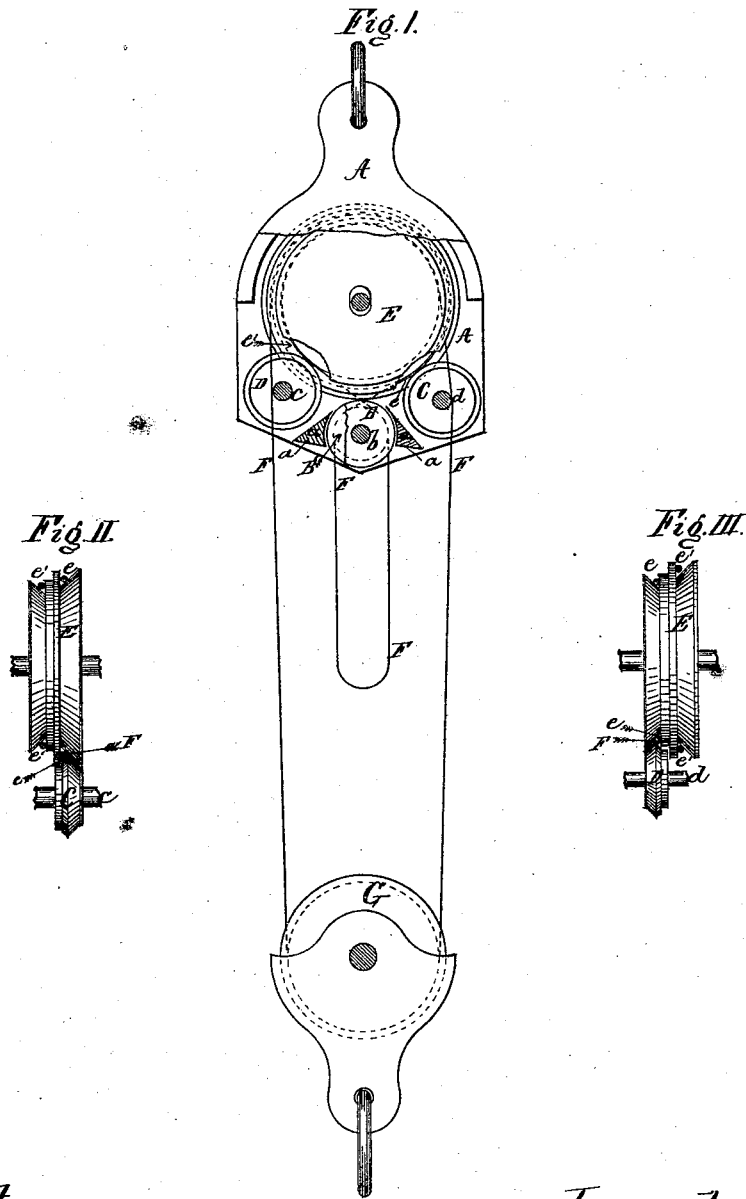


B. F. WARREN.  
Differential Pulley-Block.

No. 159,987.

Patented Feb. 16, 1875.



Witnesses:  
Franklin Barritt.  
Richard Germer.

Inventor:  
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# UNITED STATES PATENT OFFICE.

BENJAMIN F. WARREN, OF FISHKILL, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO DANIEL W. WARREN, OF NEWARK, NEW JERSEY.

## IMPROVEMENT IN DIFFERENTIAL PULLEY-BLOCKS.

Specification forming part of Letters Patent No. 159,987, dated February 16, 1875; application filed August 4, 1874.

*To all whom it may concern:*

Be it known that I, BENJAMIN F. WARREN, of Fishkill, in the county of Dutchess and State of New York, have invented a new and useful Improvement in Differential Pulley-Blocks; and I do hereby declare the following to be a full and clear description of the same, which will enable others to use my improved blocks.

This invention relates to an arrangement of the principal or driving sheave in a case, which also contains two smaller wheels or rollers, on which the said driving-sheave rests, the small wheels having flanges, which fit into the grooves of the driving-sheave, and thereby keep the fall or rope in place in the said grooves, and at the same time the small wheels act as anti-friction supports for the driving-sheave, which sustains the load. The conformation of the grooves and flanges of the above-named wheels or sheaves are peculiarly adapted to the purpose for which they are employed, and form a part of the subject-matter of this invention. There are also guide-rollers in the bottom part of the case to guide the ropes in the proper position, as will be hereinafter described.

The invention will be readily understood by reference to the accompanying drawings, of which—

Figure I is a side elevation of one of the improved blocks, with a part of the case removed to show the arrangement of the operative parts. Figs. II and III show how the two friction-wheels rotate in the face of the driving-sheave.

The case A sustains three journals, *b c d*, for the two guide-sheaves B B' and the two anti-friction wheels or sheaves C D. The two guide-sheaves B B' are placed upon the common journal *b*, located in the lower central part of the case A, and slightly above this journal; and in the opposite sides of the case are located the two journals *c d*, the location of the sheaves C D being such that the lower

part of the periphery of the principal or driving sheave E will rest on them when the parts are assembled. The sheave E has two grooves, *e* and *e'*, turned in its periphery, the diameter of the said sheave being larger in the groove *e* than the diameter in *e'*, in the usual manner of differential sheaves. These grooves are V-shaped, beveling toward the outside of the sheave. There are flat faces at each side of both of the rope-grooves of the said sheave E, which said flat faces form treads for the sheave to rest upon on the peripheries of its two sustaining-sheaves, C D. The said sheaves C D have each a central flange that fits into its respective groove in the sheave E, to hold the rope in place therein, and also two flat faces at the sides of the said central flange, that serve as treads for the treads of the sheave E to rest upon.

The rope may be of any material usually employed to or adapted to running rigging, and will be reeved over the power-sheave E and the running sheave G in the usual manner. The rope will be held in position in the grooves of the sheave E, as above described, and will be further guided in its proper position in the upper block by the two guide-sheaves B B' and the stationary stops *a*, which are attached to the sides of the case A, the said stops guiding the rope into the grooves of the said sheaves B B'.

The sheaves B B' being upon a common axle, a portion of the front sheave B is broken away in the drawing to disclose the sheave B' behind it.

Having described my invention, I claim—

In combination with the sheaves or wheels C D, case A, and guiding sheaves or wheels B and B', the loose sheave or pulley E, with grooves *e e'*, substantially as and for the purposes set forth and described.

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Witnesses:

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