(Model.)

P. MURRAY, Jr.

DIFFERENTIAL PULLEY BLOCK.

No. 280,218. Patented June 26, 1883.

Fig. 1.

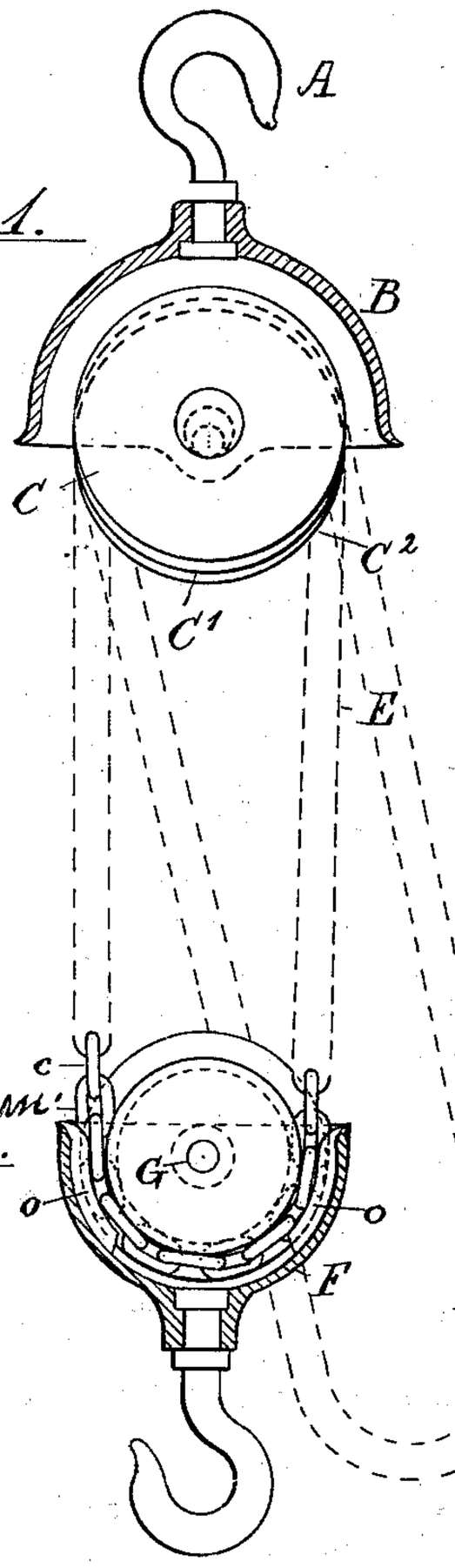


Fig. 5.

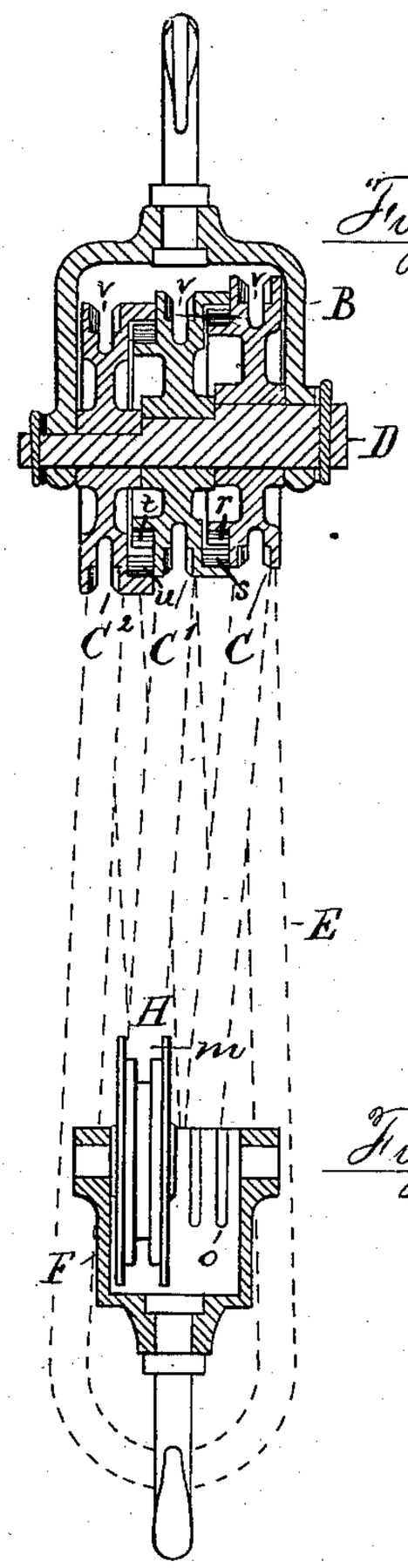
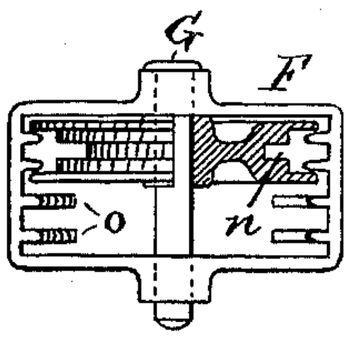


Fig. 2.

Fig. 4.

Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

PETER MURRAY, JR., OF NEWARK, NEW JERSEY, ASSIGNOR OF ONE-HALF TO THOMAS J. DENNIS, OF SAME PLACE.

DIFFERENTIAL-PULLEY BLOCK.

SPECIFICATION forming part of Letters Patent No. 280,218, dated June 26, 1883.

Application filed February 16, 1883. (Model.)

To all whom it may concern:

Be it known that I, PETER MURRAY, Jr., a citizen of the United States, residing in the city of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Differential-Pulley Blocks, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to any differential-pulley block having chain-wheels for accumulating or transmitting the power at the top, and a loose wheel at the bottom sustaining the load in the bight of the chain; and it consists, first, in constructing the upper frame with three sheaves geared together and the bottom frame with two loose sheaves, over all which sheaves the chain is passed when in operation.

It consists, secondly, in constructing the lower sheave-frame as a shell fitting closely to the sheave at each side near the horizontal center line, and in providing the shell with internal ribs formed concentric with the sheave, and adapted to fit between the flanges of the sheave and guide and hold the cross-links of the chain against the bottom of the wider groove in the sheave.

The second part of my invention is only adapted to a "cable" chain having the alternate links placed at right angles, in which case the sheave is formed with a wide groove having a narrower groove formed in its bottom.

The first part of my invention is adapted to any differential-pulley block in which three sheaves can be geared together in the upper frame, but is shown herein as applied to the chain-hoist patented by me June 27, 1882, as No. 260,220, the essential object of this part of the invention being to avoid the ordinary increase in the size of the sheaves and chains to sustain greater loads.

The nature of my improvements will be seen in the annexed drawings, in which Figure 1 is a side view, partly in section, of the upper frame and its sheaves. Fig. 2 is a similar view of the lower frame and sheaves, the section being taken through the nearer side of the frame and inside the first flange of a sheave. Fig. 3 is a plan of the lower frame with one sheave removed and one sheave shown partly in section. Fig. 4 is an edge view of the lower frame with one sheave removed and part of the shell broken away to expose the inside. Fig. 5 is a transverse section of the upper frame.

A is the upper hook; B, the top frame; C C′ C^2, the three upper sheaves geared together by the method shown in my above-mentioned patent.

D is the arbor for the sheaves, formed with three eccentric bearings for the three sheaves, and E is the chain passed alternately around the upper and lower sheaves in the usual mode.

F is the lower frame, G its arbor, and H I the two loose pulleys inside the frame. The concentric shell of the frame encircles the lower half of the sheaves H I, and thus keeps the chain E in place in the groove *m*, formed in the outer edge of the sheave, to receive the cross-links *m′* of the chain. The lower frames of similar machines are commonly made of narrow bars, between which the bight of the chain sometimes falls out when the same is slack in handling the tool, and such projecting part is very apt to get twisted and jammed in the groove *m* when the device is hung up to use. The formation of the frame F as a closely-fitting shell is a preventive of this special form of derangement; but to entirely obviate the twisting of the links as they enter the shell, and thus absolutely prevent any jamming therein, I provide for the holding of each cross-link *m′* down in the bottom of its groove *m* as soon as it enters the shell.

Various guides have heretofore been made for directing the chain properly into the sheave; but all have proved ineffectual because applied to the links *n′*, which enter the sheave edgewise, leaving the cross-links *m′* loose to turn a little, and thus get caught at some point between the frame and the sheave's rim. To crowd the cross-links *m′* down upon the seat where they belong, at the bottom of the groove *m*, I form ribs *o* upon the frame concentric with the groove, and fitting between the flanges of the sheave, at each side of the edgewise links *n′*. These ribs extend toward the cross-links *m′* as they lie in the groove *m*, and afford the links room to enter and traverse the groove without turning or twisting at all. The groove *m* is formed with another narrower

groove, *n*, in its bottom, to admit the links *n'*; and in my construction these latter links are guided positively to their place, as they enter the shell F, by the positive manner in which the cross-links are held. The ribs *o* are shown extended from the edge of the shell along its inside about the length of two links, which I find in practice is sufficient to lead the chain in positively and to obviate entirely the jamming common with other constructions. The ribs may be extended more or less at pleasure, provided they force the cross-links down upon their proper seat, as described, and may be used, if constructed and operated as described, upon an open frame, instead of the shell shown in the drawings. The ribs may also be effectively used upon other chain-hoists than that shown herein. The gearing of three sheaves together in the top frame obviously multiplies the power in a geometrical ratio, and as the load is suspended upon a greater number of pendent chains, it is obvious that a heavier load can be sustained and lifted with a given chain than by a similar hoister with two geared sheaves.

The sheaves C C' C² are shown constructed as follows: The sheave C is the driver, and is smaller than C'. It is formed with external teeth, *r*, at one side, which teeth fit into internal teeth, *s*, formed on the rim of the sheave C'. The latter sheave has external teeth, *t*, formed upon an opposite rim, which fit internal teeth, *u*, formed on a rim of the still larger sheave, C². Each of the three sheaves is constructed with a toothed groove, *v*, around its periphery, in which the chain E is held when operating; and the chains are rotated at different speeds, dependent upon the relative numbers of the teeth *r*, *s*, *t*, and *u*. The course of the chain from and over the entire set of five pulleys is indicated by a dotted line at E in the views, the links only being shown at certain points. By this arrangement of the sheaves the manufacturer is able to furnish a one-ton or a two-ton hoister with sheaves of about the same size, instead of making a different-sized sheave, as is usual in augmenting the power of such a machine. The aggregate weight of the structure is thus less than it would otherwise be, and it is more convenient to handle and use than with larger sheaves.

I am aware that a curved keeper has been shown in United States Patent No. 134,337, and that a chain-guide serving a similar purpose has been shown in United States Patent No. 267,954, and I do not therefore claim such a guide, broadly; but my invention differs from them, in that the ribs *o* are formed to enter the groove *m*, the side flanges of which in my invention can thus be made higher and act more efficiently in directing the cross-links to their place than when a keeper or curved guide merely presses upon the chain outside the flanges of the wheel. It will therefore be seen that the use of my curved ribs *o* requires and includes that the flanges at the sides of the broad groove *m* should be much higher than the thickness of the cross-links *m'*, that the ribs *o* may gradually press them into such groove. My claim to the ribs is therefore in combination with the flanges at the sides of the groove when the flanges are constructed as shown and described, so that the rib is inside the groove when it is in contact with the cross-links *m'*.

Having thus fully described the nature and advantages of my invention, I claim the same as follows:

1. The combination, in a differential-pulley hoister, of three differential pulleys mounted in a frame upon the same arbor and geared together, substantially as and for the purpose set forth.

2. The combination, in a differential-pulley hoister, of the frame B, the three differential pulleys C, C', and C², mounted upon one arbor, the endless chain E, and the frame F, containing two pivoted loose pulleys, the whole arranged and operated substantially as and for the purpose set forth.

3. The combination, with the pulley formed with the grooves *m* and *n*, and having the flanges at the sides of the groove *m* extended above the cross-links of the chain when therein, of the frame F, provided with the ribs *o*, constructed to fit inside the flanges and outside of the links *n'*, as and for the purpose set forth.

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

PETER MURRAY, JR.

Witnesses:
C. C. HERRICK,
W. F. D. CRANE.