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H. P. WHITE.

MECHANICAL SPEED REGULATOR.

(Application filed Jan. 6, 1902.)

(No Model.)

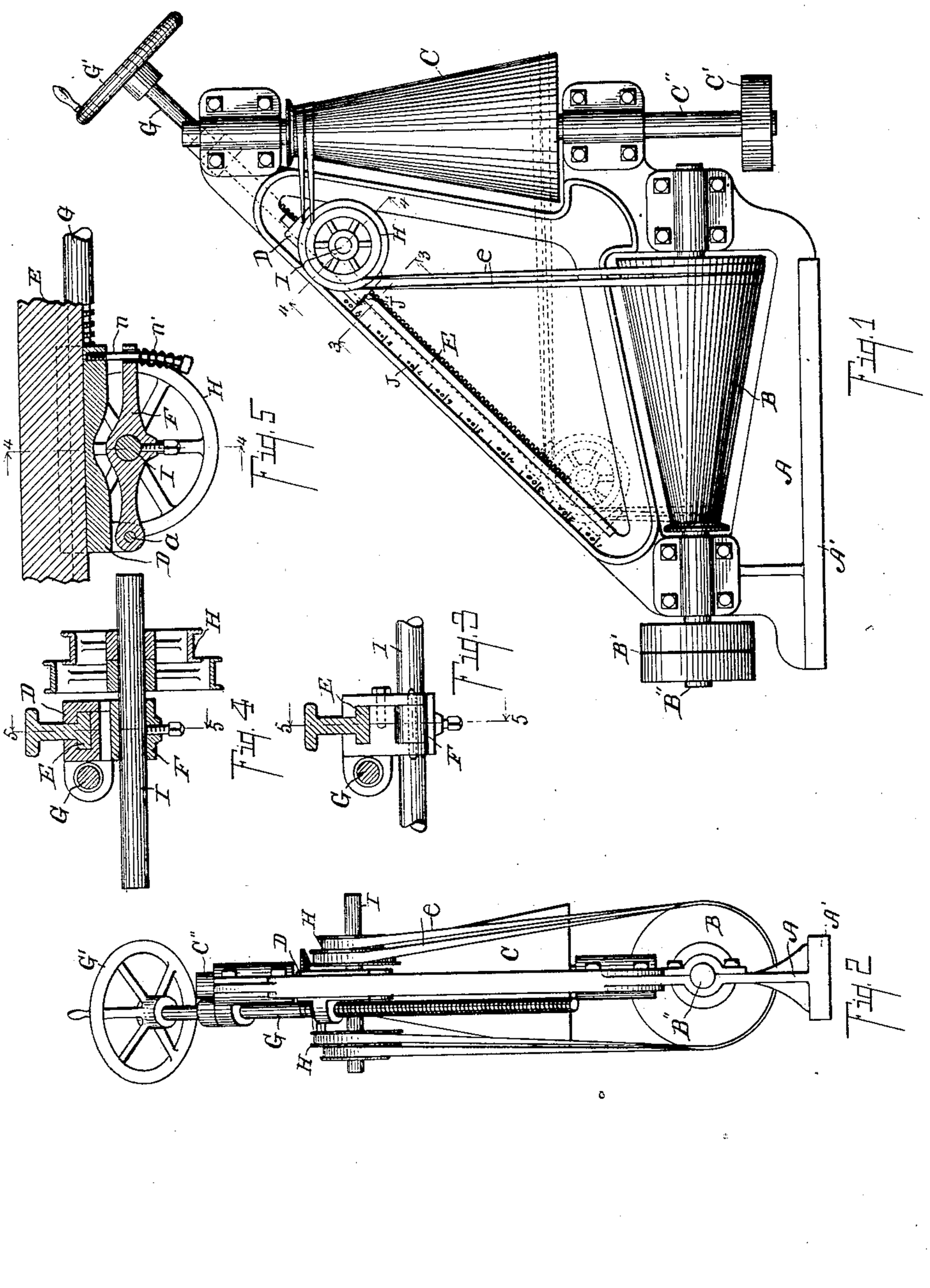

Fig. 1

Fig. 2

Fig. 5

Fig. 4

Fig. 3

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HENRY P. WHITE, OF KALAMAZOO, MICHIGAN.

MECHANICAL SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 703,027, dated June 24, 1902.

Application filed January 6, 1902. Serial No. 88,618. (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 Mechanical 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, as distinguished from step cones, are employed.

The objects of this invention are, first, to provide a mechanical speed-regulator of the cone-pulley type which may be satisfactorily applied in combination with any desired source of power; second, to provide a belt-driven cone speed-regulator in which the divisions of speed are not taken at fixed points, but may be taken at any points between the two extremes at which the machine is designed to run; third, to provide an improved cone-pulley means to secure variations in the speed of machines which in practice require such variations; fourth, to provide a belt-driven cone-regulator in which all portions of the contact-surface of the belt travels at the same relative speeds upon the surface of each cone, thereby dispensing with the compensating slip of the belt; fifth, to provide in a belt-driven cone speed-regulator an improved mechanical means for manipulating the belt to secure the desired variations in speed, thus relieving the operator of the necessity of shifting the belt with his hands.

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

I accomplish the objects of my invention by the devices, means, and mechanism described in this specification.

The invention is clearly pointed out in the claims.

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

Figure 1 is a side elevation of my improved mechanical speed-regulator. Fig. 2 is an end elevation looking from the left-hand end of Fig. 1 with the tight and loose pulleys removed. Fig. 3 is a transverse enlarged detail sectional view of the guideway for the adjustable idler. Fig. 4 is an enlarged detail sectional view through the idler-wheels and slide taken on line corresponding to line 4 4 of Figs. 1 and 5. Fig. 5 is an enlarged detail longitudinal sectional view of the idler-wheels and adjusting mechanism taken on a line corresponding to line 5 of Fig. 4.

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 lettered parts of the drawings, A is the main frame, which supports the other parts of the machine.

A′ is the base or bracket, which supports the machine and may, if desired, be cast integral with the main frame A.

B is the driven cone, mounted upon shaft B″, which also carries the tight and loose pulleys B′, which represent the medium through which power may be applied to the machine.

C is the driving-cone, mounted upon the shaft C″, which also carries the pulley C′, which is the medium by which power may be delivered from the machine. The shafts B″ and C″, upon which said cones B and C are mounted, are journaled in suitable bearings, preferably at right angles to each other, and so positioned that lines passing through their axes would meet at a common point and extend between the points of the frame beyond the outer ends of the cones and diagonal to their axes. By "like ends" of said cones I mean either the large ends or the small ends. The cones are both tapered either toward or away from this common point.

E is a track which may be integral with or attached to the main frame A. D is a sliding frame adapted to move along said track. Mounted upon said sliding frame D by means of the hinged portion F is the shaft I, upon which self-adjusting idlers H H H H are journaled. Said shaft I is supported under spring tension by means of the coil-spring n' and its supporting device shown at n. Self-adjusting idlers H engage the belts e, which pass around the cones B and C and form the medium by which power may be transmitted between said cones. G is a screw by means of which said sliding frame D may be made to move back and forth upon said track E. G′ is

a hand-wheel by means of which said screw G may be manipulated.

J is a scale, which may be stamped or marked upon a portion of the main frame A, or it may be stamped upon a separate piece and attached to said frame A. J′ is a pointer by means of which, in conjunction with said scale J, the operator may know at what speed the machine is running.

In operation with the parts arranged as above described the driven cone B will receive power through the medium of a belt applied on the pulley B′ and will transmit said power to the driving-cone through the medium of belts *e*, which pass around said cones B and C and said self-adjusting idlers, by which they are guided and held in proper position under spring tension, and said power may be delivered under various speeds from said driving-cones to any desired point by means of a belt applied on the pulley C′.

The desired variation of speed is secured by causing the sliding frame D, which supports the shaft I upon which the self-adjusting idlers H are journaled, to move along the track E by means of the hand-wheel and screw G′ and G. Said track is positioned in such relation to said cones as to cause said belts to travel the entire length of the said cones B and C whenever sliding frame D, which carries said self-adjusting idlers H, is caused to move along the length of said track E. To illustrate this point, suppose the driven cone B of the machine, as shown in the drawings, to be running at a speed of three hundred revolutions per minute, with the belts *e* in the position shown in Fig. 1. The driving-cone C will run nine hundred revolutions per minute, for the small ends of the cones are only one-third as large as the large ends. Since the belts *e* are running on the large end of the driven cone B and on the small end of the driving-cone C, it follows that the ratio is three to one, or nine hundred revolutions for the driving-cone to three hundred revolutions of the driven cone; but if while the machine is in operation the frame D be moved down to the opposite end of the track E the conditions will be reversed. The belts *e* and the idlers H will now be in the position indicated by the dotted lines, Fig. 1, and as the speed of the driven cone B has not varied the driving-cone C will now revolve one hundred times while the driven cone B revolves three hundred times. By means of the hand-wheel and the screw G′ and G the sliding frame may be positioned at any desired point along the track E. Thus any desired speed between the two extremes at which the machine is designed to run can easily be obtained, and by means of the scale J and the pointer J′ the operator may always know at what speed the machine is running.

By reference to Fig. 1 it will be observed that the same sides of the belts *e* always engage like structural ends of said cones B and C, thus obviating the necessity of a compensating constant slip at the contact-surface of said belts—that is to say, the edge of the belt toward the large end of cone C is toward the large end of cone B, and vice versa.

Having thus definitely described an embodiment of my mechanical speed-regulator, I desire to state in connection with the same that it can be greatly varied without departing from my invention. Its uses are as numerous as the occasions for transmitting power wherever a variation of power or speed is desired.

I use the term "tapered cone" to distinguish my cone-pulleys from the stepped cones appearing in many places for securing variable speed. Such stepped cones will not permit adjustment of the driving-belt as the means of varying the speed, as in my device.

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 the frame A; shafts B″, C″, supported in suitable bearings on the said frame; a tapered cone B mounted upon said shaft B″; means for delivering power to said shaft B″; a tapered cone C mounted upon said shaft C″; means for delivering power from said shaft C″, said cones having like ends pointing in the same general direction; belts *e* connecting said cones; a track E; a frame D movable on said track; a shaft I adjustably supported on said frame D; idlers H on the said shaft I over which the said belts *e* pass; means for causing said movable frame to move along said track; all coacting substantially as described and for the purpose specified.

2. In a mechanical speed-regulator, the combination of a supporting-frame; tapered cones having like ends (either the large or small) pointing toward a common point; belts thereon; idlers engaging said belts between said cones to support and guide the same; a frame supporting the journal of said idlers under spring tension; a track upon which said frame is adapted to move; means for moving said frame along said track; coacting for the purpose specified.

3. In a mechanical speed-regulator, the combination of a supporting-frame; a driven tapered cone connected to a source of power; a driving tapered cone connected to the machine it is designed to operate, said cones having like ends pointing in the same general direction; a belt operating to transmit power between said cones; idlers engaging said belt; a frame supporting the journal of said idlers; a track upon which said frame is adapted to move; and means for moving said frame along said track, coacting for the purpose specified.

4. In a mechanical speed-regulator, the combination of a supporting-frame; a driven tapered cone; a driving tapered cone, like ends of which point toward each other; a belt connecting said cones; idlers engaging said belt;

a movable frame supporting the journal of said idlers under spring tension; and track upon which said frame is adapted to move, coacting for the purpose specified.

5. In a mechanical speed-regulator, the combination of a supporting-frame; a driven tapered cone connected to a source of power; a driving tapered cone connected to the machine it is designed to operate, like ends of which cones point the same way; a belt connecting said cones; idlers engaging said belt; a frame supporting the journal of said idlers under spring tension; and a track along which said frame is adapted to move, all coacting substantially as described for the purpose specified.

6. In a mechanical speed-regulator, the combination of a driven tapered cone mounted in suitable bearings and connected with a source of power; a driving tapered cone mounted in suitable bearings, provided with means for delivering power to a desired point, like ends of which cones point the same way; a belt operating to transmit power between said cones; idlers engaging said belt to support it in proper position; and means for causing the relative position of said belt upon said cones to be changed to vary the relation of their speeds.

7. In a mechanical speed-regulator, the combination of a driven tapered cone mounted in suitable bearings and connected with a source of power; a driving tapered cone mounted in suitable bearings, provided with means for delivering power to a desired point, like ends of which cones point the same way; a belt operating to transmit power between said cones; means for supporting said belt in proper position; and means for causing the relative position of said belt upon said cones to be changed to vary the relation of their speeds.

8. In a mechanical speed-regulator, the combination of tapered cones mounted upon suitable shafts with bearings for their support, like ends pointing in the same general direction; a belt connecting said cones; idlers engaging said belt, and means adapted to cause said belt to travel along the lateral surface of said cones to secure variations of speed.

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

HENRY P. WHITE. [L. S.]

Witnesses:
ALICE E. HOUGHTON,
OTIS A. EARL.