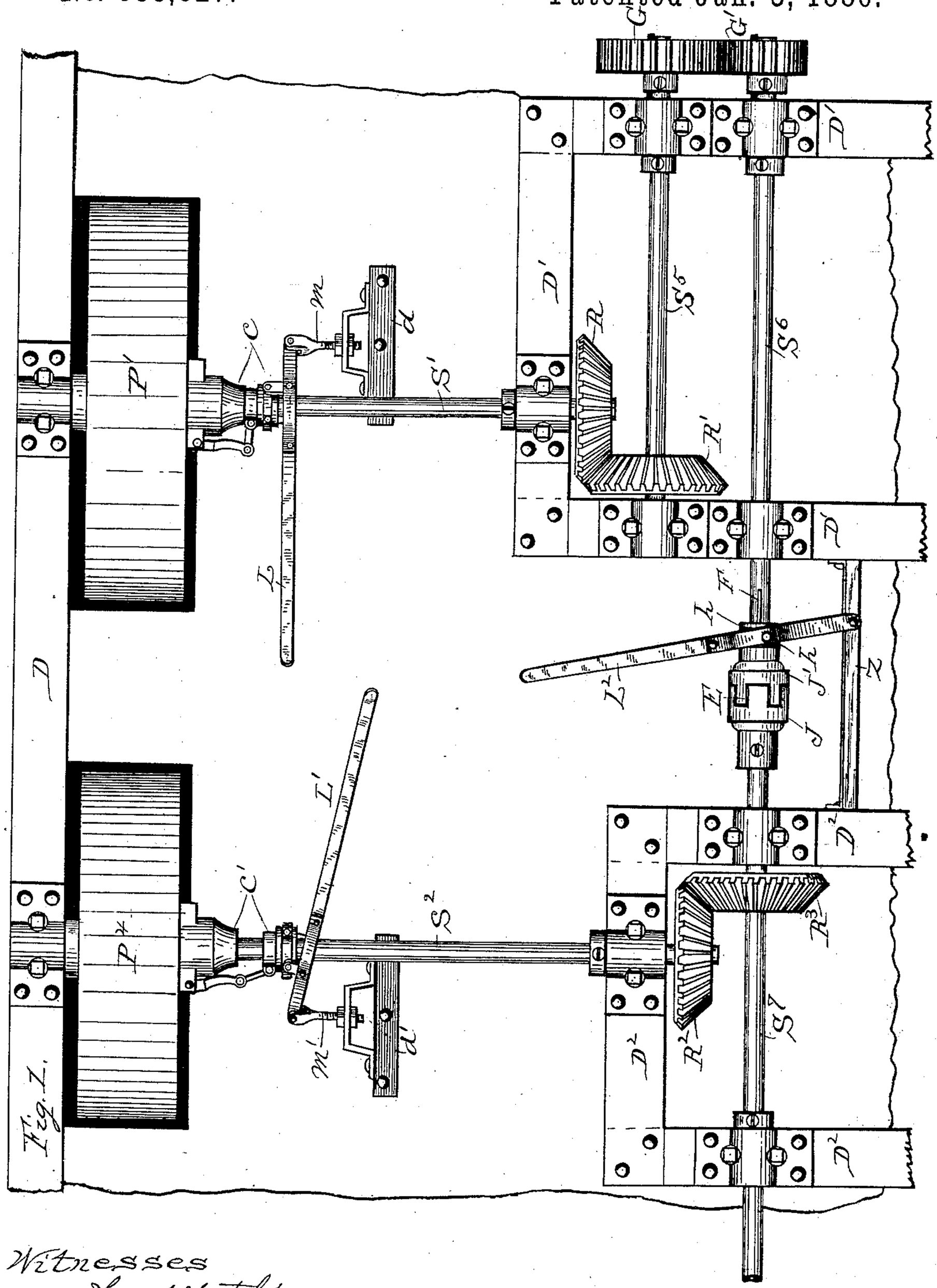
(No Model.) 2 Sheets—Sheet 1.

J. L. CAMPBELL.

SPEED REGULATOR FOR THE ROLLS OF A PAPER MILL.

No. 333,827. Patented Jan. 5, 1886.



Witnesses
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Wm J. Hutchins.

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

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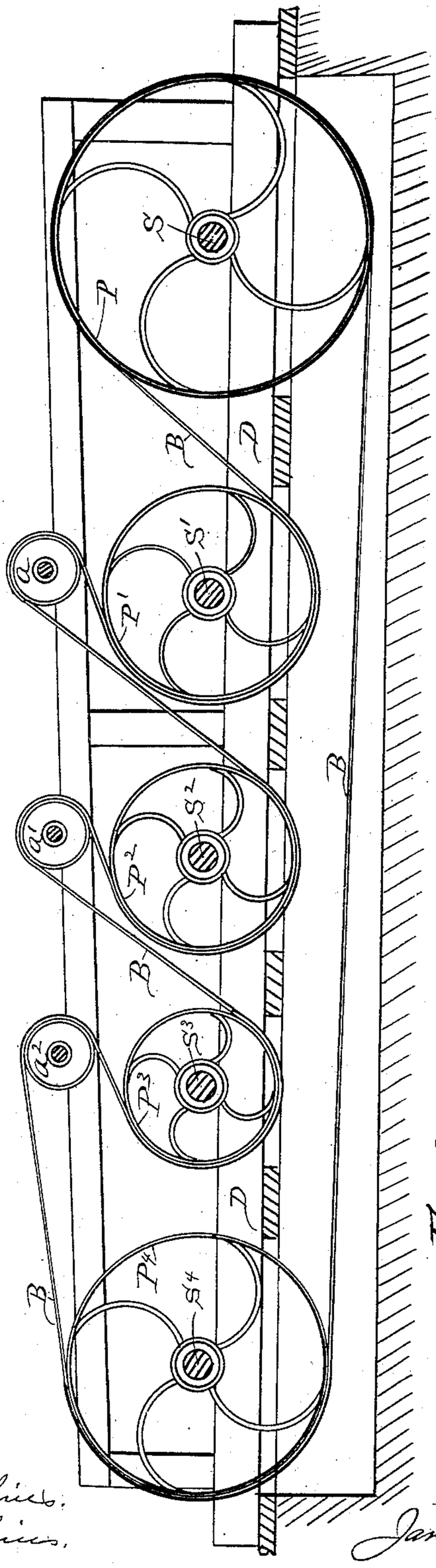

Fig. 2.

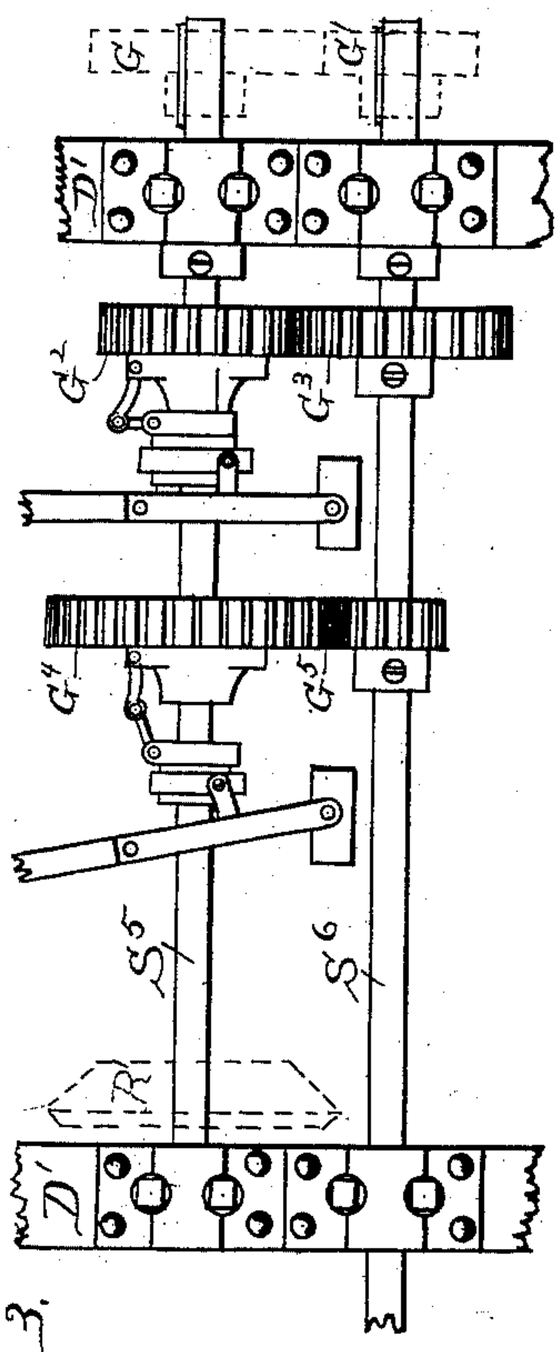

Fig. 3.

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UNITED STATES PATENT OFFICE.

JAMES L. CAMPBELL, OF LOCKPORT, ILLINOIS.

SPEED-REGULATOR FOR THE ROLLS OF A PAPER-MILL.

SPECIFICATION forming part of Letters Patent No. 333,827, dated January 5, 1886.

Application filed July 24, 1885. Serial No. 172,592. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. CAMPBELL, a citizen of the United States of America, residing at Lockport, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Speed-Regulators for the Rolls of a Paper-Mill, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain improvements in speed-regulators, and is designed as an attachment for the rolls of a paper-mill, and is for the purpose of giving a variety of given speeds to said rolls, the construction and operation of which will be fully set forth and explained in the following specification and claims, reference being had to the accompanying drawings, which form a part of this specification.

The object of this invention is to render it unnecessary to stop the rolls of a paper-mill for the purpose of changing its gearing or parts, in order to cause them to run at different speeds to make different numbers or thicknesses of paper.

The speed of the rolls of a paper-mill determines the number or thickness of paper being made, and heretofore it has been necessary to stop said rolls in order to change its gearing, so they may run at different speeds to make different numbers of paper, thereby wasting a large quantity of paper that might be on the rolls in process of making, and also losing a large amount of time.

Referring to the drawings, Figure 1 is a plan view of my attachment, showing the gearing mechanism and the manner in which it is connected with the driving-pulleys; also showing the clutch mechanism for connecting the main shaft which drives the rolls of a paper-mill with the different-sized pulleys to give different speeds to said rolls. Fig. 2 is a side elevation of the train of different-sized driving-pulleys, showing the manner in which they are driven by means of a single belt; also showing a cross-section of the different shafts which connect said pulleys with the main drive-shaft of the rolls of a paper-mill by means of their respective gears; and Fig. 3 is a detailed plan view of the two counter-shafts of the regulator, showing the different-sized or different-diameter spur-gears for connecting them for giving varied speeds to one of the said shafts.

P represents the drive-pulley mounted on the shaft S, to which power is applied to operate the different parts of this device, (see Fig. 2,) and in turn the main shaft which drives the rolls of a paper-mill, and P′, P^2, P^3, and P^4 are similar pulleys of different sizes, mounted on their respective shafts S′, S^2, S^3, and S^4. These pulleys are arranged in a train in such manner that a single belt—such as shown at B in Fig. 2—will pass partly around each one and simultaneously rotate the train, the larger ones rotating slower than the smaller ones. A set of tightening-pulleys (shown at *a*, *a*′, and a^2 in Fig. 2) are arranged on suitable shafts and properly boxed in such manner as to support the belt B between the pulleys, so the said belt will engage more surface of the pulleys, and by shifting the said tightening-pulleys along on their supporting-beams the belt B may be either tightened or loosened at will. The pulleys may, however, each have a separate belt and each have a drive-pulley—such as P, Fig. 2—mounted on the shaft S, to which power is applied to operate the different parts of this device.

The shafts S, S′, S^2, S^3, and S^4 are properly boxed on sills D, D′, and D^2, as shown in Fig. 1, at their shafts S′ and S^2, where but two shafts and two pulleys are shown, that number being deemed sufficient to illustrate the plan of the device. A short distance from the said train of pulleys and parallel therewith, and properly boxed on sills D′, are a pair of counter-shafts, S^5 and S^6, and S^7 represents the main shaft which drives the rolls of a paper-mill mounted on sills D^2. This shaft S^7 and shaft S^6 are set on a line with each other, and are arranged to be connected or detachably coupled with each other by means of a clutch, such as is shown at E, Fig. 1, one part (shown at J) being rigidly secured to shaft S^7, and one part, J′, being feathered on shaft S^6 by means of a feather-key, (shown at F,) and arranged to be reciprocated on said shaft, in order to couple or uncouple with its fellow part, by means of lever L^2, which is pivotally connected to an annular ring, *h*, of said part J′, and also pivoted to a stationary bar, Z, at its lower end, as shown in Fig. 1.

The shafts upon which the train of pulleys are mounted are arranged at right angles with shafts S^5, S^6, and S^7, and connected with shafts S^5 and S^7 by means of miter or bevel gears R R′ and R^2 R^3, (shown in Fig. 1,) the gears R^2 R^3 connecting shaft S^2 direct with the main-shaft S^7, which drives the rolls of a paper-mill, as are all the other shafts of said train, excepting shaft S′, which connects with counter-shaft S^5 by means of the miter-gears R R′.

The shafts S, S′, S^2, S^3, and S^4, with their respective pulleys, are each provided with a friction-clutch for coupling or uncoupling said pulleys with their said shafts, so that as all of said pulleys are in motion either one of said friction-clutches may be operated to clutch and rotate either or any one of said shafts independently from the other and at the desired speed produced by the sized pulley brought into service. These friction-clutches are such as shown in Fig. 1 at C and C′ on shafts S′ and S^2, the one shown at C being represented as clutched, while the one shown at C′ is represented as thrown out of service.

The levers L and L′, which are fulcrumed at their lower ends to the screw-threaded shanks *m m′*, which are respectively secured to brackets of blocks *d d′* on the floor, are for the purpose of operating the said friction-clutches. When a medium number or thickness of paper is being rolled, pulley P^2 is brought into service and clamped with its shaft S^2, which will drive shaft S^7 through the medium of gears R^2 and R^3, and in such instance clutch E would be thrown out of gear. Other pulleys of the train are arranged to be geared to shaft S^7 by either miter or bevel gears, to rotate said shaft at slight differences of speed to produce different thicknesses or numbers of paper.

When it is desired to make either very thick or very thin paper, pulley P′ is brought into service and is clutched with its shaft S′, and rotates counter-shaft S^5 through the medium of gears R and R′, and in turn counter-shaft S^6 through the medium of spur-gears G G′, which are respectively placed on shafts S^5 and S^6, and caused to rotate with said shafts by means of splines set therein and held from working off by means of set-screws. In such instances the clutch E is thrown out of gear, when the device will appear as shown in Fig. 1. The spur-gears G and G′ are arranged to be interchangeable, or may be substituted by similar gears of different sizes, so that a variety of speeds may be given shaft S^7; and while any such change of gears is being made pulley P^2 and shaft S^2 are brought into service to rotate shaft S^7 until such change can be made, and as the speed of said pulley and shaft produces a medium number or thickness of paper it matters not from what number or thickness of paper the shift or change was made, as such change being medium it is not sufficient to either buckle or pull apart the paper in process of making on the rolls. By this mechanism the shaft S^7, which is the main shaft used to impart motion to the rolls of a paper-mill, is arranged to be continuously rotated, and any desired speed produced while said shaft is in motion, by simultaneously reversing the levers of the friction-clutches to throw out of gear the one in service and in gear the one desired to be brought into service.

It is intended that each pulley and each spur-gear shall be numbered to correspond with the number or thickness of paper their working speed will produce, in order that workmen who are not familiar with the varied changes of this mechanism may readily see the required parts to put into service to produce the number of paper desired.

To obviate the necessity of taking off the spur-gears G and G′, as often, to make changes in speed through that source, where the greatest changes are made, the duplicates of said gears—such as shown at G^2 G^3 and G^4 G^5 in Fig. 3—may be placed on said shafts S^5 S^6 in their respective pairs, and arranged to be clutched to the driving counter-shaft by friction-clutches, as shown in said figure, so that either pair may be used independent from the others, and thus save removing a pair and substituting them for others.

The train of pulleys, which are shown more particularly in Fig. 2, may be substituted by spur-gears of different diameters, and of similar diameters to said pulleys, and arranged to mesh together and be driven by shaft S, which would be the mechanical equivalent of said pulleys, and produce exactly the same result.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is as follows, to wit:

1. In a speed-regulator, two or more drive-pulleys arranged on their respective shafts, substantially as shown and described, each having a friction-clutch for detachably connecting it with its shaft, a shaft of one of said pulleys being connected with a counter-shaft by means of miter or bevel gears, and said counter-shaft being in turn connected with a secondary counter-shaft by means of interchangeable spur-gears of different diameters, the shaft or shafts of the other of said pulley or pulleys being connected with a main drive-shaft for driving the rolls of a paper-mill by means of miter or bevel gears, wherein said drive-shaft is arranged to be detachably coupled with said secondary counter-shaft, for the purpose set forth.

2. In the speed-regulator described, the train of pulleys of different diameters, each independently mounted on and arranged to be detachably connected with a suitable shaft, in combination with said shafts, and the shafts S^5, S^6, and S^7, miter or bevel gears R R′ and R^2 R^3, and interchangeable spur-gears G G′, and clutch E, and the means, substantially as set forth, for operating said clutches, for the purpose specified.

3. In the speed-regulator, the train of two or more pulleys shown and described, each mounted loosely on a shaft, which shafts are provided with miter or bevel gears for meshing with similar gears of a main counter-shaft for driving the rolls of a paper-mill, and having the friction-clutches shown and described for detachably connecting said pulleys with their respective shafts, and for throwing them in and out of service, substantially as and for the purpose specified.

4. In the speed-regulator shown and described, and in combination with the shafts S^5 S^6, and shaft S^7, and the driving mechanism, the spur-gears of different diameters, arranged to connect said shafts S^5 and S^6, in the manner substantially as and for the purpose set forth.

5. In the speed-regulator described, the combination of the pulleys P′ and P^2, shafts S′ and S^2, clutches C and C′, having the levers L L′, gears R R′ and R^2 R^3, shafts S^5, S^6, and S^7, clutch E, having the lever L^2, and the interchangeable gears G G′, as and for the purpose set forth.

6. In the speed-regulator shown and described, the combination of the train of pulleys P, P′, P^2, P^3, and P^4, shafts S, S′, S^2, S^3, and S^4, each having a friction-clutch for connecting them with their respective pulleys, and each provided with a gear-wheel, as shown and described, for connecting them with the shafts S^5 and S^7, belt B, tightening-pulleys a, a', and a^2, and the means, substantially as set forth, for supporting said parts, for the purpose specified.

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