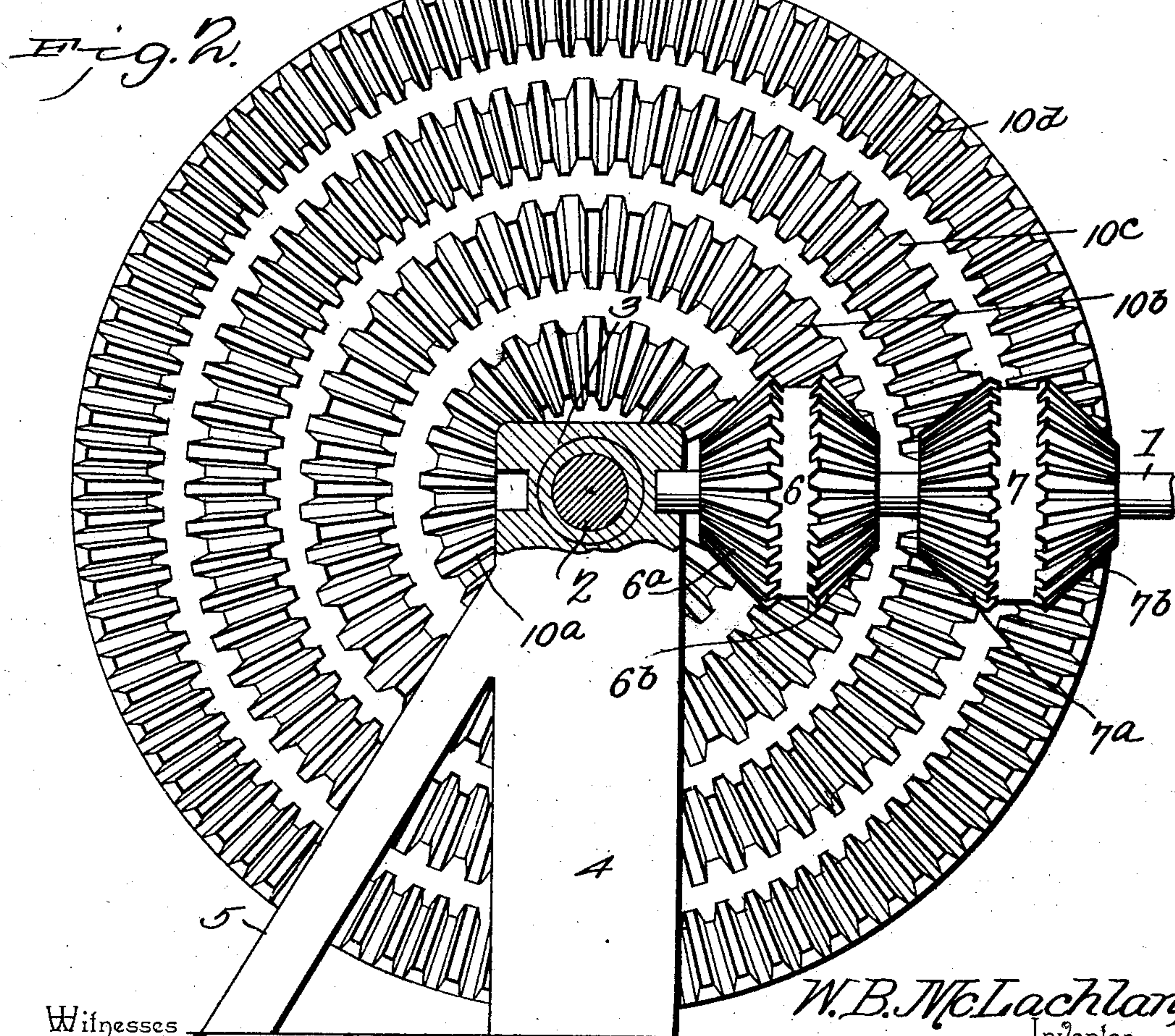
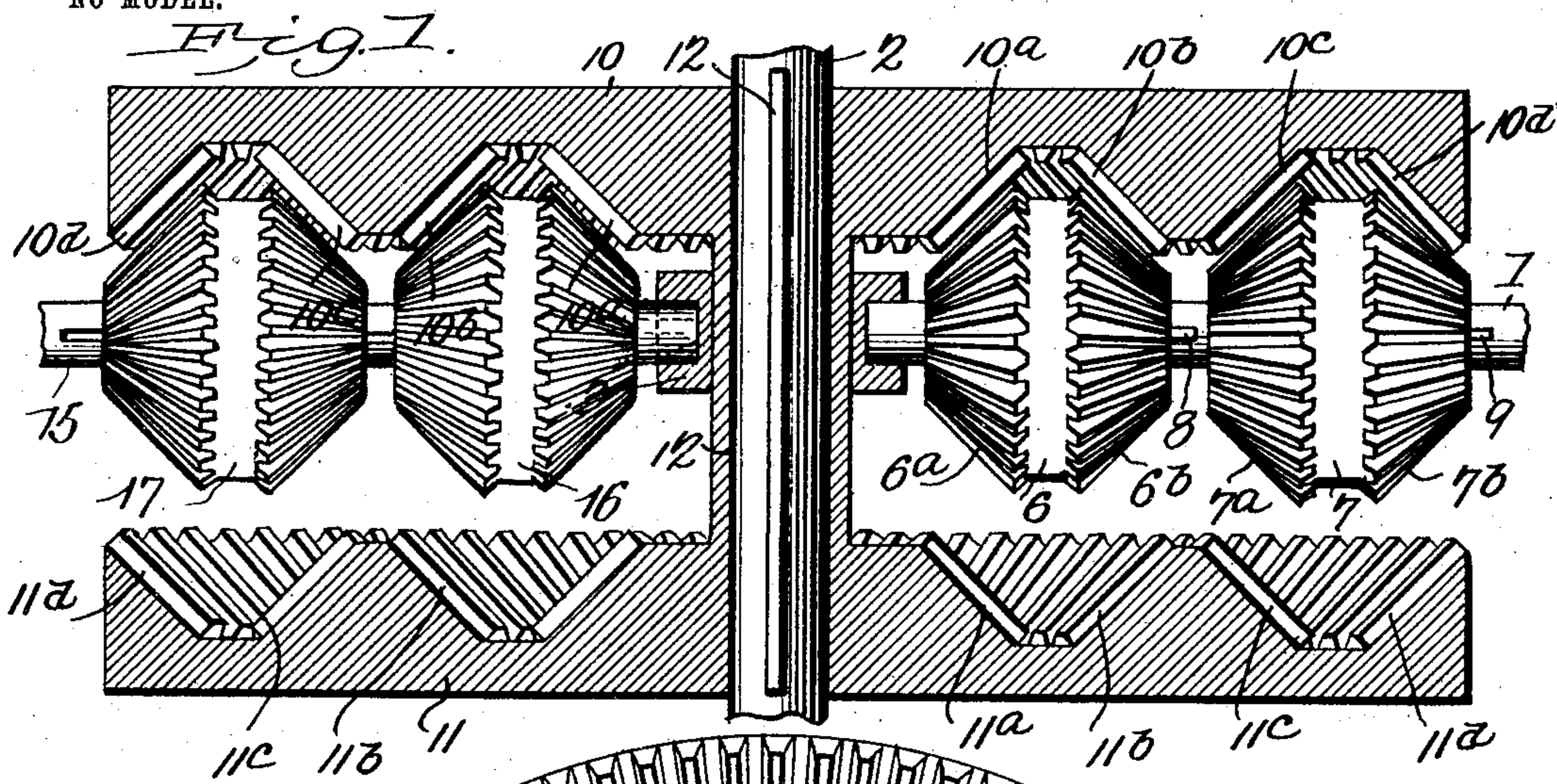


No. 765,630.

PATENTED JULY 19, 1904.

W. B. McLACHLAN.
VARIABLE SPEED GEARING.
APPLICATION FILED JUNE 29, 1903.

NO MODEL.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM BLOOMFIELD McLACHLAN, OF BEMIDJI, MINNESOTA.

VARIABLE-SPEED GEARING.

SPECIFICATION forming part of Letters Patent No. 765,630, dated July 19, 1904.

Application filed June 29, 1903. Serial No. 163,641. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BLOOMFIELD McLACHLAN, a citizen of the United States, residing at Bemidji, in the county of Beltrami and State of Minnesota, have invented a new and useful Variable-Speed Gearing, of which the following is a specification.

This invention relates to variable-speed gearing, and has for its object to provide a gearing of the class described in which the number of parts is small, by means of which a large number of different speeds may be obtained and the direction of movement readily reversed without changing the speed, and which is adapted for use upon automobiles and all kinds of machinery to take the place of cone-pulleys and belts.

With the object above stated in view and others which will appear as the invention is more fully disclosed the same consists in the construction and combination of parts of the variable-speed gearing hereinafter described and claimed, and illustrated in the accompanying drawings, forming a part of this specification, in which corresponding parts are designated by the same characters of reference throughout, it being understood that various changes in the form, proportions, and exact mode of assemblage of the elements may be made without departing from the spirit of the invention or sacrificing any of its advantages.

In the drawings, Figure 1 is a horizontal section through the gearing in the plane of the two shafts. Fig. 2 is a vertical section in the plane parallel with the driving-shaft between the two oppositely-disposed toothed disks, a part of the bearing-block being shown as broken away and the shaft 15 and the gears mounted thereon being removed.

Referring to the drawings in detail, 1 designates the driving-shaft, and 2 the driven shaft, disposed at right angles to each other, as shown, and supported in suitable bearings, as the block 3, mounted on supports 4 and 5. Upon driving-shaft 1 are mounted two double bevel-gears 6 and 7, the former of which is provided with cogged faces 6^a and 6^b and the latter with cogged faces 7^a and 7^b. The two

bevel-gears 6 and 7 are slidable upon the shaft 1 and are rigidly connected with separate keys 8 and 9, respectively, each of which is slidable in the keyway formed therefor upon the shaft 1, and which may be reciprocated by any suitable mechanism. (Not shown.)

Mounted upon the driven shaft 2 are two disks 10 and 11, of which the oppositely-disposed faces are provided with four annular series of bevel-cogs 10^a, 10^b, 10^c, and 10^d and 11^a, 11^b, 11^c, and 11^d, respectively. The two disks 10 and 11 are both slidable upon the shaft 2, but are rigidly connected by a sleeve 12, which is slidably held by a key fixed upon the shaft 2 and to which reciprocatory movement may be imparted by any suitable form of shifter. (Not shown.) The disks 10 and 11 are spaced apart a sufficient distance to permit the double bevel-gears 6 and 7 to rotate freely between them without coming into engagement with the teeth formed upon either disk, and sleeve 12 may be shifted sufficiently in either direction to bring either disk into such position that the gears thereon will engage with either of the double bevel-gears 6 and 7.

When it is desired to travel in a forward direction, sleeve 12 will be shifted sufficiently to bring the disk 10 into position for the engagement of its cogs by the bevel-gears 6 and 7, and the keys 8 and 9 will be shifted so as to bring one of the gears 6 and 7 into engagement with the cogs on the disk 10.

It will be observed from an inspection of the drawings that the cogs 6^a are adapted to mesh with the teeth 10^a on the disk 10, that cogs 6^b are adapted to mesh with teeth 10^b, that cogs 7^a are adapted to mesh with teeth 10^c, and cogs 7^b are adapted to mesh with teeth 10^d.

When it is desired to have slow speed, the keys 8 and 9 will be brought into such position that the teeth 7^c will mesh with teeth 10^d, and for slightly higher speed the gear 7 will be shifted and the teeth 7^a will be brought into engagement with the teeth 10^c. When still slower speed is desired, the gear 7 will be thrown out of engagement with the teeth on disk 10 and gear 6 will be shifted so that cogs

6^c will mesh with teeth 10^b, and for the maximum speed gear 7 will be shifted so that cogs 6^a will mesh with teeth 10^a.

In order to stop the movement of the driving-shaft 1 at any time, it is only necessary to shift the sleeve 12 far enough to throw the teeth on both disks 10 and 11 out of engagement with any of the gears and allow the gears to run freely between the two disks. When it is desired to reverse the direction of movement of the driven shaft 2, a movement of the sleeve 12 enough to bring the teeth on the disk 11 into engagement with one of the gears 6 and 7 is required, and by so shifting the sleeve 12 motion in the reverse direction at precisely the speed previously produced in a forward direction will be brought about.

When it is desired to transmit motion from the shaft 1 to a shaft disposed in the same direction, the shaft 15 may be provided on the opposite side of the shaft 2 from shaft 1 and gears 16 and 17, similar in all respects to gears 6 and 7, mounted on the shaft 15 and provided with keys 18 and 19 for shifting them longitudinally of the shaft. The movement of the disks 10 and 11 upon the shaft 2, bringing one or the other into position for the cogs thereon to be engaged by the teeth of one of the gears 6 and 7, will result in the engagement of some of the cogs on the same disk with one of the gears 16 and 17, so that motion will be imparted to one of the gears 16 and 17 in a direction opposite to that of the shaft 1. Consequently the shaft 15 will be driven in a direction the reverse of that in which the shaft 1 is rotated.

It will be noted from an inspection of the accompanying drawings and from the foregoing description that the number of elements in the gearing is small for the number of different speeds obtained and that the shifting of the gears for varying the speed and for reversing is very readily accomplished, thus making the gearing one which is serviceable, inexpensive, and by means of which a great variety of speeds may be easily obtained.

In the description of the operation of the

gearing it has been assumed that the shaft 1 is the driving-shaft, and the speeds resulting by bringing into engagement the different sets of gear-teeth adapted to cooperate have been described on this assumption. It will, however, be obvious that the shaft 2 may be made the driving-shaft and the shaft 1 the driven shaft and that when the relation of the two shafts is thus changed the description of the operation of the gearing to produce different speeds must be exactly the reverse of that given; but as the nature of the change in the description is obvious a full and detailed explanation of the production of different speeds with the shaft 2 acting as the driving-shaft is regarded as unnecessary.

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

1. In variable-speed gearing, a pair of alined shafts having their ends spaced apart, a shaft disposed at right angles to the alined shafts and arranged between their ends, a plurality of gears slidably mounted upon each of the alined shafts, a disk having gear-teeth formed on one face thereof mounted on the shaft at right angles to the alined shafts and adapted to be brought into engagement with said gears, and means for shifting said gears.

2. In a variable-speed gearing, a pair of shafts having their ends spaced apart, a third shaft disposed at right angles to the first-mentioned shafts and arranged between their ends, a plurality of gears slidably mounted upon each of the first-mentioned shafts, a sleeve slidably mounted upon the other shaft, and a pair of disks rigidly mounted on said sleeve and having the inner faces thereof provided with teeth adapted to engage the gears upon the first-mentioned shafts.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM BLOOMFIELD McLACHLAN.

Witnesses:

JAMES H. REA,

KATHERINE BARRETT.