

No. 721,406.

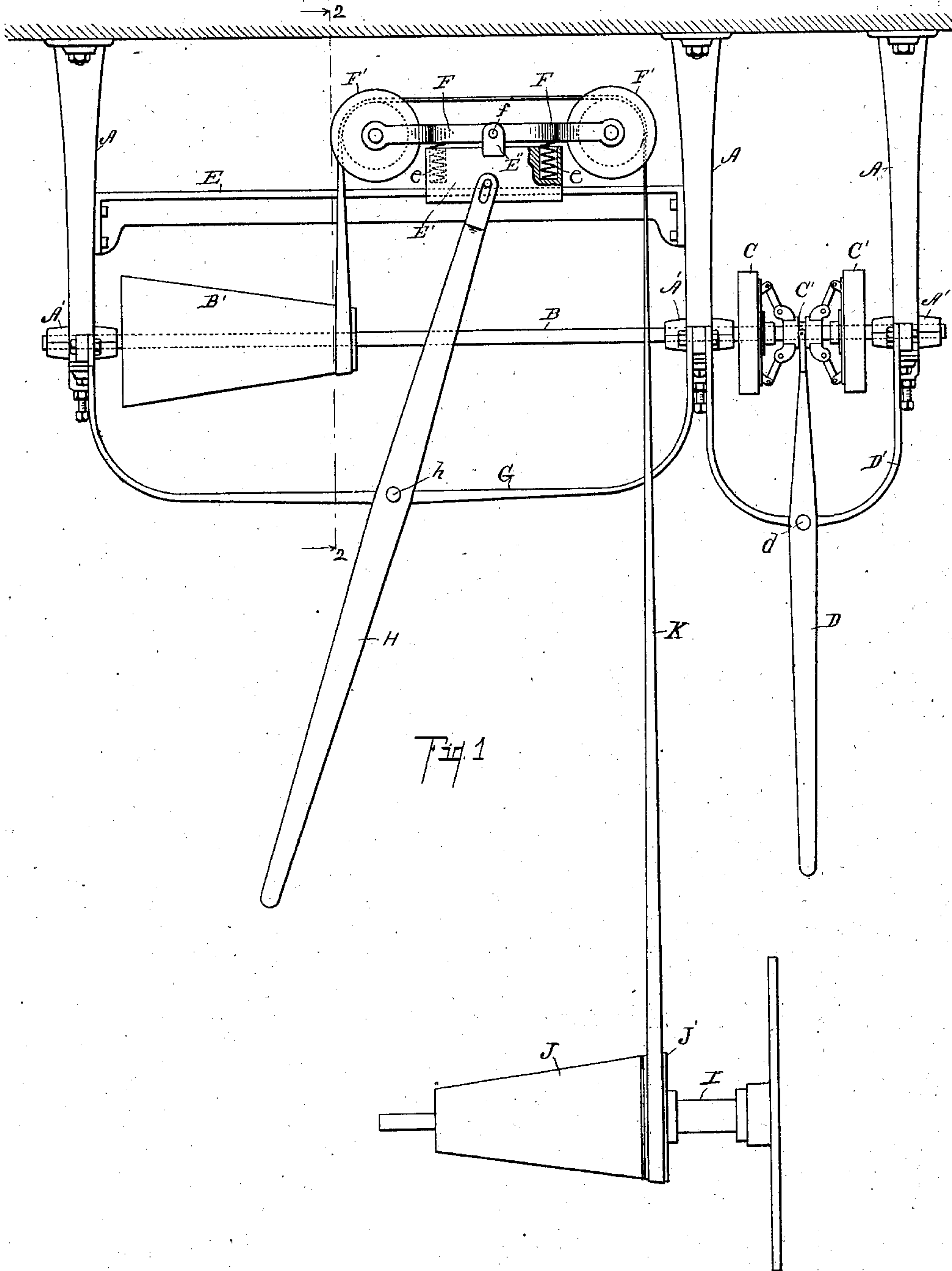
PATENTED FEB. 24, 1903.

H. P. WHITE.
SPEED REGULATOR.

APPLICATION FILED SEPT. 18, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

W. E. Wood,
Otis A. Earl

Inventor,

Henry P. White
By *Fred L. Hapgood*
Att'y.

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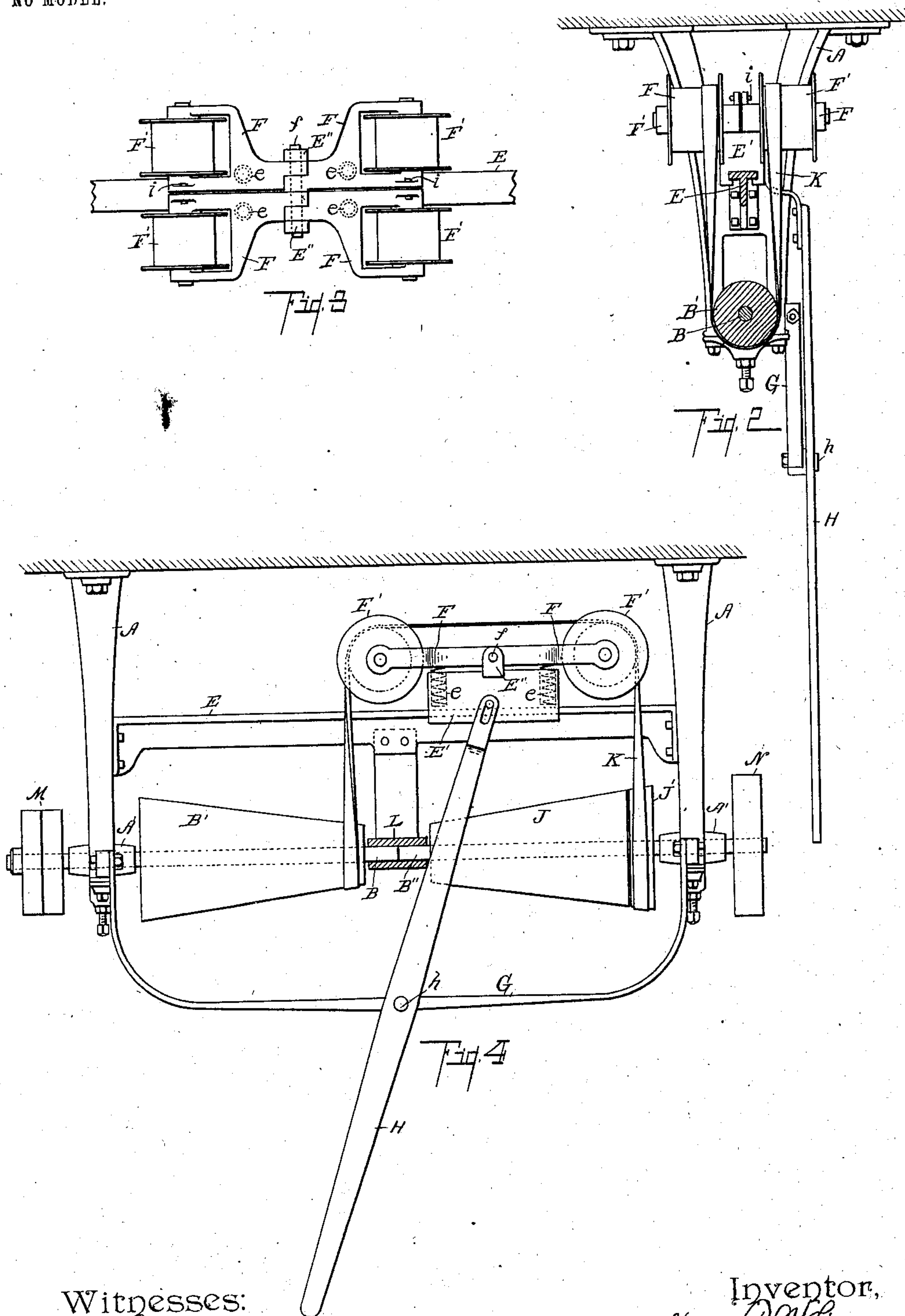
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NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:

D. C. Wood,
Otis A. Earl

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UNITED STATES PATENT OFFICE.

HENRY P. WHITE, OF KALAMAZOO, MICHIGAN.

SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 721,406, dated February 24, 1903.

Application filed September 18, 1902. Serial No. 123,913. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. WHITE, a citizen of the United States, residing at the city of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Speed-Regulators, of which the following is a specification.

This invention relates to improvements in speed-regulators of the cone-pulley type, in which tapered cones—such as are shown in my Letters Patent No. 703,027, issued to me June 24, 1902, and No. 708,439, issued to me on September 2, 1902—as distinguished from step-cones are employed. This invention is in some respects an improvement upon the speed-regulators described in said Letters Patent, it being a somewhat different embodiment of the principles there disclosed, and is particularly adapted for use in certain relations.

The objects of this invention are, first, to provide an improved belt-driven-cone speed-regulator having cones lying in the same or different planes and in which all portions of the contact-surface of the belt travel at the same relative speed and are maintained at an even tension, thereby dispensing with the compensating slip of the belt due to the usual construction; second, to provide an improved belt-driven-cone speed-regulator having cones lying in the same or different planes, in which the division of speeds may be taken at any point between the two extremes at which the machine is designed to run and without in any manner affecting the tension or friction of the belt; third, to provide a belt-driven-cone speed-regulator having cones lying in the same or different planes, with efficient and practical means of securing the variations in speed; fourth, to provide a speed-regulator of the cone-pulley type which is also effective as a power-regulator; fifth, to provide a speed-regulator of the belt-driven-cone-pulley type which may be adjusted to automatically govern its load or which may be run under different loads without any adjustment up to the full capacity of its belt.

Further objects will definitely appear in the detailed description to follow.

I accomplish the objects of the invention

by the devices, means, and mechanism described in this specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of my invention is fully illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation view of my improved speed-regulator, being illustrated as applied to a counter-shaft and to the driving-shaft of a machine to be operated, which is shown in conventional form. Fig. 2 is a detail sectional view taken on a line corresponding to line 2 2 of Fig. 1. Fig. 3 is a detail plan view of the belt-guiding idlers and their supports. Fig. 4 is a side elevation view of a modified structure in which the cone-pulleys have the same axial line.

In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the parts A are shaft-hangers, which are provided with suitable bearings A' for the shaft B. The pulleys C C are connected to the shaft by a suitable clutch mechanism, so that the shaft B may be driven in either direction, as desired. The pulleys C are preferably connected with the same power-shaft by straight and crossed belts, so that they are driven in opposite directions. The cone-pulley B' is keyed to or otherwise secured to the shaft B, so that it is revolved therewith. The clutch devices are controlled by the lever D, which is pivotally mounted on the bracket D' at *d* and is arranged within convenient reach of the operator.

Mounted upon the driving-shaft I of the machine to be operated, which is here shown in conventional form, is a driving-cone J. The cones J and B' are arranged oppositely in respect to their taper—that is, their corresponding ends point in the opposite directions. The driving-cone may be mounted upon the shaft of the machine to be operated, as is illustrated in Fig. 1, or may be arranged as in Fig. 4 in the modified structure, wherein the axial line of the driven cone and the

driving-cone coincide. The driving-cone is then connected to the machine to be operated by a suitable belt or otherwise, as may be desired, to suit the particular arrangement or machine which it is designed to operate. The cones are connected by the belt K, which is passed over the guiding-idlers F'. The idlers F' are mounted upon arms F, which are pivotally connected by the pin *f* to the upwardly-extending brackets E'' on the frame or carriage E'. The carriage E' is mounted upon a suitable track or way E, which is secured to the hangers A above the shaft B. The carriage E' is moved back and forth on the way E by a lever H, which is secured thereto and pivoted to the bracket G at *h*. The lever H extends into convenient reach of the operator, so that by shifting the same the carriage may be moved back and forth upon the way. The arms F, carrying the idlers which guide and support the belt, are held normally upward by coiled springs *e*. The cones and belt-guiding idlers are so arranged in relation to each other that when the belt is guided onto the inner end of one pulley it will be guided onto the outer end of the other, the cone-pulleys J and B' lying in different lateral planes. In passing over the idlers F' the belt K is guided and turned so that the same edge is always presented to the corresponding end of each cone, and the friction and tension of the belt being uniform throughout the same relative speed is preserved at every portion of its contact-surface.

When it is desired to use this device as a power-regulator which automatically governs its own load, the pairs of arms F are secured together by the pins *i*, (see Fig. 3,) suitably perforated ears being provided on the arms to receive the pins. When thus arranged and the tension properly adjusted, any resistance which is in excess of the tension of the springs *e* to the power delivered will cause the belt to slip. When the arms F are free, the work of the belt is its full capacity, provided its friction-surface is equal to its strength.

In the modified structure shown in Fig. 4 the shafts B B'', which support the cone-pulleys B' and J J', are in the same axial line, the bearing L serving as the bearing for both shafts.

Tight and loose pulleys M are provided for the shaft of the driven cone B', and a suitable pulley N is provided for the shaft of the driving-pulley J, by means of which the device is connected to the machine to be operated.

In operation with the parts arranged as in Fig. 1 the driven cone B' receives the power and is driven in either direction, as may be desired, through the pulleys C C' and will transmit the power through the belt K to the driving-cone J, from which it is delivered at various speeds, as desired, the desired variations of speed being secured by shifting the carriage E' along the way E by means of

the hand-lever H. As the cone B' and J lie in different lateral planes, by shifting the carriage E' the position of the belt on the cones may be whatever is desired to get any required speed between the maximum and minimum speeds of the device.

By means of the loose pulley J', arranged on the shaft of the driving-cone J and adjacent thereto, the machine is under perfect control and disconnected when the belt is shifted, as appears in the drawings. By this arrangement the speed and the operation of the machine are under the perfect control of the operator, as by simply throwing the lever H the speed may be changed as desired, or by shifting it to the extreme position, as indicated in the drawings, the belt is thrown upon the loose pulley J' and the machine thus disconnected from the power, all by the action of one lever. This avoids the necessity of the operator disconnecting the power from the speed-regulator and gives the belt of the regulator the advantage of always being in motion, and also relieves the operator of the necessity of even touching the belt with his hands.

My improved speed-regulator is adapted for use in various relations, although it is particularly adapted for use in connection with machines which would have their revolving portions in a plane parallel to the plane of the driven cone of the speed-regulator. In this list might be mentioned engine-lathes, milling-machines, planers, shapers, &c. It is also particularly applicable for use as a speed-regulator for street-car or automobile control, and is especially adapted for use in all lines of variable-speed counter-shaft and power-transmitter service. It will be observed that it is easily adapted to the uses required and that it is very simple and economical to construct.

I have illustrated and described my improved speed-regulator in the form preferred by me on account of its simplicity in manufacture and convenience in use. I desire to state, however, that I am aware that it is capable of being greatly varied in structural details without departing from my invention.

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

1. In a mechanical speed-regulator, the combination of a suitable support; a shaft B provided with suitable bearings; pulleys C C' on said shaft; suitable clutch devices for alternately securing said pulleys to said shaft; a driven tapered cone B' mounted on said shaft B; a shaft I, a driving tapered cone J, and a loose pulley J' arranged adjacent thereto, mounted on said shaft I; said cones being arranged in different lateral planes and having like ends pointing toward a line drawn between their respective lateral planes; a belt connecting said cones; guiding-idlers F' for said belt; a carriage or frame E'; arms F by which said idlers are carried arranged in pairs, pivotally mounted on said carriage;

means for detachably securing said arms together; suitable tension-springs for said arms; a track or way for said carriage; and suitable means for moving said carriage along
5 said track or way, all coacting for the purpose specified.

2. In a mechanical speed-regulator, the combination of a suitable support; a shaft B provided with suitable bearings; pulleys C C' on
10 said shaft; suitable clutch devices for alternately securing said pulleys to said shaft; a driven tapered cone B' mounted on said shaft B; a shaft I; a driving tapered cone J and a loose pulley J' arranged adjacent thereto
15 mounted thereon, said cones being arranged in different lateral planes and having like ends pointing toward a line drawn between their respective lateral planes; a belt connecting said cones; guiding-idlers F' for said belt;
20 a carriage or frame E'; arms F by which said idlers are carried, arranged in pairs pivotally mounted on said carriage; suitable tension-springs for said arms; a track or way for said carriage; and suitable means for moving said
25 carriage along said track or way, all coacting for the purpose specified.

3. In a mechanical speed-regulator, the combination of a suitable support; a shaft B provided with suitable bearings; pulleys C C' on
30 said shaft; suitable clutch devices for alternately securing said pulleys to said shaft; a driven tapered cone B' mounted on said shaft B; a shaft I; a driving tapered cone J mounted thereon, said cones being arranged in different lateral planes and having like ends pointing
35 toward a line drawn between their respective lateral planes; a belt connecting said cones; guiding-idlers F' supporting said belt; a carriage or frame E'; arms F by which said
40 idlers are carried arranged in pairs pivotally mounted on said carriage; means for detachably securing said arms together; suitable tension-springs for said arms; a track or way for said carriage; and suitable means for moving
45 said carriage along said track, all coacting for the purpose specified.

4. In a mechanical speed-regulator, the combination of a suitable support; a shaft B provided with suitable bearings; pulleys C C' on
50 said shaft; suitable clutch devices for alternately securing said pulleys to said shaft; a driven tapered cone B' mounted on said shaft B; a shaft I; a driving tapered cone J mounted thereon, said cones being arranged
55 in different lateral planes and having like ends pointing toward a line drawn between their respective lateral planes; a belt connecting said cones; guiding-idlers F' supporting said belt; a carriage or frame E';
60 arms F by which said pulleys are carried, ar-

ranged in pairs pivotally mounted on said carriage; suitable tension-springs for said arms; a track or way for said carriage; and suitable means for controlling the movement
65 of said carriage, all coacting for the purpose specified.

5. In a mechanical speed-regulator, the combination of a suitable support; a shaft B provided with suitable bearings; a driven tapered cone B' mounted on said shaft B; a
70 shaft I; a driving tapered cone J and a loose pulley J' arranged adjacent thereto, mounted on said shaft I, said cones being arranged in different lateral planes and having like ends pointing toward a line drawn between their
75 respective lateral planes; a belt connecting said cones; guiding-idlers F' for the support of said belt; a carriage or frame E'; arms F, by which said pulleys are carried, arranged in pairs pivotally mounted on said carriage; 80
means for detachably securing said arms together; suitable tension-springs for said arms; a track or way for said carriage; and suitable means for causing said carriage to move along said track or way, all coacting
85 for the purpose specified.

6. In a mechanical speed-regulator, the combination of suitable supports; a driven tapered cone adapted to be connected to a
90 source of power; a driving tapered cone adapted to be connected to the machine it is designed to operate, said cones being arranged parallel and in different lateral planes and having like ends pointing toward
95 a line drawn between their respective lateral planes; a belt connecting said cones; guiding-idlers for said belt whereby it is delivered to said cones in the same relation; and means for shifting said idlers to vary the relations of the speeds of said cones, as specified.
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7. In a mechanical speed-regulator, the combination of cones adapted to revolve upon their axis arranged parallel and in different
105 lateral planes and having like ends pointing toward a line drawn between their respective lateral planes; a belt connecting said cones; guides for said belt, which determine its relative position on said cones, and delivers said belt to said cones in the same relation; and
110 means for varying the position of said guides to shift said belt laterally on said cones to vary the relations of their speeds.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses. 115

HENRY P. WHITE. [L. S.]

Witnesses:

D. E. WOOD,
OTIS A. EARL.