(No Model.) 2 Sheets—Sheet 1.

A. ARMITAGE.

CHANGEABLE SPEED GEARING.

No. 345,018. Patented July 6, 1886.

Fig. 1.

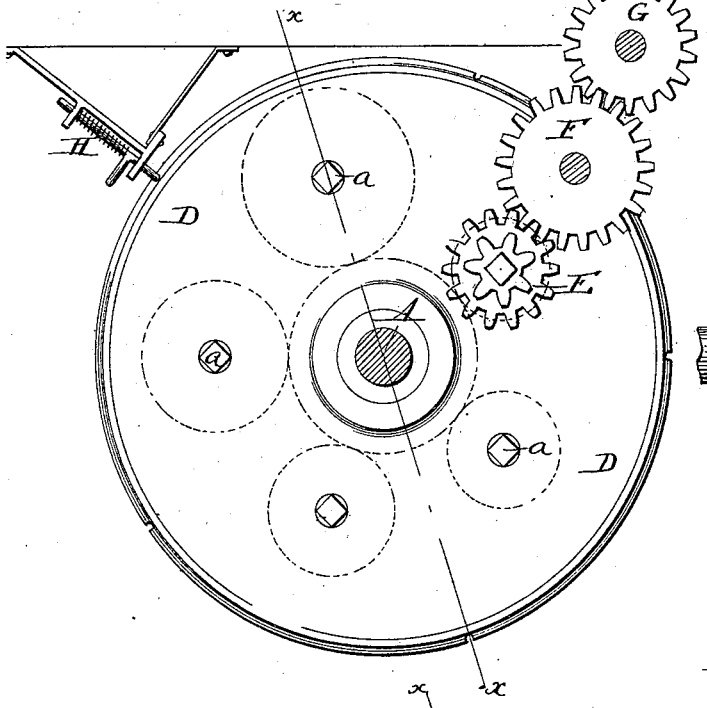


Fig. 2.

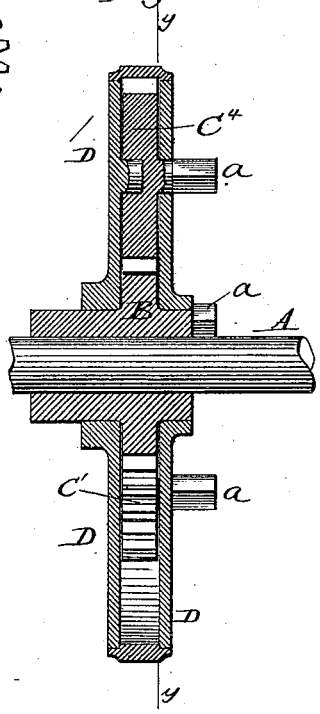
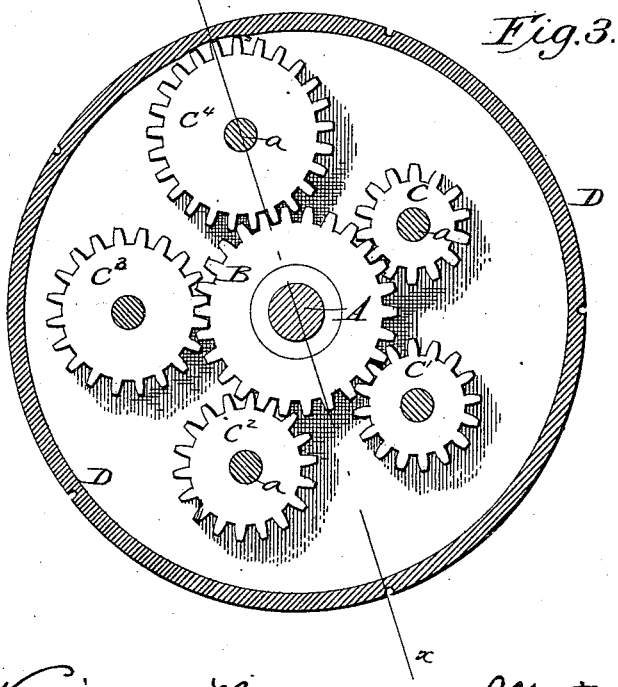


Fig. 3.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

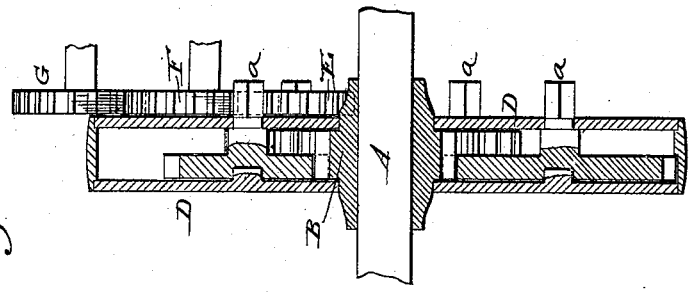
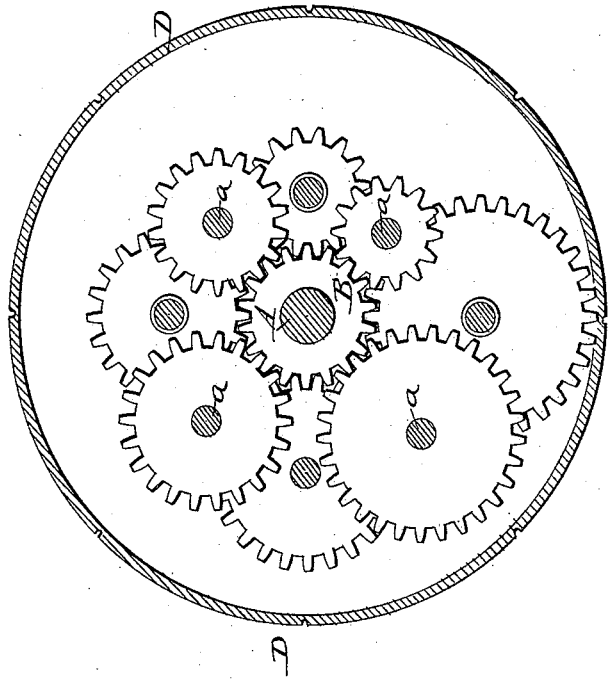


Fig. 4.



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CHANGEABLE-SPEED GEARING.

SPECIFICATION forming part of Letters Patent No. 345,018, dated July 6, 1886.

Application filed August 1, 1884. Serial No. 139,357. (No model.)

To all whom it may concern:

Be it known that I, ALBERT ARMITAGE, of Lyons, in the county of Wayne and State of New York, have invented certain Improvements in Changeable-Speed Gearing, of which the following is a specification.

It is the object of this invention to provide a simple mechanism by which a faster or slower motion may be communicated at will to a shaft which is driven from another shaft having a constant rate of speed.

To this end it consists, essentially, in the combination of a central driving-pinion with a series of secondary pinions grouped around the same and gearing constantly therewith, these secondary pinions being mounted in or upon a support or shell which is adapted to be revolved so as to bring one or another of the secondary pinions into position for use.

The invention further consists in various devices and combinations of devices of minor importance, hereinafter described.

Referring to the accompanying drawings, Figure 1 represents a side elevation of my system of gearing. Fig. 2 is a vertical cross-section of the same on the line *x x*. Fig. 3 is a cross-section on the line *y y*. Figs. 4 and 5 are sectional views illustrating a modified construction of the mechanism.

Referring to the drawings, A represents a driving-shaft, mounted in fixed bearings and provided with a driving-pinion, B. This pinion is surrounded by the series of secondary pinions C C′, &c., each of which engages constantly therewith and receives motion directly therefrom. The secondary pinions are made of different diameters, so that they are driven at correspondingly different speeds. The secondary pinions are provided with shafts or spindles *a*, which have their bearings in an inclosing shell or support, D, which is arranged to revolve about the driving-shaft. It will be perceived that by the rotation of the shell or support the series of secondary pinions may be revolved about the driving-pinion while remaining in engagement therewith. Each of the secondary pinions has its spindle *a* projecting through one side of the shell or support and made of a square form, as represented, or otherwise constructed to admit of the convenient and secure attachment of an external pinion, E, which may be changed at will from one to another of the spindles, and which consequently receives a faster or slower rotation according to the size of the pinion carried by the spindle. Adjacent to the case or shell I mount on a suitable support a pinion, F, which may communicate motion, through a pinion, G, or otherwise, to the device or mechanism which requires to be driven by the gear-train. By revolving the shell or support D the different spindles may be brought, one at a time, in such position that the pinion E applied thereto will engage with and drive the pinion F, as represented in Figs. 1 and 2. Owing to the different speeds at which the secondary pinions and their spindles are driven, it follows that the driven pinions will receive a faster or a slower motion, according as the spindle of one or another of the secondary pinions is brought into use. The smaller the secondary pinion which is brought into action the higher the speed of the driven pinion F, and vice versa.

It will be perceived that the essence of the invention lies in the employment of the secondary pinions grouped about the driving-pinion, and each driven directly therefrom, in combination with a rotary carrier or shell adapted to present the secondary pinions successively at a common point, from which they may transmit motion to the other members of the gear-train.

It is to be noted as a peculiarity of my system that the power is transmitted only to that secondary pinion which is for the time being in use, and that in the meantime the other secondary pinions are permitted to revolve idly and without material wear or friction.

In order to secure a reliable action of the devices, it is advisable that the rotary shell or support D be locked firmly in position, except at the moment of effecting a change in adjustment. For this purpose I propose to employ a locking or fastening device of any suitable character. A simple device answering effectually the object in view is that represented in Fig. 1, consisting of a slide, H, mounted in a fixed guide, and urged downward by a spring in such manner as to engage notches formed in the periphery of the shell or support, these notches being properly

located to insure the presentation of the spindles at the proper operative point.

In the figures above described I have represented the case or shell as containing but a single series of secondary pinions arranged in the same vertical plane. If it be desired to provide for an increased number of changes in the speed, I widen the face of the driving-pinion and employ in connection therewith two series of secondary pinions arranged in different vertical planes, as represented in Figs. 5 and 6. When thus arranged, the two series may overlap each other, as represented in the drawings, so that a large number of pinions may be placed in a small space. It will be noted that the pinions thus arranged are entirely independent of each other, and engage directly with the central driving-pinion, as shown.

An important feature of the invention is the employment of a rotary shell or support containing a series of pinions, each of which is in constant engagement with the central driving-pinion, and it is manifest that the form of this shell and the manner of sustaining and locking the same may be greatly modified without departing from the limits of my invention. It is preferred to construct the support, as shown, in the form of a close shell or casing, for the reason that it is thus adapted to completely inclose the secondary pinions and protect them from the entrance of dust and other foreign matters.

A changeable gear such as above described is applicable to various purposes and to many classes of machines. It is peculiarly adapted and intended for application to grain-drills and other seeding machinery, imparting different rates of speed to the seed-delivering mechanism. It is also intended and well adapted for use in metal-working lathes for transmitting variable speed to the feed mechanism. It is also intended to be applicable to metal-planing machinery, and generally to any and all machines in which it is required to transmit variable speeds from a prime mover the speed of which is constant.

Having thus described my invention, what I claim is—

1. In a changeable-speed gear, a central driving-pinion, a rotary shell having its axis coincident with that of the pinion, secondary pinions mounted in the shell to engage with the driving-pinion, and a locking device to hold the shell, whereby either of the secondary pinions may be presented at will in position for use.

2. In a changeable-speed gear, the combination of the driving-pinion, a driven pinion, a series of secondary pinions, each in engagement with the driving-pinion, a rotary support for the secondary pinions, and an intermediate pinion or pinions to communicate motion from the secondary pinions to the driven pinion.

3. In combination with the central driving-pinion and the secondary pinions of different sizes in permanent engagement therewith, the rotary shell or support for the secondary pinions, the locking device for said shell, the pinion changeable from one to another of the secondary pinions, and the driven pinion to engage the changeable pinion, as described.

4. The driving-pinion mounted on a fixed shaft, the rotary shell or support, and the secondary pinions of different sizes mounted in the shell, each in engagement with the driving-pinion, said parts combined for joint operation, substantially as described.

5. In combination with the wide driving-pinion, the narrow secondary pinions arranged in two series in different planes, the rotary shell or support, the pinion or pinions E, and the pinion G.

6. In a changeable-speed gear, a central driving-pinion, in combination with a series of secondary pinions, each gearing therein, and a rotary case surrounding and supporting the pinions, as shown.

7. In a changeable-speed gear, the combination, with a driving and a driven pinion, of a series of intermediate or secondary pinions mounted on a rotary carrier or support, substantially as described, whereby the respective intermediate pinions may be brought into action in the train at will.

8. A speed-gearing device consisting of a series of gear-wheels of different diameters arranged around a central driving gear-wheel upon shafts supported by a disk or plate adjustable around the axis of the central gear.

In testimony whereof I hereunto set my hand, this 25th day of July, 1884, in the presence of two attesting witnesses.

ALBERT ARMITAGE.

Witnesses:

ADDISON L. GARDNER,

S. B. MCINTYRE.