

No. 701,543.

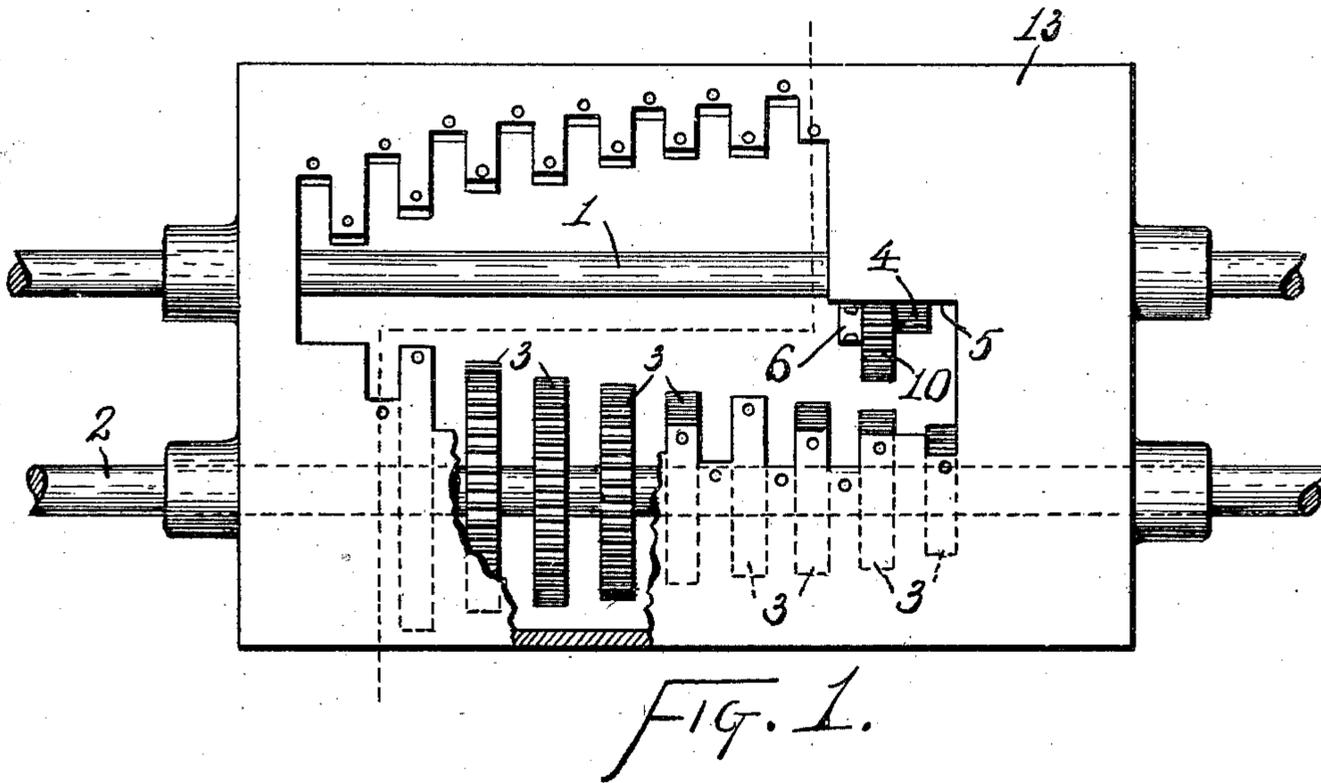
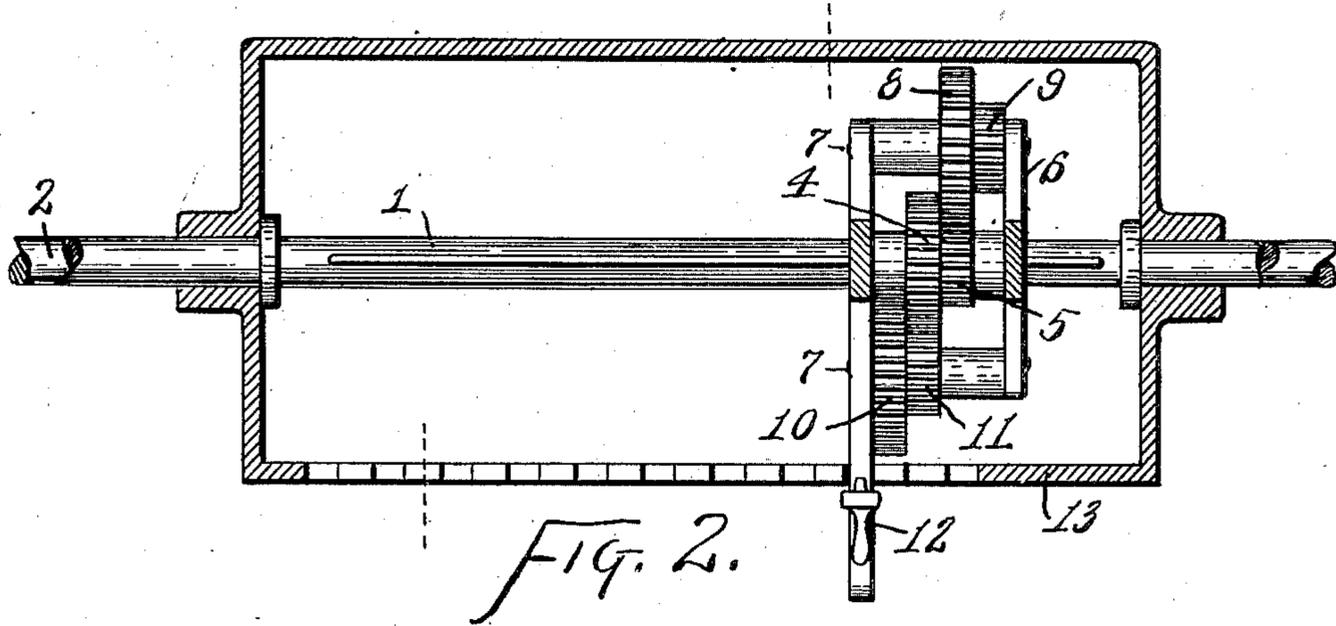
Patented June 3, 1902.

F. B. COCKBURN.  
VARIABLE SPEED GEAR.

(Application filed Mar. 31, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Francis B. Cockburn

Witnesses:

*E. Shipley*  
*M. S. Belden*

Inventor

by *James W. See,*  
Attorney

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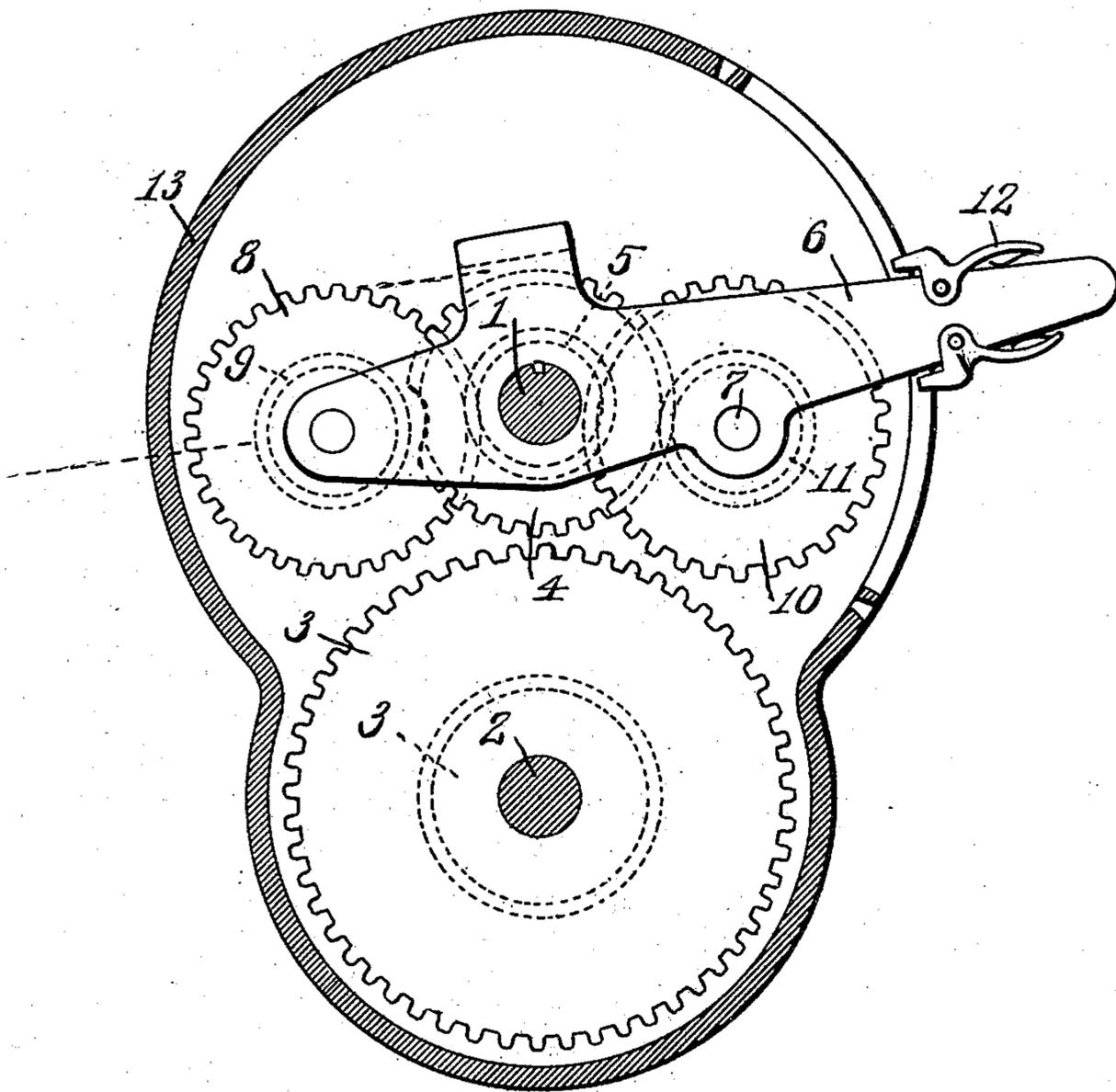


FIG. 3.

Francis B. Cockburn

Witnesses:  
*E. Shipley*  
*M. S. Belden*

Inventor  
by *James W. See*  
Attorney

# UNITED STATES PATENT OFFICE.

FRANCIS B. COCKBURN, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO  
NILES-BEMENT-POND COMPANY, OF JERSEY CITY, NEW JERSEY.

## VARIABLE-SPEED GEAR.

SPECIFICATION forming part of Letters Patent No. 701,543, dated June 3, 1902.

Application filed March 31, 1902. Serial No. 100,775. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS B. COCKBURN, a subject of the King of Great Britain, residing at Plainfield, Union county, New Jersey, have invented certain new and useful Improvements in Variable-Speed Gears, of which the following is a specification.

This invention relates to that class of variable-speed gears employing a series of diversely-sized gears upon one shaft in conjunction with a parallel shaft provided with tumbler-gearing which can be brought into engagement with any selected one of the diversely-sized gears; and the present improvement directs itself to a tumbler arrangement serving to greatly increase the capacity of the general system.

The invention will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a structure exemplifying my invention, a portion of the casing being broken away; Fig. 2, a plan of the tumbler, the casing appearing in horizontal section; and Fig. 3, a vertical transverse section of the general device.

In the drawings, 1 indicates a splined shaft constituting one shaft of the pair with which the system is to deal; 2, the other shaft of the pair, these shafts being arranged parallel with each other; 3, a series of diversely-sized gears fast on shaft 2; 4, a gear splined on shaft 1; 5, a gear, smaller than gear 4 and similarly splined on shaft 1, gears 4 and 5 being in practice fast with each other; 6, a double-armed tumbler mounted on shaft 1 and carrying the gears 4 and 5, being fitted for rocking and sliding motion upon the shaft; 7, two axles carried by the tumbler parallel with its shaft 1; 8, a gear on one of axles 7 and permanently engaging gear 5; 9, a gear fast with and smaller than gear 8; 10, a gear on the other one of the axles; 11, a gear smaller than and fast with gear 10 and permanently engaging gear 4; 12, a handle and latch upon the tumbler to serve as means for adjusting it longitudinally and angularly and locking it; and 13, a casing inclosing the gearing and having an opening through which projects the handle of the tumbler, the up-

per and lower shores of this opening being arranged as stops for the tumbler and provided with detent-recesses for the latching device.

Either of the shafts 1 or 2 may be considered as the driving-shaft; but it will be assumed that shaft 1 is the driver, turning at constant rate, and shaft 2 is the driven, to be turned at selective rate. In Fig. 3 the tumbler and the gears carried by it are shown in an idle position entirely free from any of the gears on shaft 2. Under these conditions shaft 2 will be stationary while shaft 1 turns. The tumbler may be shifted along its shaft and then angularly adjusted to bring either gear 10 or gear 11 into engagement with any properly-selected gear upon shaft 2. By this means there may be obtained for shaft 2 a number of speeds equal to twice the number of gears 3 upon that shaft. While either of gears 10 or 11 are thus employed in transmitting motion between the two shafts, the gears 8 and 9 are out of office. By other obvious adjustments of the tumbler either gears 8 or 9 may be brought into action upon any properly-selected gear upon shaft 2, thus again providing for a number of speeds for shaft 2 equal to twice the number of gears upon it. Thus by means of a single tumbler and two gears upon the driving-shaft there is obtained for the driven shaft a number of speeds equal to four times the number of selective gears upon the driven shaft. From an inspection of Fig. 2 it will be observed that, relatively considered, gears 10 and 11 constitute high-speed intermediates, while gears 8 and 9 constitute low-speed intermediates.

By means of this system it becomes possible with comparatively few gears to obtain not only speeds with greatly-separated terminal limits of variation, but to provide within those limits for a great number of desirable speeds, whether in order of true graduation or otherwise.

I claim as my invention—

1. In variable-speed gears, the combination, substantially as set forth, of a shaft, a series of diversely-sized gears fast thereon, a splined shaft, a plurality of gears splined thereon, a double-armed tumbler sliding with said splined gears, a plurality of dissimilar-

sized gears carried by said tumbler and driven from one of the splined gears and adapted for engagement with said diversely-sized gears, a second plurality of gears carried by the tumbler and driven from another one of said splined gears and adapted for engagement with said diversely-sized gears, and means for adjusting and locking the tumbler.

2. In variable-speed gears, the combination, substantially as set forth, of a shaft, a series of diversely-sized gears fast thereon, a splined shaft, a plurality of gears splined thereon, a double-armed tumbler sliding with said splined gears, a plurality of dissimilar-sized gears carried by said tumbler and driven from one of the splined gears and adapted for

engagement with said diversely-sized gears, a second plurality of gears carried by the tumbler and driven from another one of said splined gears and adapted for engagement with said diversely-sized gears, a casing provided with an opening for a projecting portion of the tumbler, an upper and a lower longitudinal series of stops arranged at the margins of said opening and adapted to determine the angular and longitudinal position of the tumbler, and means for adjusting and locking the tumbler.

FRANCIS B. COCKBURN.

Witnesses:

GEORGE E. GREENLEAF,  
GEO. B. WEAN.