross-section. Fig. 3 is a plan, and Fig. 4 is longitudinal section. These figures show the entire machine on a small scale. Fig. 5 represents a side view of some of the parts on a larger scale, being the friction-gear and its appurtenances. Fig. 6 similarly represents another detail—the combined friction and spur gear which conveys the power from the back shaft to the hoisting-drum. Fig. 7 is a section of the same on the line S S in Fig. 6.

Similar letters of reference indicate like parts in all the figures.

A is the fixed frame-work, made of cast-iron or other suitable material. B is a section of a long shaft, which is rotated by a steam-engine or other power. (Not represented.) This shaft is extended, and holds the same relation to a number of hoisting-machines, only one being represented.

A feather, *b*, communicates the rotating motion from the shaft B to the friction-pulley B′, the latter being free to move endwise on the shaft and feather, but being compelled to rotate with the shaft. The periphery of the friction-pulley B′ is finished in **V**-shaped grooves, as represented.

C is a counter-shaft, and C^1 is a large friction-pulley, keyed or otherwise firmly fixed thereon. The periphery of this pulley C^1 is finished in grooves, **V**-shaped to correspond with the surface of the friction-pulley B′. The motion is transmitted from the pulley B′ to the pulley C^1, and this from the shaft B to the shaft C, at a reduced velocity, but with an increased force.

C^2 is a similar pulley by the side of the friction-pulley C^1, which is adapted to receive the strap-brake D, which is mounted as represented, and adapted to be operated by the action of the foot on the treadle D′, as will be obvious. C^3 is a small tooth-pinion, fixed on the shaft C, and meshing into the larger pinion E^3. There is a peculiarity in the construction of these wheels which will be described further on.

The general effect of the gearing is to transmit a slow and powerful rotatory motion to the wheel E^3. This latter is firmly fixed to the drum E. This drum winds up the rope or chain, or, by being allowed to turn in the opposite direction, allows the latter to unwind, according as the machine is required to hoist or lower.

It will be understood that, in the act of unwinding, the brake D and its connections are used in the ordinary manner to control the rapidity of the unwinding, consequently the lowering of the weight which is suspended.

It will be observed that the bearings of the shafts B and C are not directly on the frame-work A, but are in boxes. I will describe these boxes separately. The boxes M N support the shaft B, and also the gudgeons or trunnions of the drum E. The bearings or gudgeons of the drum E are designated E^1, and are hollow extensions, cast or otherwise firmly fixed on the drum, and turned at the periphery to form small and durable bearings. A hole is provided quite through the gudgeons E^1, and also through the drum E, of a greater diameter than the shaft B, so that it allows the shaft to turn freely without contact therewith. The boxes M N are finished properly to form a suit-

able bearing for the gudgeons E^1, and also to form a suitable bearing for a smaller shaft, B. This is effected by making the bearings each with an offset, as represented, one-half, or about one-half, of the width of each box M N being adapted to serve as a bearing for the shaft B, and the other one-half of the width adjacent to the ends of the drum E is finished and adapted to form a suitable bearing for the gudgeons E^1. I form the lower box and the upper box alike, so that a firm and reliable bearing is provided, with proper provisions for oiling. (Not represented.) I have designated the large part of each bearing m^1 and the small part of each bearing m. The peculiar construction and arrangement in these parts make the bearings of the shaft B entirely independent of the bearings of the drum D.

It frequently happens, where machines are worked in this manner, that one hoisting-machine lies idle for a long period, sometimes for an entire season, while the shafting which is ready to drive it is actively rotating and giving motion to the others. Now, if, as is usually the case, the shaft B were used for the support of the drum E and its connections, the wear thus induced, being all on one side of the drum E, would induce serious damage, and perhaps quite incapacitate the machine for subsequent work. As I have arranged it, the wear is entirely independent of the drum E. No contact of the shaft B with the interior of the drum E can occur until the box M is gradually worn away. Very ordinary care on the part of the engineer in charge is sufficient to guard against the shaft getting so much out of line as to touch and wear upon the interior of the part E; and even supposing that it does so wear, the subsequent lining up of the shaft by introducing new boxes M N remedies the evil entirely; and the fact that the interior of the drum D is worn a little out of true on one side is of no effect whatever in the subsequent working of the machine.

The boxes M′ N′ support the shaft C. Both move horizontally within certain limits. The box nearest to the wheel C^1 is connected, by links m^2, to pins O, mounted eccentrically in the shaft P. By turning this shaft P by aid of the hand-lever P′, the box N′ may be moved horizontally. It is thus moved away from the shaft B when it is desired to suspend the hoisting motion, and is moved toward the shaft B, so as to press the surfaces of the friction-pulleys C^1 into contact with the surfaces of the friction-pulley B^1, whenever it is desired to hoist.

The pins O are mounted in such a position on the shaft P, and all the parts are so adjusted, that the radius of motion of the pins O acts nearly in line with the links m^2 when the friction-wheels B′ C^1 are properly in contact, so that there is a great leverage to allow these parts to be forcibly brought together by the action of the hand on the lever P′. I attach considerable importance to this arrangement.

The other box, N′—that nearest the gear-wheel C^3—is adapted to be adjusted horizontally by means of the screw R. This screw allows the gear-wheels C^3 and E^3 to be adjusted with very great delicacy.

I will now describe the construction and the peculiar operation of this gear as thus delicately adjusted.

The teeth of each of the wheels C^3 and E^3 are cast or otherwise produced, of the ordinary approved forms, for matching accurately together, and transmit the motion smoothly from one wheel to the other. The service which is required of these wheels is peculiarly severe. In the act of hoisting, a rotatory motion is transmitted slowly from the wheel C^3 to the wheel E^3. In the act of holding the weights suspended, the teeth, which are in contact, stand at rest, or support the strain in the ordinary manner.

So far the work is not peculiarly severe; but in the act of lowering the load by slackening the strain on the brake D the rope is liable to unwind from the drum E with very great rapidity, and a motion in the reverse direction of that of winding up or hoisting is transmitted from the large gear-wheel E^3 to the small gear-wheel C^3. The wear in this case is on the opposite faces of the teeth from that experienced in hoisting; and it is very difficult in practice to avoid a disagreeable and dangerous backlash in the gear. This is particularly severe when, after attaining a very high speed, the brake D is applied with violence, and again let off or slackened up suddenly, as is liable to be done. The noise and liability to fracture which would otherwise result from this peculiar service are entirely obviated by my construction and arrangement of these parts. I provide on each of the gear-wheels C^3 E^3 a stout rim on each side of the teeth, which is accurately turned to the pitch-line of the gear. I turn the screw R until the bearings thus provided are pressed firmly together, so that there is a rolling contact between the surfaces C^4 and E^4 on each side of the gear C^3 and E^3. The rims C^4 and E^4 are cast in one with the teeth C^3 and E^3, and perform the double functions of strengthening the teeth and of steadying the motion of the gear. I press the wearing-surfaces in contact firmly, so as to induce a slight resistance to motion, and find that the result is an almost noiseless motion of the gear, both in hoisting and in lowering.

I have tested the invention, and find that it greatly reduces the liability of the parts to fracture. I wish it distinctly understood that I ascribe this fact not alone to the strengthening of the teeth by their connection at the roots, but also to the steadying of the motion and the prevention of concussive shocks and hammering of the teeth together by reason of the contact of the rolling-surface.

I aid in resisting the strain, urging the boxes M N apart, by means not only of the frame A, but also by peculiarly arranged and constructed binders H. These latter are

adapted to perform the double duties of binders and of ties. Strong shoulders h^1 h^2 are provided, which fit over and support the corresponding surfaces on the framing A. By mounting the bearings of the shaft P and of the screw R in the ends of these binders, instead of on the framing A, I insure a directness of strain and an absence of spring in all the parts which is very desirable, and without which it would be difficult to properly realize the advantages due to the other advantages of my invention.

When the shaft B is short, the provision for allowing the friction-pulley B′ to move endwise thereon is of little importance. But when the shaft B is long, and is employed to give motion to more than one of my hoisting-engines, it is liable, from various causes, particularly from the occasional heating of the shaft from the friction, to vary the length, and thus to vary the position, of the parts firmly attached thereto, so much so as to cause serious mischief. My arrangement in allowing the end motion, as described, is being tested at the mouth of a mine where heavy loads of material are lifted by independent hoists at the rate of two hundred and fifty feet per minute by a single continuous-working engine.

Having now fully described my invention of an improved hoisting-machine, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a system of hoisting-machines, providing for end play by the employment of the feather *b*, or its equivalent, in combination with the V-shaft, friction gear-wheels B′ C^1, substantially as and for the purposes herein set forth.

2. In combination with the shaft C and friction-wheels B′ C^1, the movable box M′, links m^2, and eccentric-pins O, mounted relatively to the shaft P and handle *p*, so that the pins O shall come nearly on their dead-points when the friction-wheels B′ C^1 are properly connected, as and for the purposes herein set forth.

3. Connecting the shaft C and the winding-drum E in a hoisting-machine by the peculiarly constructed and arranged parts C^3 C^4 and E^3 E^4, as and for the purposes herein set forth.

4. The bearings m^1 for supporting the drum E and its connections independently of the concentric shaft B, as and for the purposes herein set forth.

5. The binders H h^1 h^2, constructed and arranged to serve relatively to the shafts B C and their several connections, so as to support the frame A, and aid in preventing any spring or displacement of the parts under the strains and vibrations to which they are subjected, as herein set forth.

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

GEO. H. REYNOLDS.

Witnesses:
W. C. DEY,
C. C. LIVINGS.