F. H. HAMBLETON.

Improvement in Hoisting Apparatus.

No. 127,049. Patented May 21, 1872.

Fig. 1.

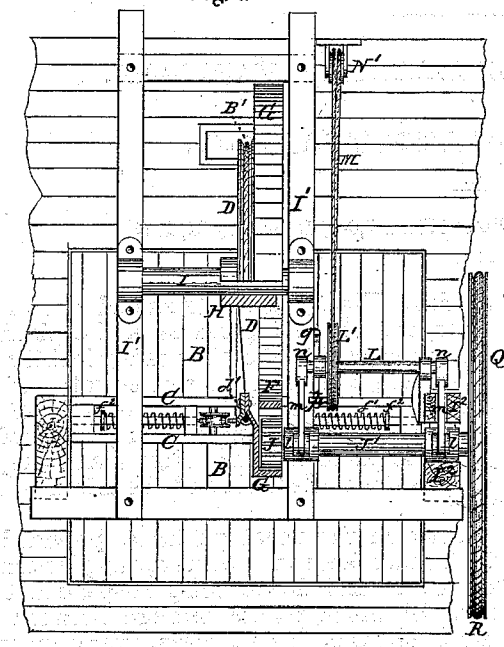


Fig. 4.

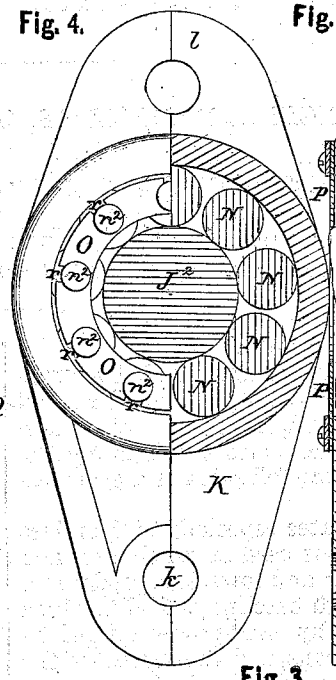


Fig. 5.

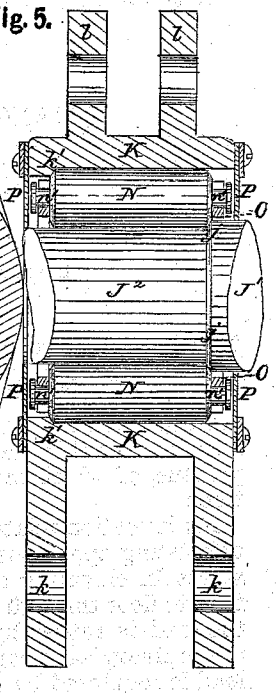


Fig. 2.

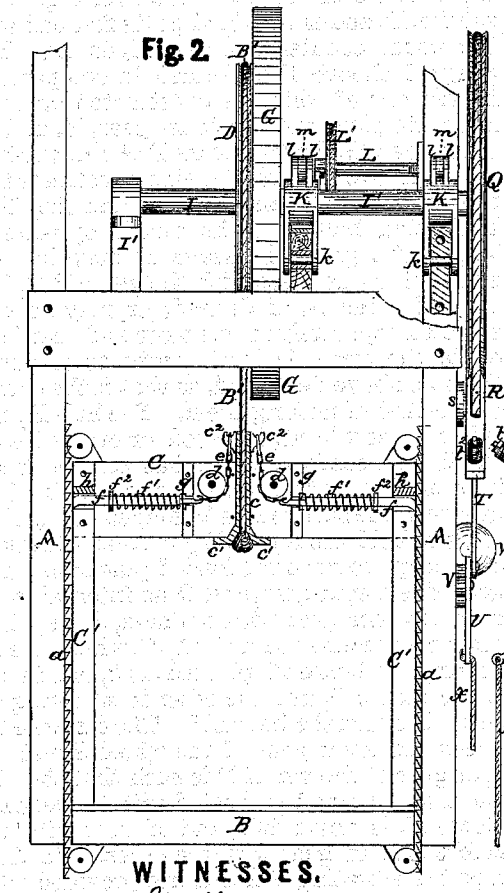
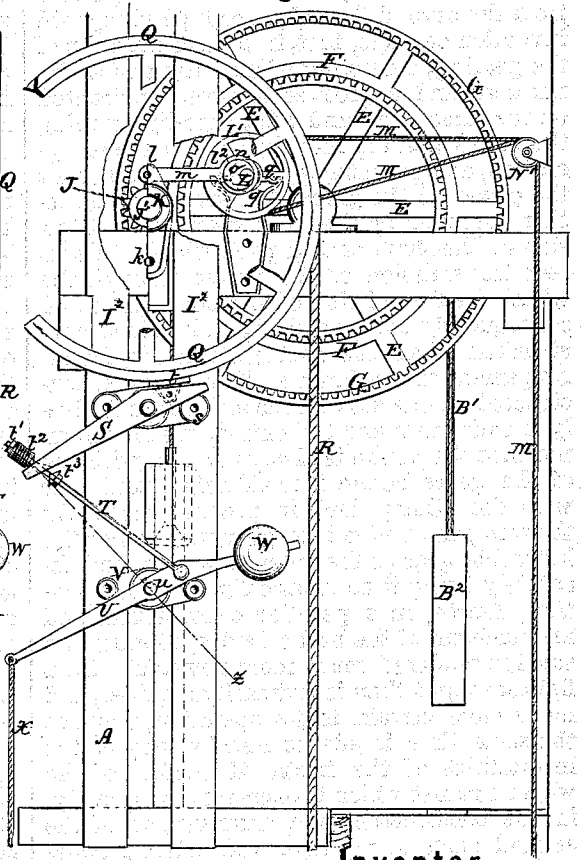


Fig. 3.



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FRANCIS H. HAMBLETON, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN HOISTING APPARATUS.

Specification forming part of Letters Patent No. 127,049, dated May 21, 1872.

To all whom it may concern:

Be it known that I, FRANCIS H. HAMBLETON, of the city and county of Baltimore and the State of Maryland, have invented certain new and useful Improvements in Hoisting Apparatus, of which the following is a specification:

My invention relates especially to that class of hoisting apparatus used in warehouses and stores for elevating and lowering goods from floor to floor through hatchways, and in which the load is raised by hand-power applied by the ordinary hand-rope, and the descent of the load is regulated by a friction-brake operated from the several floors by a rope; and my said invention consists, first, in the construction of the gearing, consisting of an outer and an inner gear and a grooved sheave, constructed on the same arms and hub, thereby bringing the entire gearing into the same plane of operation, and permitting the pinion to transmit the power to the grooved sheave, through either the inner or the outer gear, without torsion of the shaft carrying the wheel; this direct transmission of the power through the wheel itself admitting of a much lighter and consequently cheaper shaft, and lighter construction of all the parts; second, in the arrangement of the inner and outer gears, constructed on one set of arms and hub, relatively to each other and the pinion, in such a manner that the pinion is always in gear with one of the gears before it is entirely out of gear with the other; third, in peculiar means for throwing the pinion into gear with either the inner fast gear or the outer slow gear, and absolutely fixing it automatically in either position; fourth, in a peculiar construction and arrangement of the brake device, whereby the same is rendered much more powerful with a lighter weight than is ordinarily required, and much more certain in its operation, while at the same time it adapts itself to any of the inequalities of the frictional surface of the wheel against which it operates; and, lastly, in the construction and arrangement of the several parts of my improved hoisting apparatus.

In the accompanying drawing, Figure 1 represents a plan or top view of my improved hoisting apparatus, one portion of the gear-wheels and grooved sheave being shown in section. Fig. 2 represents an end view of the same, one of the top beams of the platform being removed to show the safety locking device. Fig. 3 represents a side elevation of the same, part of the framing and one-half of the boxes of the pinion-shaft being removed to show the pinion in gear. Figs. 4 and 5 represent sectional elevations of the friction-bearings.

Between the usual guides A, provided on their inner faces with racks *a*, the platform B moves up and down, being suspended by a rope, B^1, which passes through between the top beams C of the platform, over a grooved sheave, D, and is provided at its free end with the usual counterbalance-weight B^2. The grooved sheave D is formed in two parts or halves, one of which is constructed on arms E, in one piece with an inner gear, F, and an outer gear, G, the two gears F G and one-half of the grooved sheave D being constructed on the same hub H and arms E, and the other half being bolted to the part D by bolts *d'*. The entire grooved sheave D may be constructed in one piece with the gears F G, hub H, and arms E, if desired, or may be constructed separately in one piece and then bolted to the arms E; but I prefer to construct them as above described, as that is the cheapest method of making them. The hub H, carrying these wheels, is keyed or otherwise secured on a shaft, I, which has suitable bearings on the cross-beams I^1 in the loft. The groove of the sheave D is V-shaped or angular, so as to hold the rope B^1 by friction with sufficient gripe to raise the loaded platform. The gear F is a spur-gear, and G an internal gear, both of which gear with a pinion, J, keyed or otherwise secured on a shaft, J', which has its bearings in boxes K, pivoted at *k*, one in one of the beams I^1, and the other in a casting secured between the beams I^2. The distance between the inner gear of the wheel G and the spur-gear of the wheel F is such that the pinion J, which may be vibrated with its bearing-pieces K, is never fully out of gear with one before it is in gear with the other. On their tops the vibrating boxes K are provided with lugs *l*, between which the inner ends of rods *m* are pivoted, the outer ends of which are provided with straps *n*, in which eccentric disks *o* move, which are formed on the ends of

a shaft, L, secured in suitable bearings. This shaft L, between its bearings and near its inner one, carries a grooved wheel, L′, over which, as over a double-sheaved pulley, N′, a rope, M, passes, by means of which rope the shaft L can be turned half a revolution and the shaft J′ vibrated with its bearings, thereby bringing the pinion into gear with either gear F or gear G. The wheel L′ is provided with a solid section or weight, l^2, so arranged that the center line of this solid portion is always in line with the dead-centers of the eccentric disks *o* when the pinion J is fully in gear with either of the gears F or G. From a center line of this section l^2 a pin, *p*, extends laterally and lies in a rest, *q*, on either side of the shaft L when the pinion J is fully in gear, and is, by the rest *q*, prevented from dropping down and bringing the parts out of gear, while the momentum of the weight of the solid portion l^2 of the wheel L′ assists in shifting the pinion when the wheel is operated by the shifting-rope M, and prevents the eccentric from working upward accidentally or independent of the wheel L′.

The bearings of the shafts J^1 in the vibrating boxes K are shown in detail in Figs. 4 and 5. These boxes K are bored out to a diameter sufficient to admit the journal J^2 of the shaft J^1 and a suitable number of anti-friction rollers N, and the bore is, at its outer end, reduced, so as to form a shoulder, *k′*. The body of the shaft J^1 is sufficiently larger than its journal J^2 to form a shoulder, *j*. These shoulders *k′* and *j* are slightly beveled to conform to the beveled ends of the rollers N, and these beveled surfaces are sufficiently rounded to prevent any cutting or binding of the parts. The journals n^1 of these rollers N are provided with collars n^2, and these journals have their bearings in radial slots *r*, in distance-rings O, one at each end. The rollers N having been placed in their distance-rings O, they are placed into the boxes K until their beveled ends bear against the correspondingly-beveled shoulder *k′*. The journal J^2 of the shaft J^1 is then passed centrally into the openings formed by the rollers N until its beveled shoulder *j* bears against the correspondingly-beveled shoulders of the rollers N, which rollers are in this manner held between the shoulders *k′* and *j*, without any other fastening whatsoever. The ends of the openings in the boxes K are closed by washers P, of any suitable material, secured to the boxes K, and encircling the shaft J^1 dust-tight. The bearings of the shaft I are formed in precisely the same manner. They may, however, as the shaft does not pass through them entirely, be formed with solid outer ends, thus obviating the necessity of washers on the outside. By this arrangement of the bearings I not only gain great advantage in the cheapness of construction of this kind of bearings, but their great simplicity enables them to be taken apart and put together again for repair, cleaning, or any other purposes with the greatest ease, and without the necessity of taking apart and reuniting a large number of pieces.

The shaft J^1 carries on its outer end the grooved hand-rope wheel Q, over which the hand-rope R passes, by means of which motion and power are transmitted to the pinion J and the operating-wheel F, G, and D. Just below the hand-rope wheel Q a bracket, *s*, is secured to the beams I^2, on which the brake-lever S is pivoted. In the upper face of this lever the brake-shoe *t*, conforming in shape to the groove or periphery of the wheel Q, is secured, so as to allow it to rock and play to accommodate itself to the accidental irregularities of the wheel. Through the lower end of the lever S passes a rod, T, the upper end of which is provided with a screw-nut, t^1, against which one end of a coiled spring, t^2, bears, while the other end bears against the lever, a screw-nut, t^3, under the lever, on the rod T, serving to adjust the play of the rod in the lower end of the lever. The lower end of this rod T is pivoted to a lever, U, a short distance above the pivot *u* of the latter on a bracket, V. The upper end of this lever U carries a weight, W, while to its lower end a rope, X, is secured, which rope extends downwardly to the ground floor. When the rope X is slack the brake is applied to the wheel Q, and the spring t^2 is then fully compressed, so that when, in order to release the brake, the rope X is pulled, this spring will first expand before the shoe *t* drops entirely away from the wheel; and, by means of this spring, the inequalities in the periphery of the wheel Q are more or less absorbed, thereby preventing jerking or injuriously sudden checking as the load descends, and preventing any sudden descent of the platform. By the arrangement of the rod T relatively to the levers S and U, it will be seen that the nearer the pivot of the rod T on the lever U approaches to the line from the end of the lever S, through the pivot *u* of the lever U, the more power does the ball W get in operating the brake, until, when the end of the lever S, the pivot *u*, and the pivot of the rod T are in line with each other, as shown by the dotted line *z*, Fig. 3, the power would be infinite, as in the ordinary toggle-joint; but the weight, of course, is arranged so as never to have excessive strain. By this arrangement of the levers I am, therefore, enabled to use a much smaller weight than is ordinarily required, and at the same time get the required throw of the rod T, and in pulling the rope X to release the brake, much less exertion is required to overcome the small weight, and the brake is therefore more sensibly under the control of the person operating it. From the platform B rise standards C^1, to the outside of which, at their upper ends, are secured beams C, between which a hollow tube, *c*, has a free play. At its lower end the tube *c* is provided with a flange, c^1, which bears against the under side of the beams C, and at its upper end, which extends a suitable distance above the upper edge of the beams C, it is provided with hooked projections c^2. The wire-rope B^1 passes through this tube *c*, and is suitably secured on the under side of the

same. On each side of the tube *c* grooved sheaves *d* are pivoted between the beams C, over which chains *e* pass, which are at their upper ends hooked over the projections c^2 of the tube *c*, while their lower ends are connected to spring-bolts *f* which pass through partitions *g* between the beams C, and through the standards C^1, and are encircled by springs f^1, which with their inner ends bear against the partitions *g*, and with their outer ends against shoulders f^2 on the bolts *f*, and have a tendency to force the bolts *f* outwardly. As long as the wire-rope B^1 supports the platform it keeps the tube *c* elevated, as shown in Fig. 2, and the bolts *f* drawn inwardly against the springs f^1, which springs I prefer to make of such strength as to be merely overbalanced by the weight of the empty platform; but should the rope break the tube *c*, which has then nothing to keep it up, instantly falls, for the springs f^1 are then released and force the bolts *f* out instantly; and the bolts, catching on the teeth of the racks *a*, on the guides A, at once arrest the descent of the platform, and hold it suspended, and it will be readily observed that either of the bolts *f* may act independently of the other, so that if one bolt should foul, or the teeth of the rack *a* on one side be clogged up so as to prevent that one bolt from operating, the other bolt will still be free to act and prevent the dropping down of the platform; and in this feature my device differs from all others in which the bolts can only act simultaneously, and not independently of each other, so that if one bolt, for any reason, becomes inoperative, or does not act, the other bolt is thereby rendered useless also. As the distance from one tooth to the other on the rack *a* is about three inches, the platform may have, should the rope B^1 break, a fall of that distance, and the weight of the platform with its load, being suddenly brought up with a shock on any two teeth, might have a tendency to break either the teeth or the bolts. To prevent this sudden shock, I insert in the standard C, in the openings through which the ends of the bolts *f* pass, rubber cushions or springs *h*, against which the bolts *f* strike, when the robe B^1 breaks, and which cushions *h* tend to soften the sudden shock, and prevent the breaking of any of the parts.

The advantages of constructing the gears F G and sheave D on one hub and one set of arms, besides the cheapness of construction, consists in transmitting all the strain of the power exerted directly from the teeth to the groove without having to make several sets of arms and a shaft strong enough to transmit it back and forth through several gears. And for this reason I obtain at the working point the maximum amount of power under the least possible amount of friction. And, further, as the strain on the shaft I is always perfectly even over its whole length, and as the power is transmitted to the grooved sheave D directly from the pinion, by reason of the sheave being constructed in one piece with the gear-wheels F and G, I am enabled to use much less material in the shaft and operating-wheel. By placing the gears F and G at such distance from each other that the pinion J is never fully out of gear with one gear-wheel until it is in gear with the other, I render the shifting device absolutely safe against its getting accidentally out of the control of the person operating the shifting-rope. For, if the pinion could, by fouling, attain a position between the two gears, so as to be out of gear with both, and by reason of some accident the load descend, violence would be done to some of the machinery. But by my arrangement this is rendered impossible, as the pinion is always in gear with one of the gears or the other, and can never be out of gear with both at the same time.

The only advantage one hoisting machine can have over another, provided both are geared an equal number of times, in point of the load lifted and the amount of power applied, must necessarily be in the less amount of friction in the better machine. And this important advantage in hand-power machines I attain by applying the anti-friction rollers to the bearings of the shafts of my apparatus, by means of which the friction is reduced to the least possible amount; and these friction bearings being made dust-tight by means of the washers P, require no oiling or other attention, so very necessary in hoisting apparatus, in which the dust and dirt collecting on the oil and drawn into the bearings renders repeated oiling an absolute necessity.

The shifting-wheel L′, being provided with a pin, *p*, extending laterally from its solid portion l^2, holds the pinion absolutely fixed in gear with either wheel F or G; for by reason of the solid portion l^2, which of course has a downward tendency, the wheel L′ cannot revolve so as to raise the section l^2, and cannot therefore revolve the shaft L in one direction until operated by the rope M; and the pin *p*, lying in its rest *q*, prevents the wheel from revolving the shaft in the other direction, and thus prevents the pinion from being moved out of gear.

Having described my invention, I claim—

1. The operating-wheel of a hoisting apparatus, having its several parts, consisting of the gears F and G and grooved sheave D, constructed and arranged upon one hub and one set of arms, in the manner essentially as described.

2. In combination with the operating-wheel of a hoisting apparatus having a fast and slow gear, I claim the shifting pinion J, arranged with respect to the fast and slow gear, to be engaged with either the one or the other, to increase or diminish the speed of the platform, as may be desired, essentially as described.

3. The operating gear F G and pinion J, having their pitch lines arranged relatively with each other so as to always form a lock to the operating-wheel in changing the pinion from one gear to the other, as described.

4. The arrangement of the fast and slow gears F G and pinion J in the same plane, as shown and described.

5. The eccentric device L′ connected with the pinion J, by means of the rods *m*, for effecting the change of the pinion and holding it when so changed, as described.

6. The combination of the eccentric disks *o* with the wheel L′ and its operating cord M, when arranged to have its movement limited on either side to half a revolution for the purpose of determining with exactness the position of the pinion J to the gears F G, as described.

7. The vibratable boxes K of the shifting-pinion J, provided with anti-friction rollers N, as and for the purpose described.

8. The sheaves *d* holding chains *e* and the hooked-projections c^2 of the movable tube *c*, arranged as and for the purpose described.

9. The arrangement of the safety locking bolts *f* of the platform B, with respect to their central attachment, for the purpose of allowing the bolts *f*, when released, to operate in combination with their racks, independently of each other, or simultaneously, essentially as described.

10. In combination with the safety-bolts *f*, I claim the cushions *h*, arranged as described, for the purpose of preventing the fracture from concussion of both racks and bolts, in the event of the breaking of the rope B^1, essentially as described.

11. The spring t^2 on the rod T, connecting the brake-levers S U, arranged to operate in connection with the brake device, essentially as described.

12. The combination of the levers S U, rod T, weight W, spring t^2, pivoted shoe *t*, and rope X, operating as a brake upon the hand-rope wheel Q, essentially as described.

13. An elevator or hoisting-machine, constructed, arranged, and operating in all its parts substantially as herein set forth.

The above specification of my improvement in hoisting apparatus signed this 16th day of February, 1872.

FRANCIS H. HAMBLETON.

Witnesses:
A. E. H. JOHNSON,
ALEXR. A. C. KLAUCKE.