A. S. Hallidie's

Improved Endless-Rope Way

No. 121,776. Patented Dec. 12, 1871.

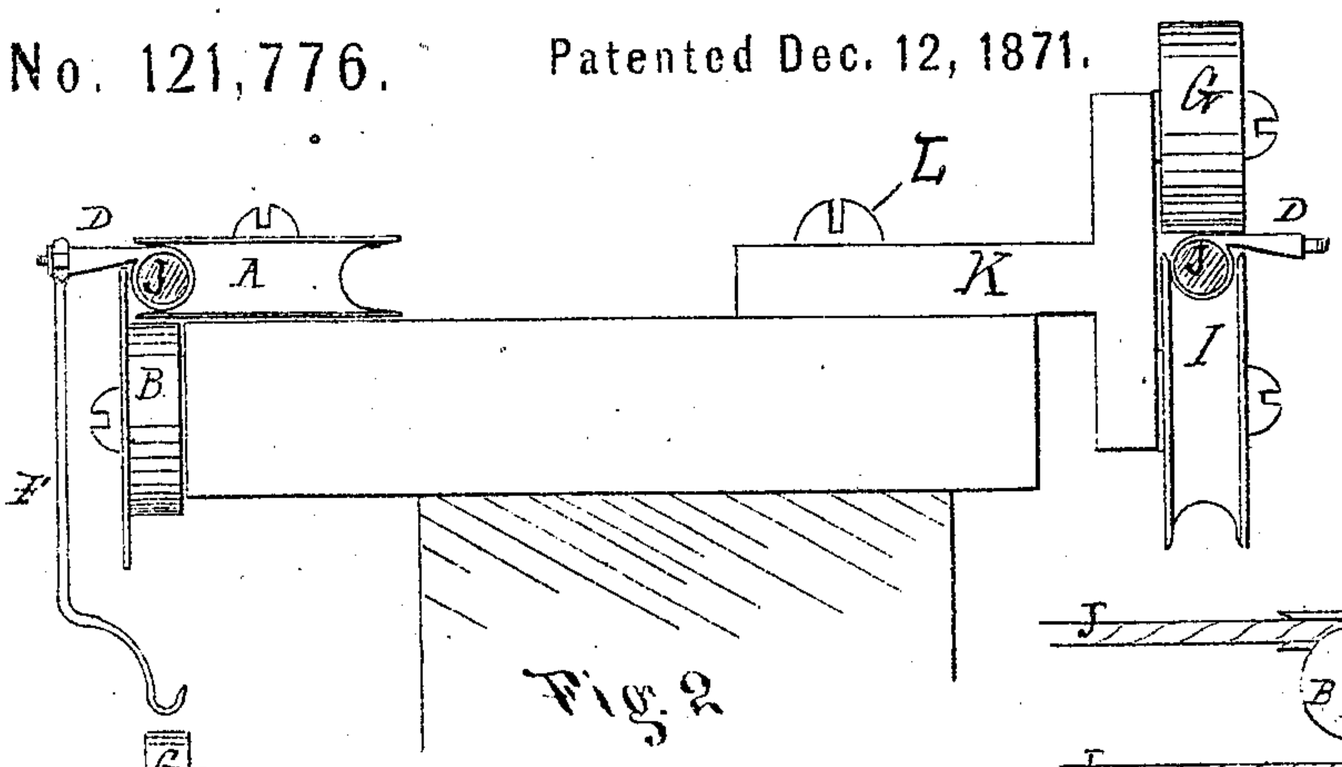

Fig. 2

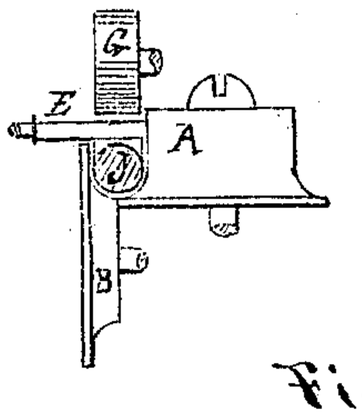

Fig. 3

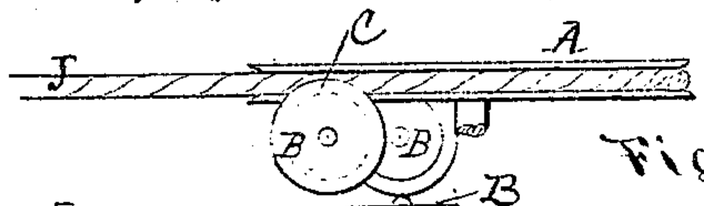

Fig. 4

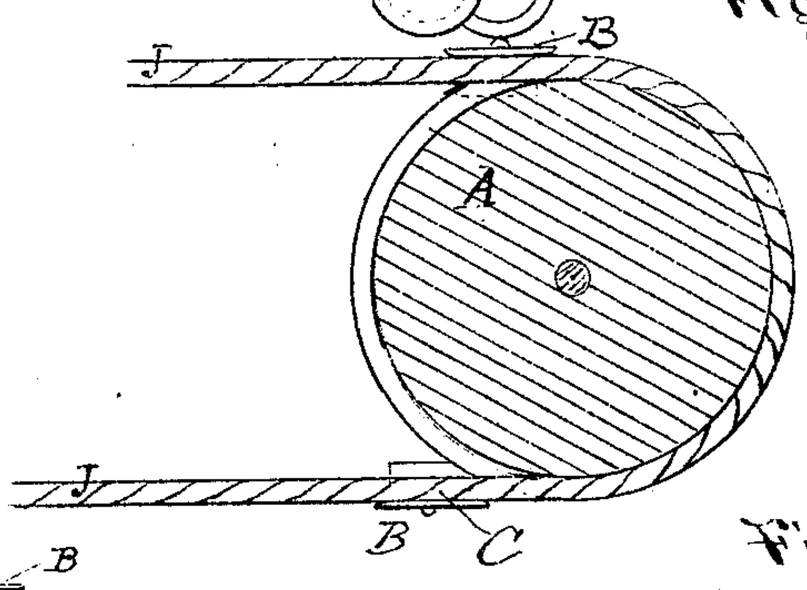

Fig. 5

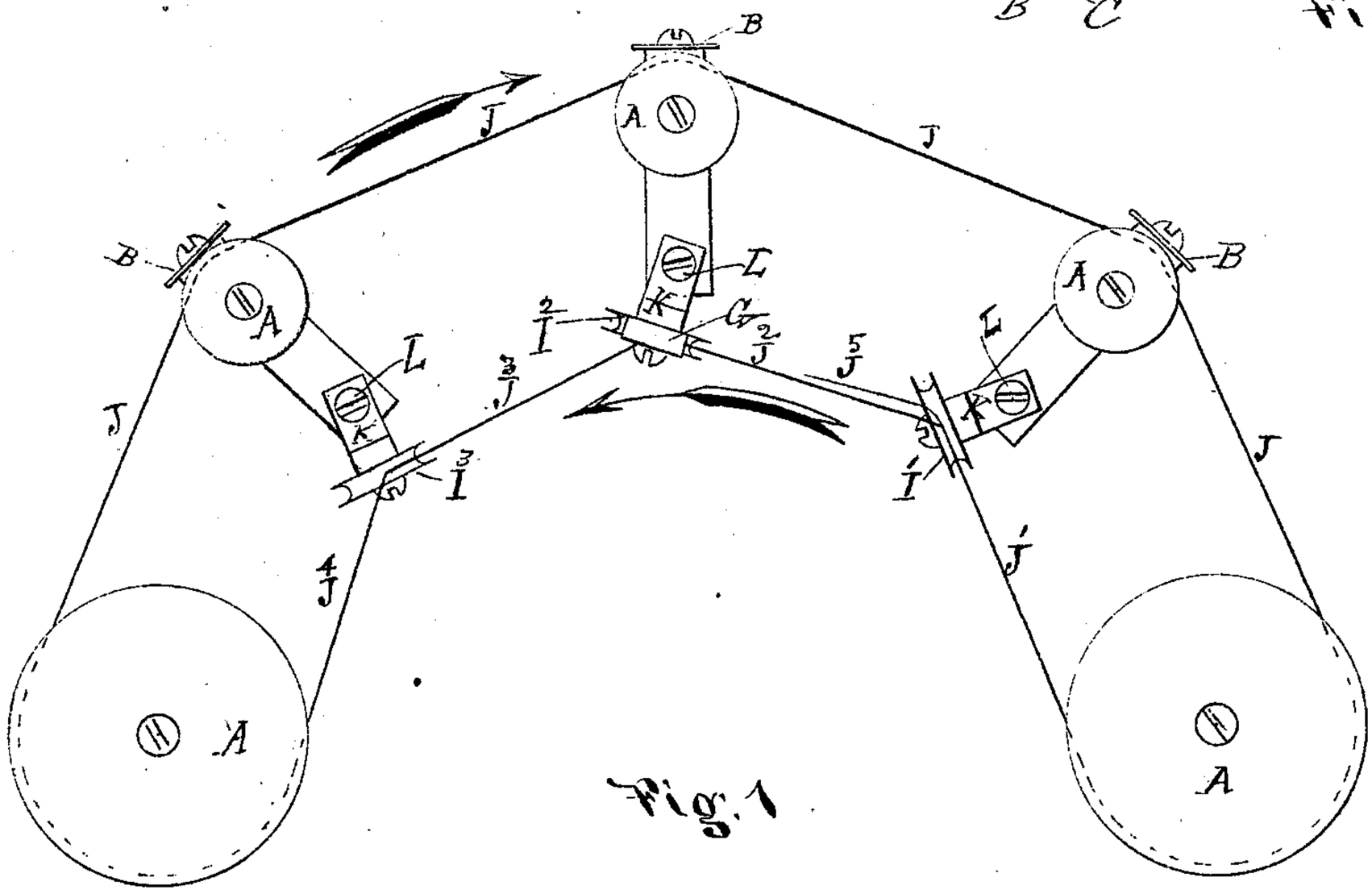

Fig. 1

Witnesses

Chas. H. Parker

David Woods

Inventor

Andrew J. Hallidie

UNITED STATES PATENT OFFICE.

ANDREW S. HALLIDIE, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN ENDLESS ROPE-WAYS.

Specification forming part of Letters Patent No. 121,776, dated December 12, 1871.

To all whom it may concern:

Be it known that I, ANDREW S. HALLIDIE, of San Francisco, in the county of San Francisco and in the State of California, have invented an Improved Endless Rope-Way, of which the following is a specification, reference being had to the accompanying drawing.

In a rope-way in which an endless moving rope is employed the weight attached to the hanger, if very great, will have a tendency to pull the rope down at the point at which the hanger is attached with so much force as to prevent its entering the groove of an inclined or horizontal end pulley, or guide or bearing-pulley employed at the outer angles of the line; and it is found in practice that the vibrations and undulatory movements to which the rope is subject will occasionally have the same effect, and sometimes even throw the rope out of the groove if suitable means are not taken to prevent it. Inclined or horizontal pulleys, if employed at the inner angles of the line, would come in contact with the suspension-rods or necessitate the employment of a very long arm to the hangers. The object of my invention is to overcome or provide a remedy for these difficulties. My invention relates to the form and arrangement of the bearing and guide-pulleys employed at the angles and ends of the line, and consists: First, of the combination of the vertical guide or bearing-pulleys having only one flange with the horizontal or inclined end pulleys, or guide or bearing-pulleys employed at the outer angles of the line, for the purpose of securing by this combination the entrance of the rope into the groove and of preventing its escape therefrom. Second, of the employment at the inner or outer angles of the line of vertical or nearly-vertical bearing-pulleys, arranged with their axles at right angles, or nearly at right angles, to a vertical plane passing through the approaching part of the rope, by which arrangement the entrance of the rope to the groove is secured and any unnecessary amount of bending of the rope is avoided, and by which, consequently, the resistance arising from the stiffness of the rope is reduced to a minimum. Third, of the combination of the vertical bearing-pulleys with a swinging bracket that may be clamped in any desired position, whereby the position of the vertical bearing-pulleys may be reversed, and at the inner angles of the line automatically when the direction of the motion of the rope is changed.

In the drawing, Figure 1 is a plan of a part of the details of a line of endless rope-way embodying my invention, and designed to move in either direction if required, and in which three angles of about forty-five degrees each are shown. Figs. 2, 3, 4, and 5 represent various combinations of details of rope-way illustrating my invention.

Each part is distinguished by the same letter whenever it appears in the drawing.

A is the outer angle or end pulley, which, although shown in the drawing in a horizontal position, will be inclined, according to circumstances, at all angles with the horizon, as it should always be placed in and coincide with the plane in which the rope both approaches and recedes from its groove. When it is vertical or only slightly inclined from the vertical the pulley B cannot well be employed with it; or, in other words, the pulley B would vanish when the pulley A becomes vertical; neither in that case will there be any necessity for the employment of pulley B, but a part of its office will then be filled by pulley G and the rest by pulley A. B is a pulley employed to secure the entrance of the rope to the groove of pulley A and to prevent its escape therefrom. The pulley B differs from pulleys heretofore used by me for this purpose in having only one flange. By doing away with the inner flange I am enabled to place the pulley B quite close to the pulley A to prevent the escape of the rope from the groove, as shown in all of the figures; and the face of the pulley B may be so modified as to sustain a greater or less portion of the weight of the rope at or near the point at whieh the rope comes in contact with the face or groove of pulley A, as shown in Fig. 3, and at C, Figs. 4 and 5. When the rope is to move in either direction and the angle is great, as around an end pulley, two pulleys, B, should be employed with each pulley A, as illustrated in Figs. 4 and 5; but if the angle is small or the load on each hanger light, one may answer the purpose, as shown in Fig. 1. D and E are hangers, and F the suspension-rod. When hangers are used permanently attached to the rope the grooves and flanges of the pulleys A and B must be so arranged and proportioned (see all of the figures) as to allow of the passage of the hanger; but if the suspension-rods are attached to saddles

that detach themselves automatically from the rope when passing the end or bearing-pulleys, the combined grooves and flanges of the two pulleys A and B may entirely inclose the rope, and the saddle may pass over above the pulley A or G when pulleys G are employed. G are pulleys that prevent the escape of the rope from the groove in an upward direction, and differ essentially from pulleys B in being placed above the rope instead of below, and consequently in never supporting any part of the weight of the rope.

It is evident that the above-described combination of the pulleys A and B can only be employed at the ends or outer angles of the line, for if employed at the inner angles an impracticable length of arm of the hangers would be required. I therefore employ vertical pulleys I^1 I^2 I^3 at the inner angle of the line, arranged in the plane of the approaching part of the rope, as represented in Fig. 1. The arrows indicate the direction in which the rope moves when the pulleys I^1, I^2, and I^3 are in the position shown in the drawing. J is the rope. The parts of the rope between the inner angles are numbered J^1, J^2, J^3, and J^4. J^1 is the part of the rope approaching the pulley I^1. The plane of pulley I^1 is placed, set, or arranged in a vertical plane passing through the approaching part J^1 of the rope. The pulleys I^2 and I^3 are arranged in the same manner with reference to the approaching parts J^2 and J^3 of the rope. The rope J is represented for the purpose of illustrating the principle of this part of my invention as forming sharp angles at the very top of the pulleys I^1, I^2, and I^3, and the pulleys are represented as in a position corresponding to that circumstance; but the rope would in practice adhere to and be carried over by the pulleys a considerable distance beyond the top, and leave them on a curve nearly as represented by the line J^5. The pulleys I, instead of being attached to some immovable part of the framing, are secured by their axles to a swinging bracket, K, pivoted by the vertical screw or bolt L. When the pulleys I are set or adjusted in any required position they may be readily clamped in that position by screwing down the screw-bolt L.

It is evident that the above-described arrangement of the pulleys I may be employed either for the outer or inner angles of a line of endless rope-way, and that by means of the swinging bracket K the direction of motion of the rope may be reversed by first reversing the position of the pulleys I.

If the brackets K employed at the inner angles are left free to swing instead of being firmly clamped by the screw L the direction of the motion of the rope may be reversed at pleasure, and the rope, when beginning its reversed motion, will force around the pulleys I and bracket K into a position approximating to that hereinbefore described, in which the plane of the pulley I coincides with a vertical plane passing through the approaching part of the rope; but it is evident that when pulleys I and bracket K are employed at the outer angles they cannot be reversed automatically, and consequently some other device or arrangement must be employed at the outer angles when the motion of the rope is to be frequently reversed, or reversed automatically.

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

1. The combination of the herein-described pulley A with the herein-described pulley B, substantially as and for the purposes hereinbefore set forth.

2. The arrangement in an endless rope-way, as herein described, of the pulleys I^1 or I^2 I^3 in a vertical plane passing through the approaching part of the rope, substantially as and for the purposes herein set forth.

3. The combination of the pulleys I with the swinging or adjustable bracket K, substantially as herein described, and for the purposes herein set forth.

In testimony whereof I have hereunto set my hand this 1st day of June, A. D. 1871.

ANDREW S. HALLIDIE.

Witnesses:
CHARLES H. OAKLEY,
DAVID P. SMITH.

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