

No. 610,353.

Patented Sept. 6, 1898.

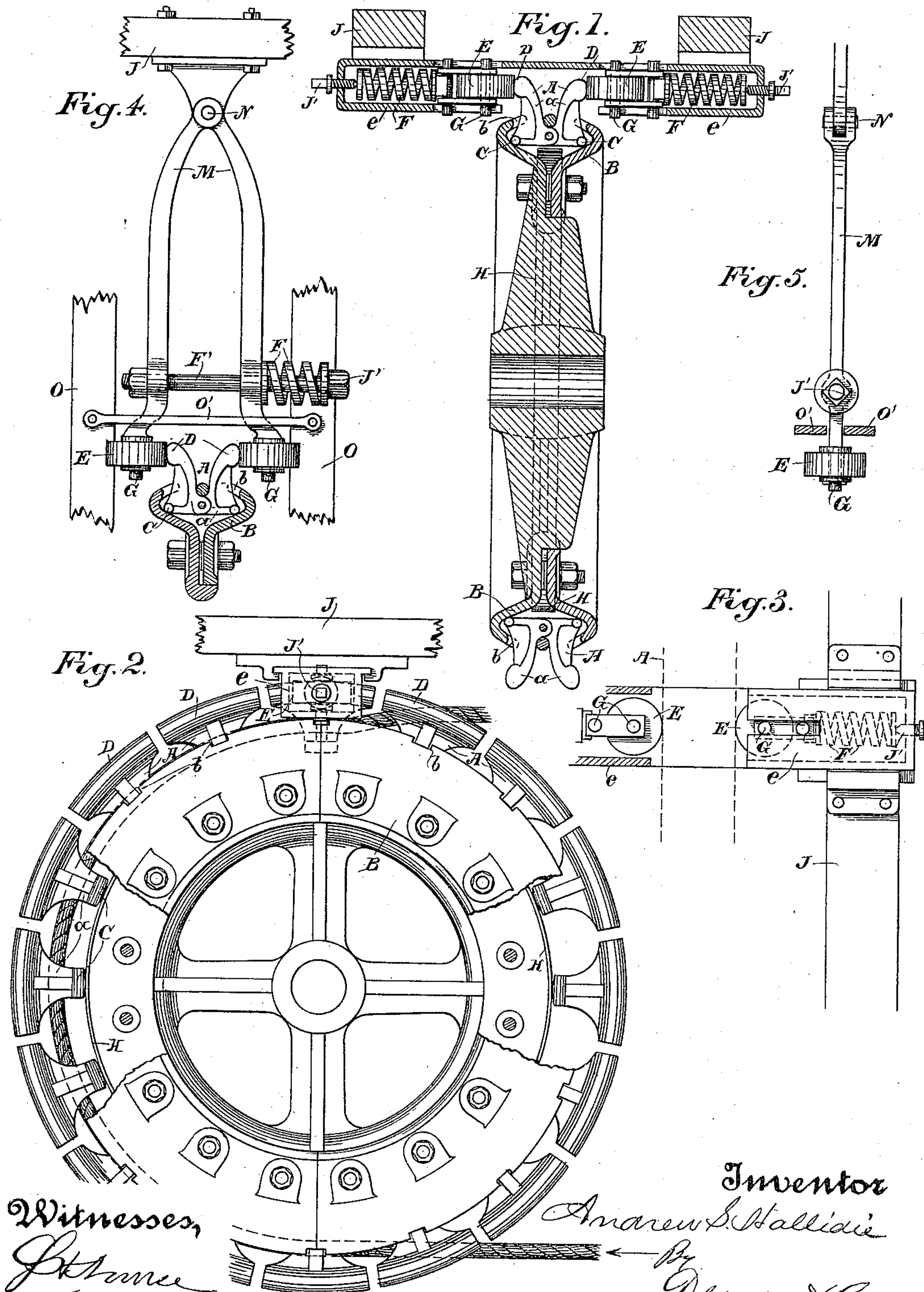
A. S. HALLIDIE.

GRIP PULLEY.

(Application filed Jan. 18, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses,  
*J. H. Aschbeck*

Inventor  
*Andrew S. Hallidie*  
 By *Dewey & Co.*  
*attys*

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Fig. 6.

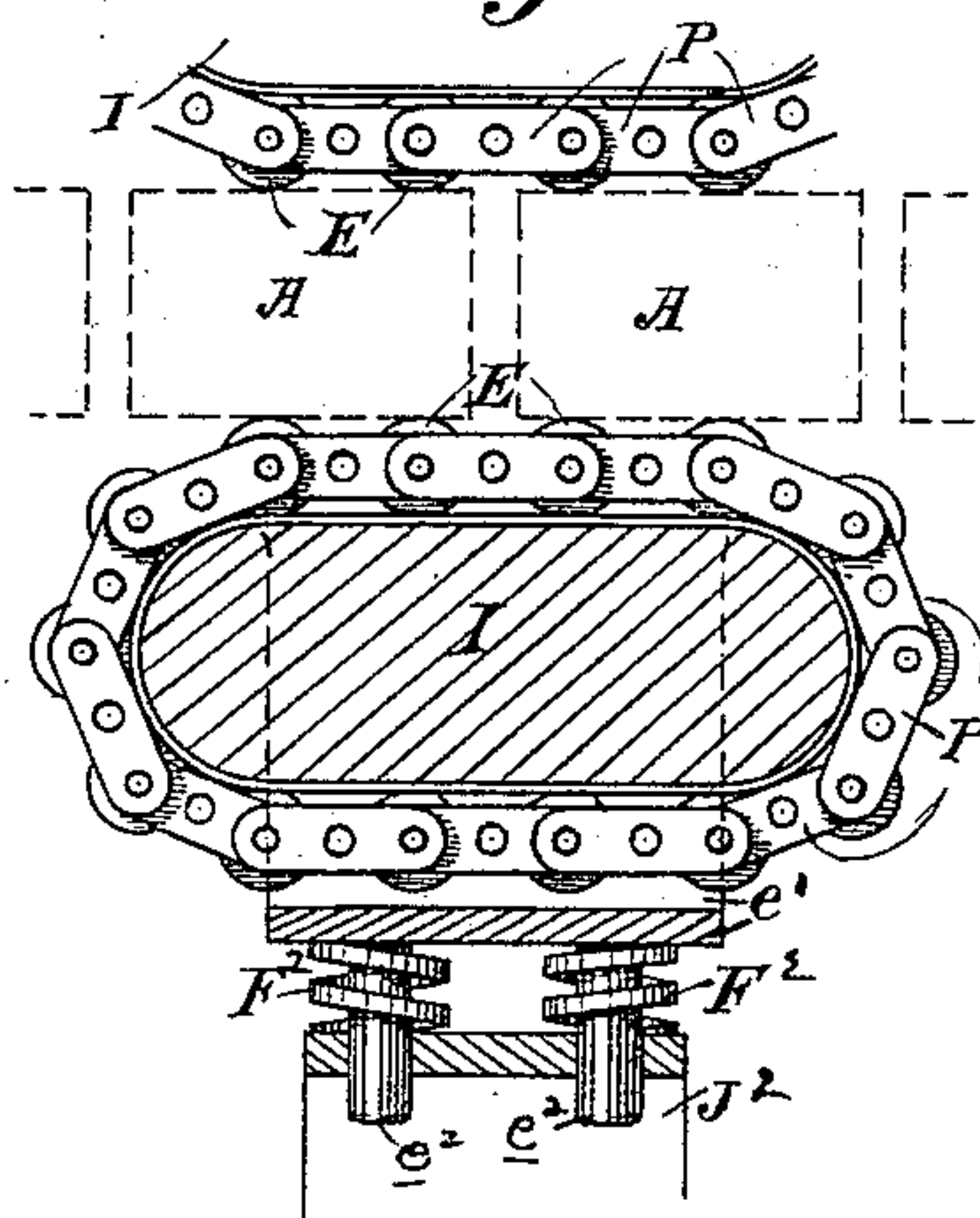
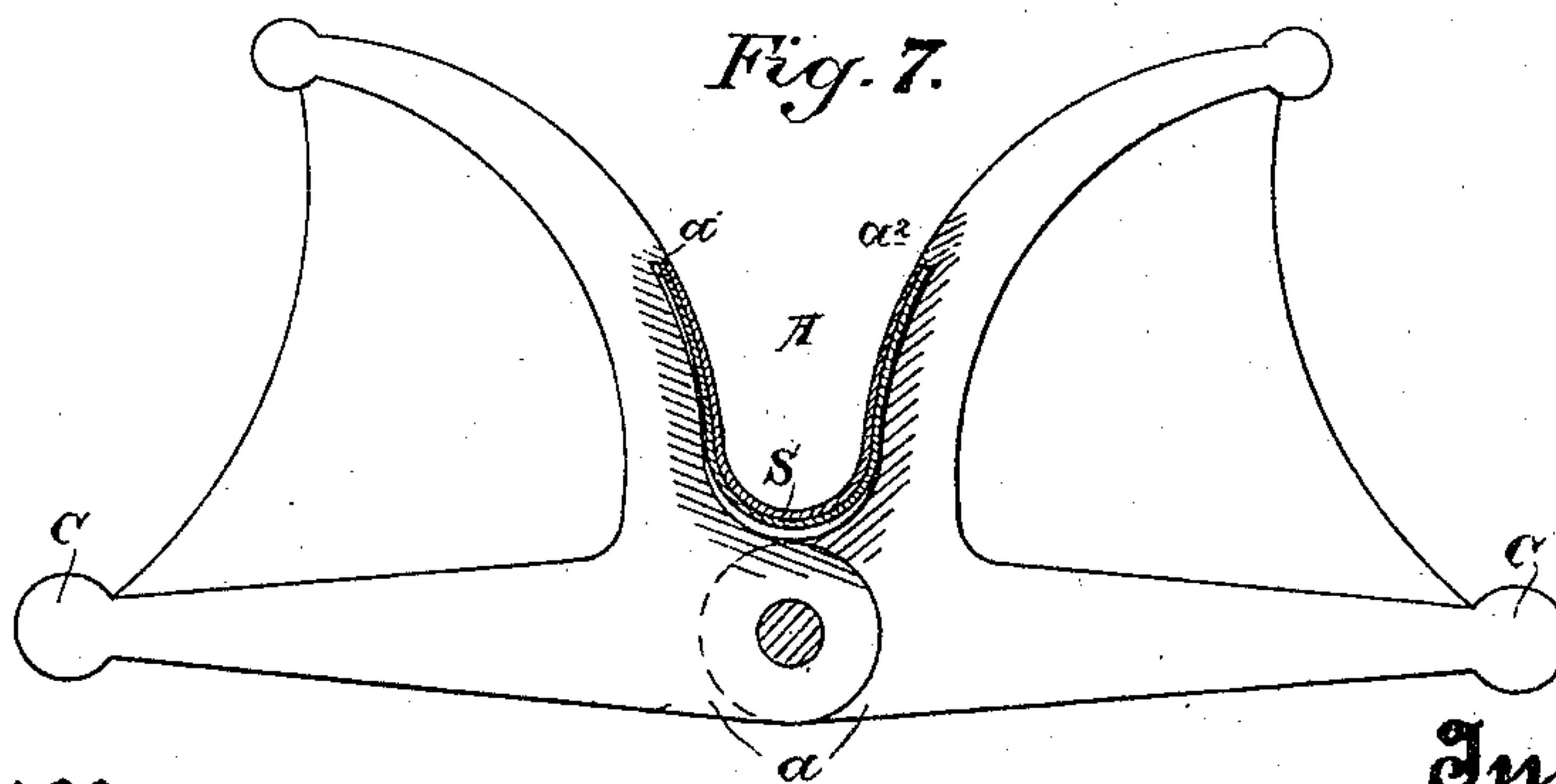


Fig. 7.



Witnesses,  
J. H. Morse  
H. F. Aschbeck

Inventor,  
Andrew S. Hallidie  
By Dewey & Co.  
attys



# UNITED STATES PATENT OFFICE.

ANDREW S. HALLIDIE, OF SAN FRANCISCO, CALIFORNIA.

## GRIP-PULLEY.

SPECIFICATION forming part of Letters Patent No. 610,353, dated September 6, 1898.

Application filed January 18, 1898. Serial No. 667,093. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW S. HALLIDIE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Grip-Pulleys; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in that class of wheels or pulleys called "grip-pulleys," and which are so constructed as to grip ropes or cables passing over them to prevent the slipping of such ropes or cables in the pulleys.

The object of this invention is to increase the gripping power of such wheels or pulleys and the effective working of the gripping parts therein; and it consists, essentially, in the application of an elastic pressure to the gripping-jaws in such a manner as to increase the gripping force of the jaws, while adapting itself to inequalities of the rope, variation in the truth of the pulley, and the fluctuation in the hauling strain of the rope.

It also consists in details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a sectional view of the pulley and the pressure device for increased gripping. Fig. 2 is a side elevation of the same. Fig. 3 is a bottom view of the pressure-rollers and their connections. Fig. 4 is a modification of the same, and Fig. 5 an end view of Fig. 4. Fig. 6 shows the application of a series of pressure-rollers to exert pressure upon more than one grip at a time. Fig. 7 is a partial section through the grip-jaws, showing a modification of the means of keeping the jaws open when not in operation.

My invention is especially adapted for use upon gripping-pulleys of the class shown in my United States Patents Nos. 100,140, 127,690, and 483,442.

In these devices the pulleys B have a channeled rim or periphery, and within this periphery are fitted the grips A A, which comprise two oppositely-placed jaws *a a*, connected and hinged together or otherwise arranged in such a manner that the jaws are opened sufficiently for the rope to fall into

the space between them and are then closed upon the rope to grip it with greater or less force. These jaws have outwardly-projecting heels C, which rest on bearings within the grooved periphery of the pulley and form fulcrums about which the jaws move to open and close, each of the jaws being provided with a web fitting loosely in slots *b*, made transversely in the rim of the wheel. This construction allows the gripping-jaws to freely open and close and rock between the sides of the wheel-rim.

In order to increase the gripping force of the jaws beyond that which would be produced by the pressure of the rope or cable in the bottom of the groove or channel formed between these jaws, I have applied spring or weight pressed rollers in such a manner as to cause the jaws to close upon the rope or cable with an increased pressure. Various means for applying this pressure may be employed, and I do not wish to limit myself to particular mechanical constructions, because a great variety of these may be used which are mechanical equivalents in the results produced.

The diverging lips D D of the jaws have their outer edges turned up true, and there is a sufficient space between the lips of the adjacent grips so that they do not come into contact with each other, as plainly shown in the side view of the pulley.

The pressure-rollers E are suitably journaled so that their faces travel in contact with the exterior edges of the lips D D of the grip-jaws. These rollers are here shown as set in pairs in a frame or housing *e* and are movable, so that by means of suitable springs F or equivalent weighted levers a yielding pressure will be brought continuously upon these rollers and through them upon the peripheries of the gripping-jaws, thus closing the latter upon the rope or cable with a much firmer grip than could otherwise be attained. At the same time the yielding nature of the pressure will allow the grip-jaws to open slightly in case of any enlargement or inequality of the rope passing between them, and in case that the pulley is untrue in its mounting upon the shaft this elastic pressure will allow of sufficient movement of the parts to compensate for any untruth of the pulley,



which would not need a permanent adjustment. The wire ropes or cables pass half-way around the grip-pulley, and the pressure-rollers are preferably placed at or near  
5 the point where the wire rope leaves the pulley and forms the tangent thereto, as plainly shown in the side elevation.

It will be manifest that the pressure-rollers may be arranged in various ways.

10 In Figs. 1, 2, and 3 I have shown these rollers journaled on pins G and carried within a housing *e* and with boxes in a slidable frame and having springs F, which press the rollers forward. The housing is allowed to  
15 slide in guides in a direction parallel to the shaft of the grip-pulley, but is fixed in the direction of the travel of the rope, so as not to be moved from its place, being secured to permanent beams or timbers J. The tension  
20 of the springs F is regulated by means of adjusting-screws J', which pass through the housing in which the springs are contained, and they may be set so as to increase or decrease the tension of the springs and their corresponding pressure upon a movable frame-  
25 work which carries the rollers.

In Figs. 4 and 5 I have shown the rollers E journaled upon the ends of arms M M, which are pivoted or hinged together at a point N,  
30 some distance from the periphery of the pulley, so that these arms can swing to or from each other. Through these arms extends a rod or bolt F', and the spring F surrounds this rod or bolt exterior to one of the arms.  
35 By means of an adjusting-nut J' upon the screw-threaded end of the bolt the tension of the spring may be increased or diminished and the consequent pressure upon the arms regulated. The rollers E being journaled  
40 upon the lower ends of these arms will press upon the periphery of the jaws D, as previously described.

In order to steady the arms M and prevent their being moved in the line of travel  
45 of the rope, I have shown bars O', fixed to a framework O upon opposite sides of the rim of the pulley, and these serve to retain the parts in place.

If it be desired to distribute the pressure of  
50 the rollers over more than one set of grips, a series of gripping-rollers, Fig. 6, may be journaled in links P, which are connected together, so as to pass around an oval support I in the manner of an endless chain. This support I,  
55 of which there is one upon each side of the grip-pulley, will be rigid with and carried by a frame or housing *e'*, having projecting guide pins or studs *e''*, slidably mounted in a bearing-piece *j''*, between which and the housing *e'*  
60 springs F<sup>2</sup> are placed, so that the housings, with the supports I, which constitute a form for the links and rollers, will be pressed forward, so that said rollers will contact with two or more of the jaws as they pass between  
65 the opposing sets of rollers, thereby increasing the gripping capacity and overcoming the

jaws incident to single rollers passing the spaces between the jaws.

In all of these devices the object is to bring an increased pressure upon the jaws at a distance from the heels or points C, by which  
70 they are supported and which practically serve as the fulcrums about which the jaws move.

When the pressure of the rollers is applied  
75 to the outer sides of the lips D, this pressure is brought to bear upon the points most distant from the heels C and will consequently give the most effective leverage. It will, however, be manifest that pressure can be brought  
80 to bear upon any point intermediate these lips and the heels or fulcrum-points C, with the advantage of increasing the gripping force of the jaws upon the rope or cable, although in such cases it would be to a less extent. 85

In order to prevent the jaws of the grip-pulley from closing when they are not in action and to enable the rope or cable to seat itself freely in the grips before the latter close  
90 to grip the cable, I employ an elastic steel band H, which is fitted into the annular space in the rim of the grip-pulley B and interior to the inner or meeting ends of the grip-jaws, these ends resting upon this elastic band or spring. The diameter of this band is some-  
95 what greater than that of its seat upon the interior of the pulley, so that the pressure of the grips upon the band beneath that portion where the rope or cable is pressing upon the grips will act to force the opposite part  
100 of the band away from its seat upon the pulley and thus force the feet or meeting portion of the grip-jaws outwardly, and this serves to open the jaws about their heels or fulcrum-points C, so that they are free to receive the  
105 rope or cable. Although I have here shown this band as continuous, the same result may be attained by inserting in the seat of each of the grips a curved spring-steel plate or  
110 plates S, fitted into the groove between the jaws and held in place by means of shoulders, as shown at *a''*, Fig. 7. In this case the pressure to separate the jaws is brought upon them at a point exterior to the meeting angle,  
115 but with the same effect, because the pressure acts to separate the jaws or turn them about their fulcrum-points C. This construction is also important, because these steel plates prevent the wear which would otherwise take  
120 place by the friction of the wire-rope upon the grips.

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

1. The combination, with a grip-pulley and  
125 gripping-jaws connected therewith, of movable journaled pressure-rollers adapted to contact with the gripping-jaws, and springs whereby the rollers are caused to press upon and close the grips. 130

2. The combination, with a grip-pulley and gripping-jaws connected therewith, of mov-



able pressure-rollers adapted to contact with the gripping-jaws upon opposite sides of the pulley, and springs acting simultaneously upon said rollers to cause the latter to close the jaws.

3. The combination, with a grip-pulley and gripping-jaws mounted upon opposite sides of its periphery, of pressure-rollers contacting with said jaws, supports in which the rollers are journaled said supports being movable to and from the jaws and pulley, and devices by which a yielding pressure is applied to said supports to increase the pressure upon the jaws.

4. The combination, with a grip-pulley and gripping-jaws fulcrumed upon opposite sides of its periphery, of spring-pressed devices contacting with said jaws for causing the latter to press upon and grip the cable.

5. The combination of a pulley having gripping-jaws fulcrumed around its periphery, a rope or cable to be engaged by said jaws, a frame fixed with relation to said jaws, pressure-rollers adapted to engage said jaws and having their spindles or shafts journaled in said frame, springs acting upon the rollers, and adjusting-screws for regulating the tension of the springs.

6. The combination of a pulley having gripping-jaws fulcrumed around its periphery, a rope or cable to be engaged by said jaws, a frame, journal-boxes movable in said frame, pressure-rollers having their spindles or shafts journaled in said boxes, said rollers arranged in pairs so that their peripheries press successively upon the jaws as the latter pass between them, mechanism by which a yielding pressure is applied to the rollers, and means for regulating said pressure.

7. A pulley, having gripping-jaws fulcrumed in pairs around its periphery, movable to or from each other about their fulcrum-points, and pressure devices whereby a yielding pressure is applied to cause the jaws to grip a rope or cable passing between them with an increased pressure.

8. The combination of a pulley having gripping-jaws fulcrumed around its periphery, a rope or cable to be engaged by said jaws, yieldingly-mounted pressure-rollers adapted to engage the jaws and successively operate them to increase the gripping-pressure on the rope or cable, and an elastic medium adapted to separate the jaws after their release from the pressure-rollers.

9. The combination of a pulley having gripping-jaws fulcrumed around its periphery, a rope or cable to be engaged by said jaws, yieldingly-mounted pressure-rollers adapted to engage the jaws and successively operate them to increase the gripping-pressure on the rope or cable, and an elastic band surrounding the grip-pulley interior to the adjacent movable ends of the jaws and adapted to open said jaws.

10. The combination, with a grip-pulley and gripping-jaws fulcrumed around its periphery, of transversely-movable devices adapted to contact with the jaws and means whereby said devices press upon and close the grips with a yielding pressure.

In witness whereof I have hereunto set my hand.

ANDREW S. HALLIDIE.

Witnesses:

S. H. NOURSE,  
JESSIE C. BRODIE.