(No Model.) 2 Sheets—Sheet 1.

W. G. FINLAY.

EXPANDING PULLEY.

No. 307,450. Patented Nov. 4, 1884.

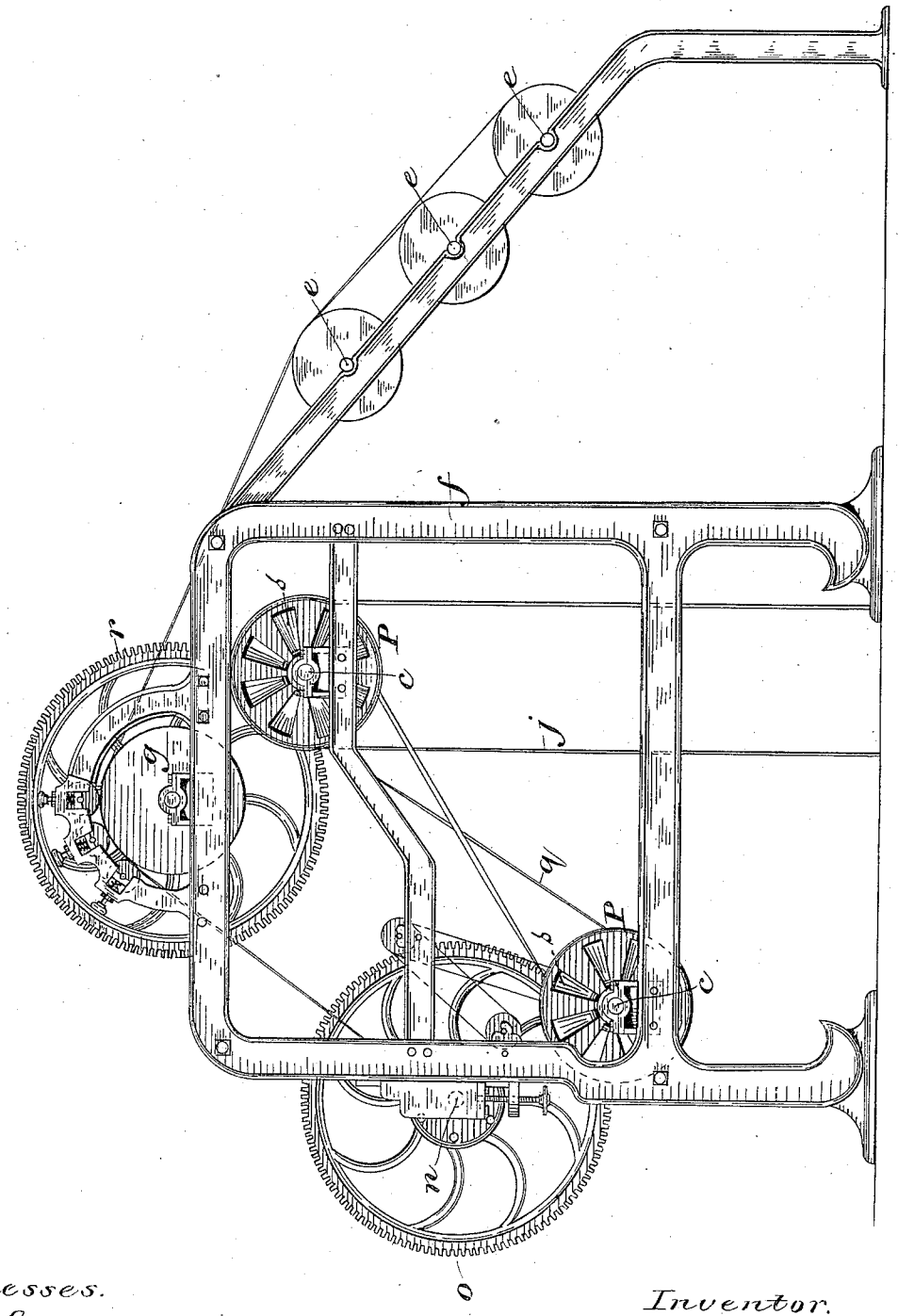


Fig. 1.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

W. G. FINLAY.

EXPANDING PULLEY.

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Fig. 3.

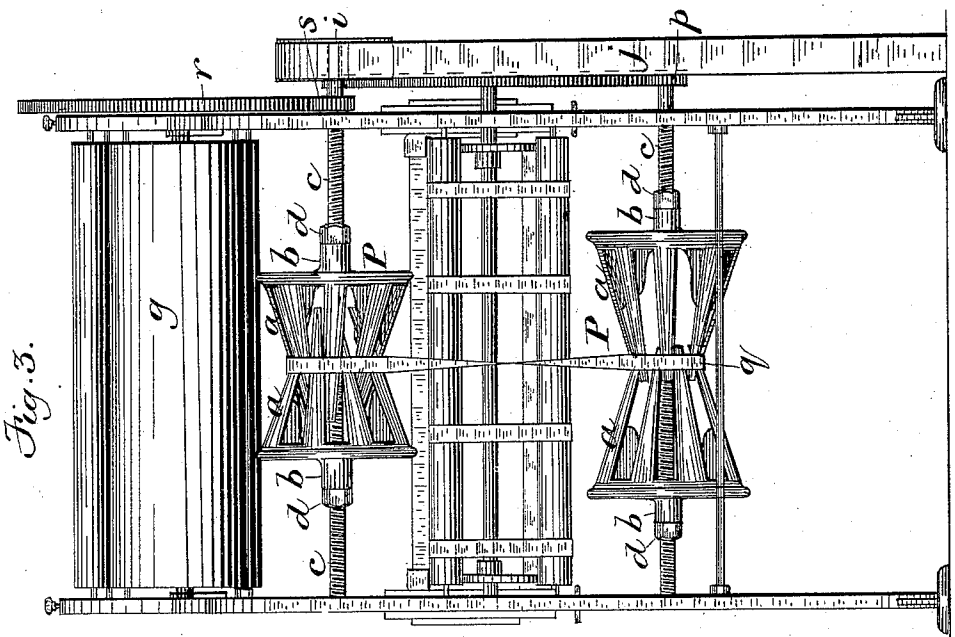
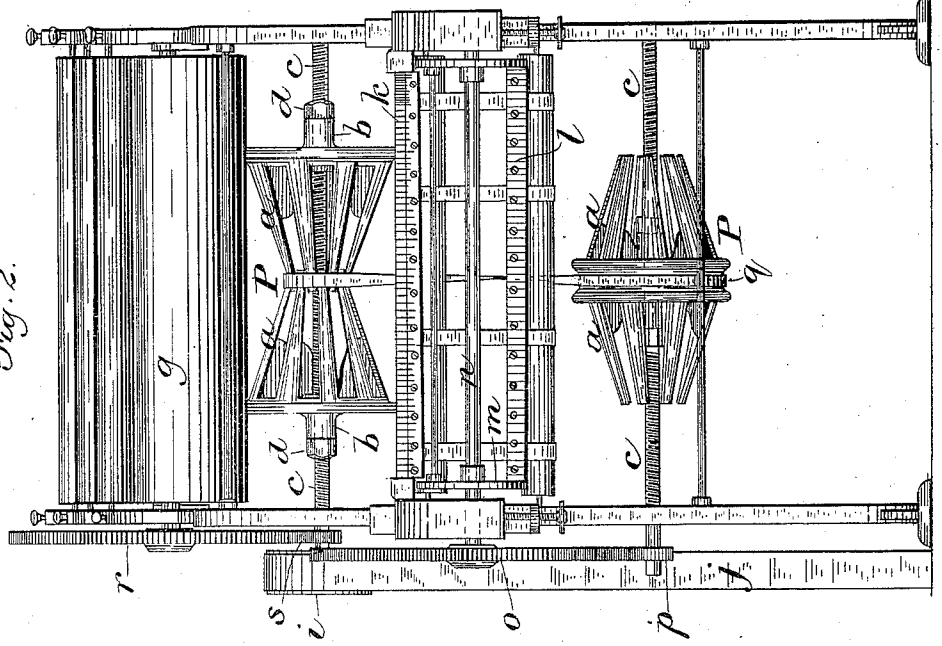


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM G. FINLAY, OF LAWRENCE, MASSACHUSETTS.

EXPANDING PULLEY.

SPECIFICATION forming part of Letters Patent No. 307,450, dated November 4, 1884.

Application filed September 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. FINLAY, of Lawrence, in the county of Essex and State of Massachusetts, have invented certain Improvements in Expanding Pulleys, of which the following is a specification.

This invention has for its object to provide an improved expanding pulley especially adapted for paper-cutting machinery and other mechanism in which it is desirable to change the relative speed of two shafts connected by a belt through which motion is communicated from one shaft to the other.

The invention consists in a pulley composed of two parts or sections, each of which is a frustum of a cone having longitudinal slots separating its periphery into fingers and slots in its base or larger end to receive the fingers of the other section, the fingers of one section coinciding with the slots of the other section, so that the two sections can be telescoped or moved into or out of each other, thus varying the diameter of the belt-supporting portion of the pulley—viz., the point where the peripheries of the two sections intersect.

The invention also consists in the means provided for moving said sections simultaneously in opposite directions, to vary the diameter of the belt-supporting portion, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a paper-cutting machine provided with my improved pulleys. Fig. 2 represents a front elevation of the same, and Fig. 3 represents a rear elevation.

The same letters of reference represent the same parts in all the figures.

In the drawings, P represents my improved expanding pulley, which is composed of two sections, *a a*, each of which is frusto-conical in shape and is slotted longitudinally, the tapering peripheries of the sections being thus converted into fingers separated by open spaces. The fingers are rigidly connected to the base or larger end of each section, which is provided with a central tapped boss or nut, *b*, the nut of the one section having left-hand threads, while the nut of the other section has right-hand threads. The shaft *c*, upon which the improved pulley is supported, passes through said nuts, and is provided with right and left hand screw-threads corresponding with those of the nuts, so that when the shaft is rotated and the sections of the pulley are prevented from rotating, the two sections will be moved simultaneously in opposite directions by the right and left screw-threads. The sections *a a* are placed on the threaded shaft with the fingers of the one section entering the slots of the other, thus forming a double cone-pulley having its smallest diameter midway between its ends, where the peripheries of the two parts intersect. The larger ends or bases of the sections are provided with slots *s*, Fig. 1, which coincide with the slots in the peripheries of the sections, the slots *s* of each section end or base receiving the fingers of the other section when the two sections are telescoped, as hereinafter described. It will be seen that when the sections *a a* are moved inwardly on the shaft or toward each other the diameter at the intersecting point will be increased, and when the sections are moved outwardly on the shaft said diameters will be decreased, so that the diameter of the belt-supporting surface of the pulley will be varied in proportion to the movement of the sections, which may be telescoped or moved inwardly until their larger ends almost meet, the fingers of each section projecting through the slotted bases of the other section, as shown at the lower portion of Fig. 2, thus presenting the largest possible central diameter; or may be separated, as shown at the upper portion of Fig. 2, until the smaller ends are almost separated and the smallest possible central diameter is presented. The shaft *c* is provided with jam-nuts *d d*, to hold the sections at any points to which they may be adjusted on the shaft.

The operation of the pulleys as applied to a paper-cutting machine is as follows: The paper to be cut into sheets of a required length is in rolls wound on mandrels *e*, which are placed in bearings in the frame *f* of the machine. The paper is first passed over a roll, *g*, said roll being rotated by a large gear, *r*, attached to the shaft of the roll *g*, and meshing with a pinion, S, attached to a shaft, *c*, having one of my improved pulleys, P, said shaft having a pulley, *i*, at one end, on which runs a driv-

ing-belt, *j*, which rotates the shaft *c* and roll *g* at a uniform rate. From the roll *g* the paper passes between the fixed knife *k* and the revolving knife *l*, whereby the web of paper is severed into sheets, said knives being of the usual construction. The revolving knife is secured to two heads, *m m*, affixed to an arbor, *n*, having at one end a gear-wheel, *o*, meshing with a pinion, *p*, on a second shaft, *c*, having another of my improved pulleys, P, which is connected by a belt, *q*, with the pulley on the shaft *c*, which imparts motion to the roll *g*. At each revolution of the knife *l* a sheet is cut from the web corresponding in length to the rapidity of rotation of said knife, the paper always passing to the knife at a uniform rate of speed under all circumstances.

When desirable to alter the length of the sheet of paper, the speed of the revolving knife is varied as follows: If a longer sheet is to be cut, the sections of the pulley P that is situated on the shaft *c*, which communicates motion to the revolving knife, are moved toward and into each other until the belt-supporting diameter is enlarged sufficiently, and at the same time the sections of the pulley on the other shaft *c* are moved from each other in the same ratio. This operation causes the cutting-knife to rotate slowly and causes a longer sheet of paper to be cut off. The operation is reversed when a shorter sheet of paper is required, thus causing the cutting-knife to rotate at an increased velocity and form shorter sheets.

I do not limit myself to the application of my improved pulleys to paper-cutting machines, as they may be used for any of the purposes to which expanding or differential pulleys are applicable.

Other means may be used for adjusting the sections of the pulley beside the right and left hand threaded shaft without departing from the spirit of my invention.

I am aware that a pulley composed of two tapering sections slotted to form fingers and coinciding spaces is not new, and I do not, therefore, claim the same, broadly.

I claim—

1. An expanding pulley composed of two oppositely-tapered sections, each having its periphery slotted to form longitudinal fingers, and its base or larger end slotted to receive the fingers on the other section, the fingers of the one section coinciding with the slots in the periphery and base of the other, as set forth.

2. The combination of the two oppositely-tapered slotted sections, the one having a right-hand and the other a left-hand nut, and the supporting-shaft having right and left hand threads engaging with said nuts, as set forth.

3. The combination of the two oppositely-tapered slotted sections, having the oppositely-threaded nuts, the right and left hand threaded shaft engaged with said nuts, and the jam-nuts *d d*, whereby the sections are secured whenever they may be adjusted.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of September, 1884.

WILLIAM G. FINLAY.

Witnesses:
C. F. BROWN,
H. BROWN.