2 Sheets—Sheet 1.

M. PENNYPACKER.

HOISTING APPARATUS.

No. 189,649. Patented April 17, 1877.

Fig. 1.

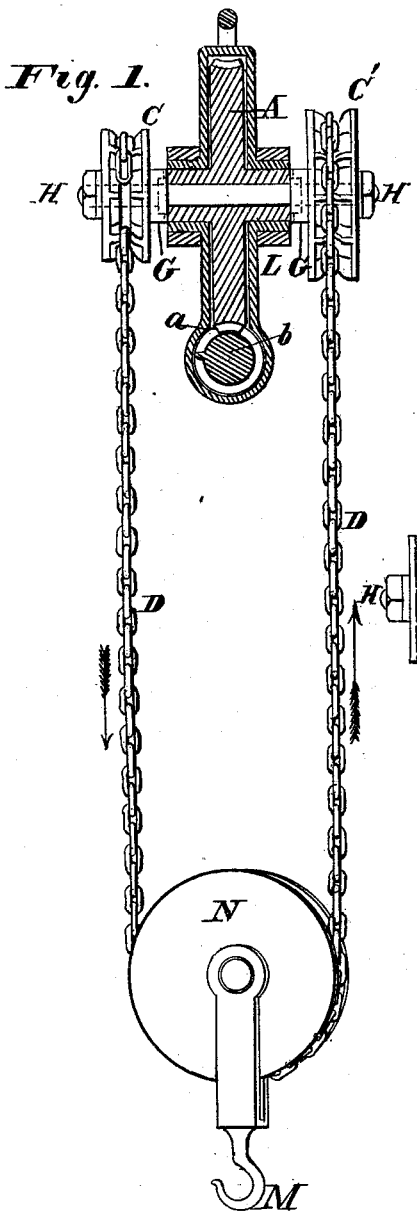
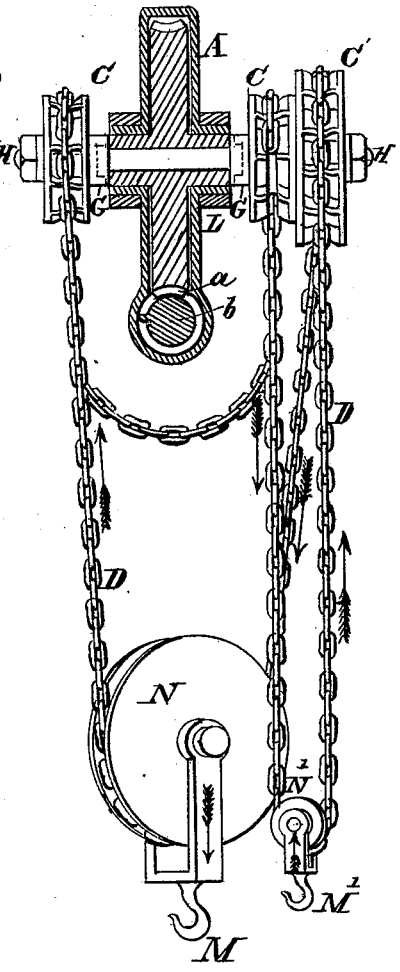


Fig. 2



WITNESSES

Wm. H. Pearce

LeBlond Burdett.

INVENTOR

Matthias Pennypacker

By Knight Bros Attorneys

2 Sheets—Sheet 2.

M. PENNYPACKER.

HOISTING APPARATUS.

No. 189,649. Patented April 17, 1877.

Fig. 3

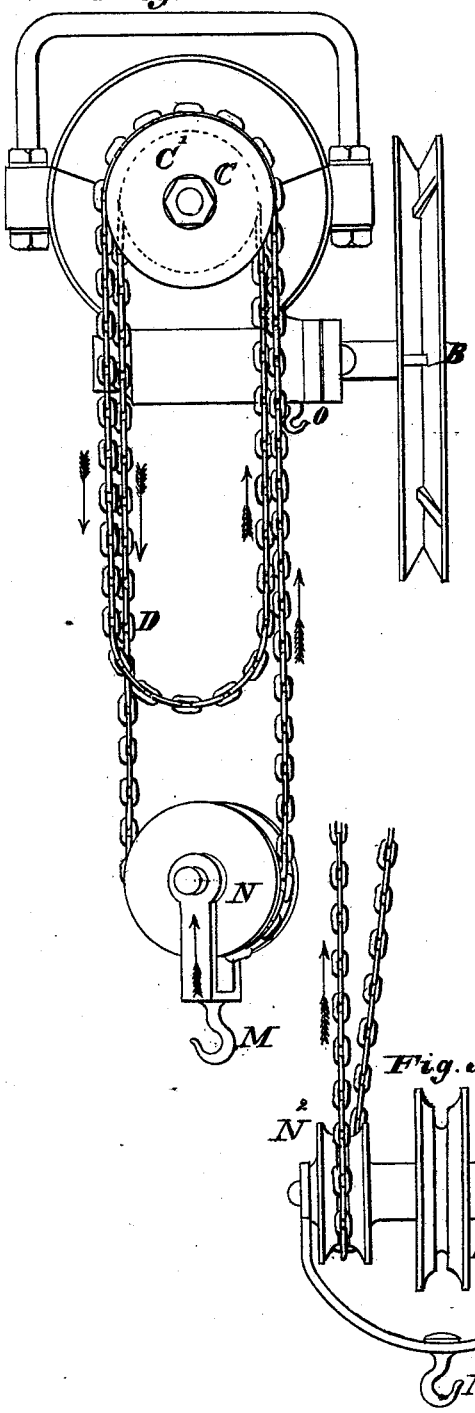


Fig. 4

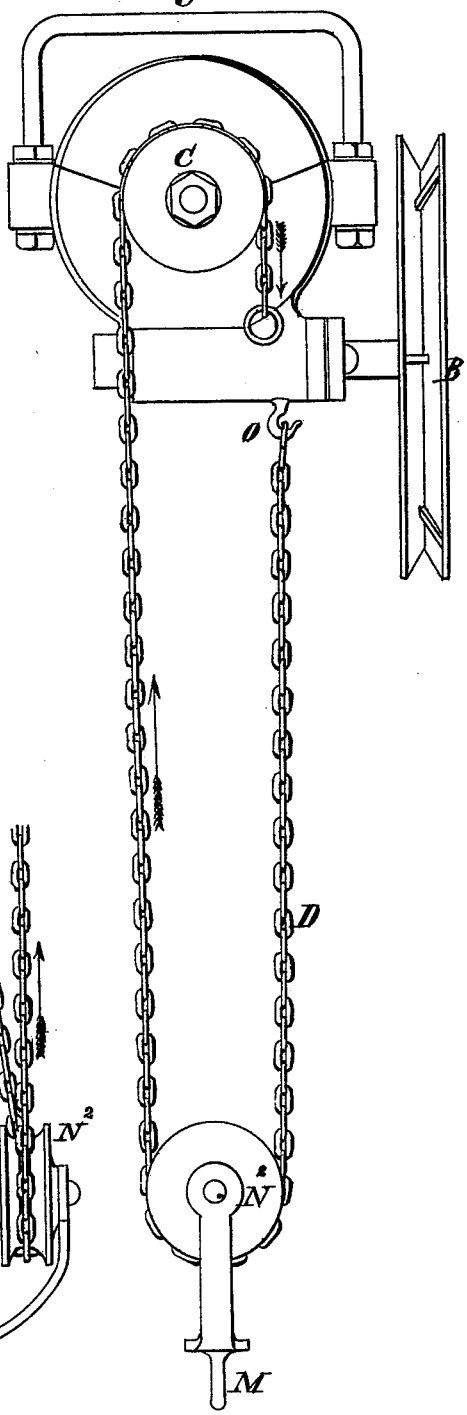
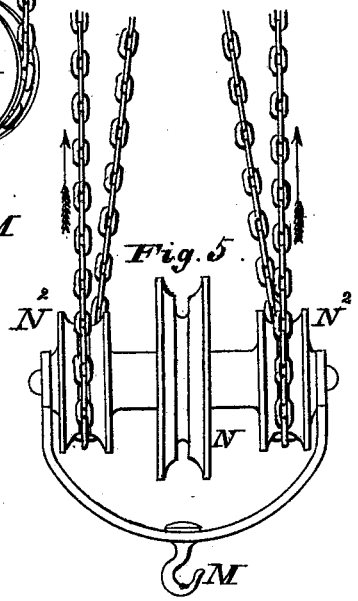


Fig. 5.



WITNESSES

Wm. H. Pearce

LeBlond Burdett.

INVENTOR

Matthias Pennypacker.

By Knight Bros. Attorneys

UNITED STATES PATENT OFFICE.

MATTHIAS PENNYPACKER, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HOISTING APPARATUS.

Specification forming part of Letters Patent No. **189,649**, dated April 17, 1877; application filed September 30, 1876.

To all whom it may concern:

Be it known that I, MATTHIAS PENNYPACKER, of Philadelphia, Pennsylvania, have invented a certain new and useful Hoisting Apparatus, of which the following is a specification:

My invention relates to an improvement in the class of hoisting-machines described in Letters Patent No. 171,855, granted January 4, 1876, to Louis T. Pyott and myself, as assignee of said Pyott.

My invention consists, first, in constructing a screw hoisting-machine of the kind referred to with differential pulleys of different diameters, or different number of teeth, and located on opposite sides of the main wheel and central box, so that the hoisting-chain, being passed diagonally from one pulley to the other, may wind up on one pulley, while it is paid out at a less speed by the other, thus affording great hoisting power, and at the same time causing the load to be sustained at any point by the screw-gearing, and dispensing with bearings outside or beyond the sheaves.

In the accompanying drawing, Figure 1 is an elevation of a hoisting apparatus illustrating my invention, showing the worm-gear in section, and illustrating the application of the differential pulleys to opposite sides of the worm-gear. Fig. 2 is a similar sectional elevation, illustrating the application of pulleys of equal diameters to opposite sides, and a larger pulley attached to one of them, so as to rotate therewith. Fig. 3 is an end elevation of the apparatus shown in Fig. 1. Fig. 4 is an end elevation, illustrating my mode of attaching one extremity of the chain to a stationary hook, in order to double the hoisting power. Fig. 5 is a front elevation of the lower portions of a double chain used as in Fig. 4, and a double sheave adapted for use in connection therewith.

A represents a worm-wheel, having its bearings in a central box, L. B is a driving-wheel, the shaft of which is formed with a worm or screw, *b*, meshing with the worm-teeth *a* of the wheel A, so as to impart a powerful rotary movement thereto, and retain it in any position in which it may rest. C C′ are chain-wheels or sheaves, which are connected rigidly with the worm-wheel A on either side of the central box L by means of clutches G G and bolt H. D represents the hoisting-chain, which may be endless or otherwise, as preferred. For operating with great power, one part of it is carried over the sheave C, and the other part in the opposite direction over the sheave C′, as illustrated in Figs. 1 and 2, the differential pulleys being placed on opposite sides of the worm-wheel, as preferred. The load is carried by a hook, M, suspended from a traveling pulley, N, which rests on the bight of the moving chain. As illustrated in Fig. 2, two equal pulleys, C C, are employed on opposite sides of the wheel, and an additional pulley, C′, of larger diameter, containing more teeth, attached to one of them, so as to revolve therewith, the chain D being passed over the three pulleys in succession, as shown, so as to have two depending bights, in which two hooks and pulleys, M N M′ N¹, are placed, so that one may rise while the other falls.

Fig. 4 illustrates another mode of using the apparatus, by attaching one end of the chain, or the middle of the double chain, to a stationary hook, O, so that, by winding on the sheave C, the load may be elevated with half the speed and double the power. N², in Figs. 4 and 5, show separate pulleys, which receive the depending bights of the chain under this mode of using the apparatus, the central pulley N being adapted for use in the manner shown in the other figures.

It will be observed that my mode of combining differential sheaves or pulleys with a screw hoisting apparatus of the construction described in Letters Patent hereinbefore referred to adapts the apparatus to hold the load at any point where it may rest.

Having thus described my invention, the following is what I claim as new, and desire to secure by Letters Patent:

1. A screw hoisting apparatus, constructed with sheaves of different diameters, located on opposite sides of the main wheel and central box, in combination with a hoisting-chain passed diagonally from the smaller to the larger sheave, substantially as described.

2. The combination of a screw hoisting apparatus with differential sheaves or pulleys C C′, located on opposite sides of the main wheel and central box, a hoisting-chain, D, and a traveling hook or support, M, for the purposes set forth.

MATTHIAS PENNYPACKER.

Witnesses:

J. R. MASSEY,

JOHN MCCONNELL, Jr.