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J. BANWELL.

REVERSIBLE AND VARIABLE SPEED MECHANISM.

APPLICATION FILED JULY 31, 1901. RENEWED FEB. 12, 1903.

NO MODEL.

FIG. 1.

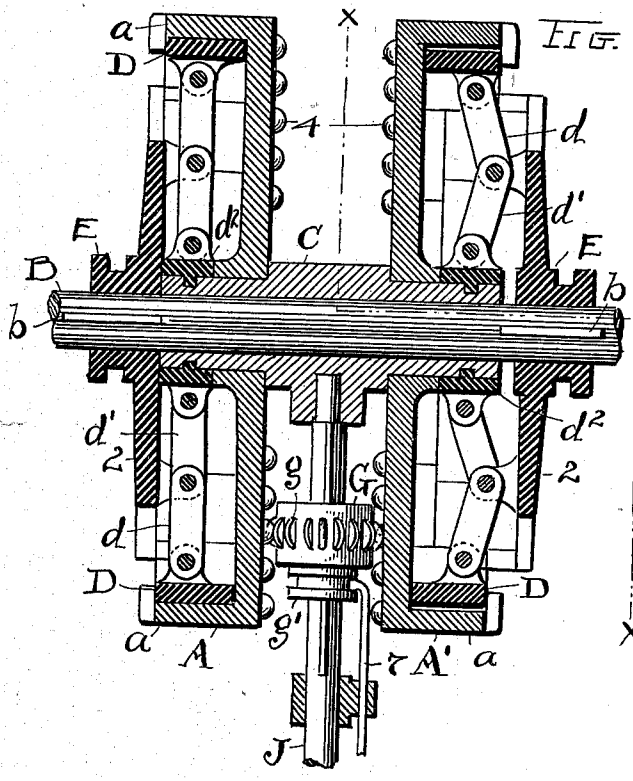



FIG. 2.

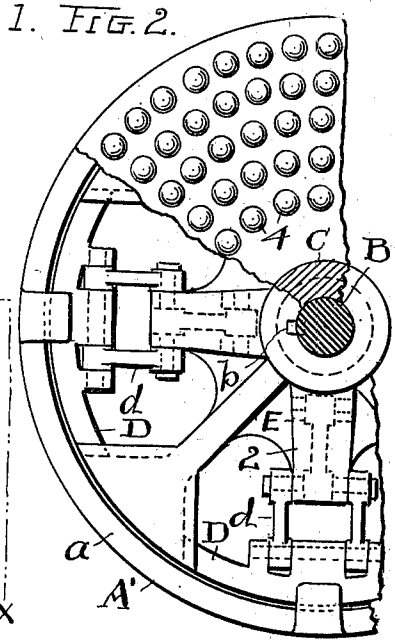



FIG. 3.

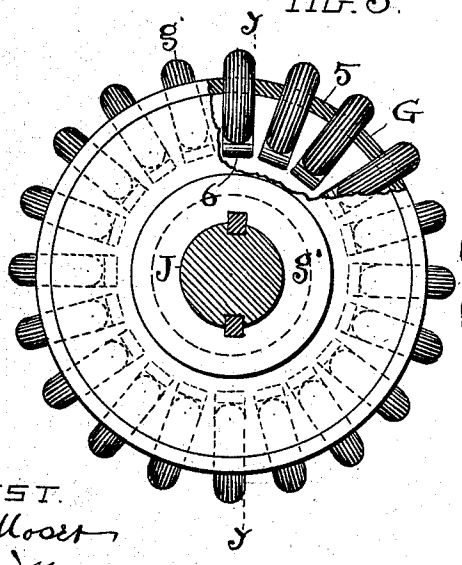
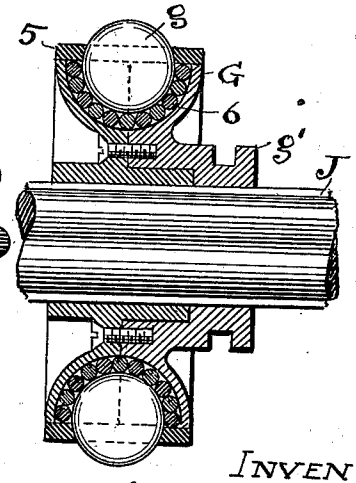



FIG. 4.




ATTEST.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

JAMES BANWELL, OF CLEVELAND, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF THREE-FOURTHS TO C. W. NOKES, JOSEPH C. NORTON, WILLIAM H. LEPPLEY, AND WILLIAM J. ROBLIN, OF CLEVELAND, OHIO.

## REVERSIBLE AND VARIABLE-SPEED MECHANISM.

SPECIFICATION forming part of Letters Patent No. 723,228, dated March 24, 1903.

Application filed July 31, 1901. Renewed February 12, 1903. Serial No. 143,143. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES BANWELL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Reversible and Variable-Speed Mechanism; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to reversible and variable-speed mechanism; and the prime object of the invention is to provide a speed-varying and reversing mechanism in which a positive gear connection is made with the driven disk, as heretofore, all substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical cross-sectional elevation of a set of gear-disks and a section of shaft on which they are supported and showing also the gear and clutch mechanism connected with the disks, as hereinafter fully described. Fig. 2 is a face view of a section of one of the disks and of the clutch mechanism in the rear. Fig. 3 is an enlarged side elevation of the drive gear or pinion, partly broken away at its top to more clearly disclose the depth and relation of its teeth therein. Fig. 4 is a vertical sectional elevation taken substantially on line $y\ y$, Fig. 3, disclosing the construction of the drive-gear and the disk-shaped teeth and their bearings therein.

As above indicated, one of the objects of this invention is to provide positive actuating connection between the drive mechanism and the disk or wheel which it operates, and thus avoid the objections which are encountered in an all-friction engagement between these parts and which by reason of its being merely frictional and not positive is difficult to maintain in heavy work without slipping. It will furthermore be observed that I employ two so-called "disks" instead of only one and that these disks A and A' are placed on the same shaft B directly opposite each other, with their working surfaces in parallel planes and always maintained at the same distance apart whichever wheel is in operation for the time being. These disks are supported on a sleeve C common to both upon shaft B, and said disks are adapted to rotate upon said sleeve and are confined thereon laterally in both directions, so as to have no sliding movement off their bearings. Each disk, furthermore, is provided with a right-angled outwardly-extending flange $a$ of a perfect ring or band shape and adapted to be engaged by the friction clutching or locking segments D, arranged inside of said flange or band $a$ and adapted to make engagement therewith to communicate the driving power to or upon shaft B. The construction of all the parts for both disks is the same, so that a description of one answers for both.

The shaft B has a spline $b$, which is engaged by the hub of clutch-controlling member E, mounted on said shaft and adapted to slide back and forth thereon. This member in this instance has a series of arms 2, with which are engaged on their inner sides a set of links $d$ and $d'$, respectively, operating somewhat on the principle of lazy-tongs and pivoted at their meeting ends on lugs on the rear of said arms 2. At their outer ends the links $d$ connect with friction-segments D, two of said links being directly engaged with each segment, as seen in Fig. 2, while links $d'$ extend inward and are pivoted on ring $d^2$ on sleeve C. Thus the power transmitted to the disks through drive gear or pinion G is communicated to shaft B through either one of the disks A or A', according as one or the other is selected by the operator and which is determined by the direction he wants the machine to go.

On the inside of each disk I provide a series of gear-teeth 4, arranged in concentric circles, as shown in face view, Fig. 2, and spaced uniformly apart between circles as well as in circles. These teeth are preferably semispherical and constitute in this instance an integral portion of the disks.

Gear-wheel G is provided with disk-shaped teeth $g$, which are confined by and project about a third their depth through the rim or outer band 5 of said wheel and expose their flat sides to the teeth 4 of the disks. These

latter teeth 4 are set upon antifriction-rollers 6 in suitable races within wheel G and are adapted to rotate or roll thereon. This is especially advantageous when the pinion or wheel G is moved back and forth upon its shaft J for the purposes of varying speed, because said wheel is to be operated when the gear is in motion under resistance, and being in mesh under the pressure of the load there must be considerable resistance to its movement back and forth. Hence disks with antifriction-rollers are used and are found exceedingly practical. In this instance a rod 7, presumably operated from a suitable lever, (not shown,) engages the neck or hub $g'$ of wheel G and serves to slide said wheel to and fro on shaft J. The inner end of said shaft is shown in this instance as having its bearing in the sleeve C, but it might be otherwise supported. The wheel G is shown here as made up in two parts side by side and bolted together, and the races or pockets for gears and their rollers are formed partly in each section.

In a vehicle one disk A or A′ serves for propelling and the other for backing. Both revolve at the same time, but one always runs idle. When idle, segments D are disengaged, as at the right in Fig. 1.

Obviously gear G can be moved to mesh with any one of the circles or series of teeth 4, and this movement is promoted by reason of the peculiar construction of the respective teeth and their joint operation.

It will be noticed as a feature of the antifriction-teeth 5 that their edges are rounded laterally, conforming somewhat to the roundness of the teeth 4, and having fixed bearings at their sides in the rim $g$ they are caused to lie in a plane at right angles to the plane of the disks A and A′, and thus present their flat sides to the teeth 4. This promotes adjustment back and forth on the gear and gives a broad bearing-surface when at work.

What I claim is—

1. A varying-speed mechanism comprising a set of disks with fixed rounded teeth in circles, in combination with a drive-wheel having disk-shaped rotatable teeth arranged to engage with the teeth on said disks and to rotate at right angles to the wheel, substantially as described.

2. In variable-speed mechanism, a drive-gear having a series of flat-sided pockets and disk-shaped antifriction-teeth confined loosely in said pockets, in combination with a disk having a series of teeth on its side engaged with the said disks of the drive-wheel, substantially as described.

3. A set of disks having teeth on their opposed faces, a shaft on which said disks are supported and separate clutch mechanism for each disk, in combination with a single gear placed between said disks and in mesh with both, and adjustable to and from the shaft carrying the disks to vary the speed, substantially as described.

Witness my hand to the foregoing specification this 16th day of July, 1901.

JAMES BANWELL.

Witnesses:
R. B. MOSER,
H. T. FISHER.