

No. 620,325.

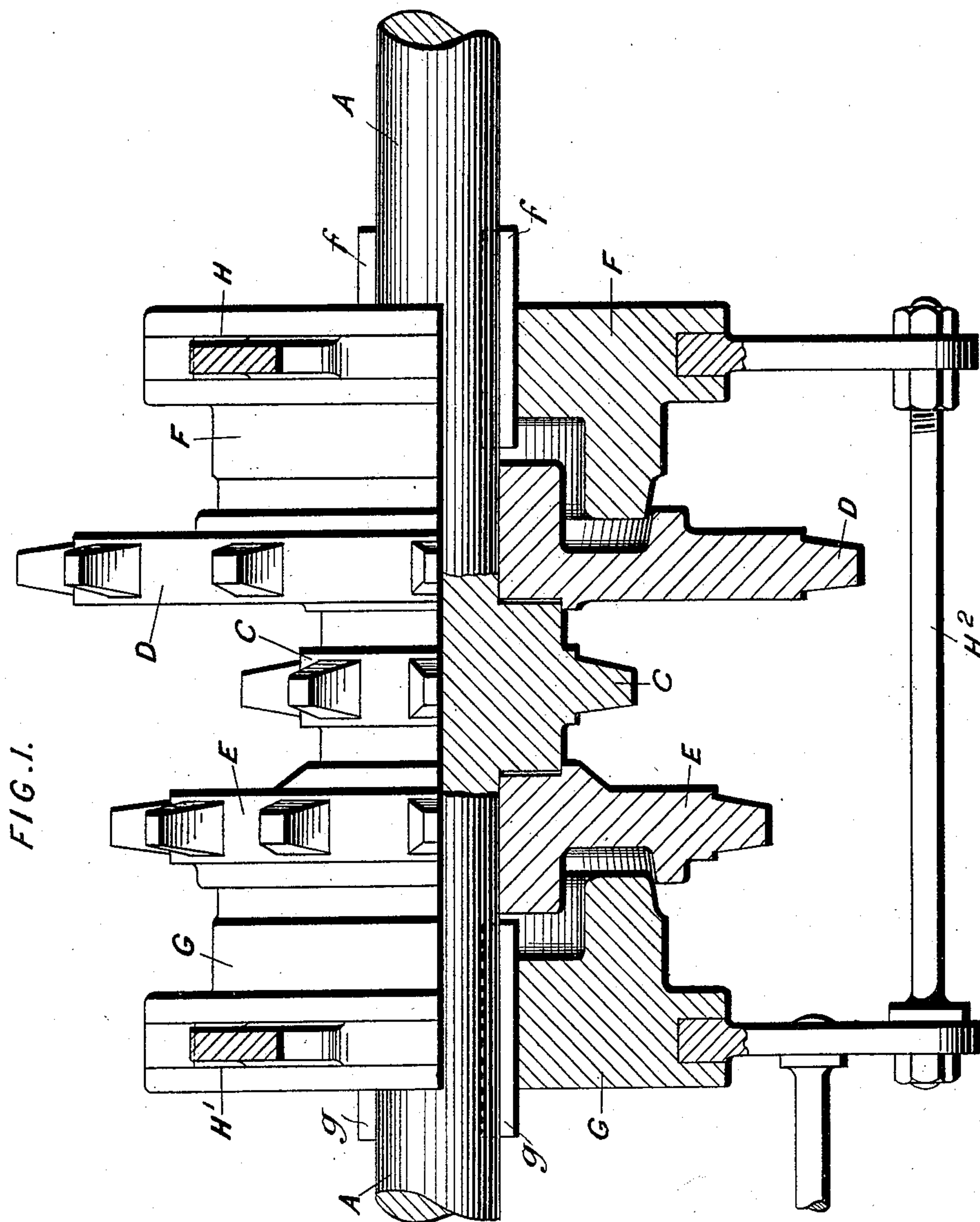
Patented Feb. 28, 1899.

W. C. ILIFFE.
CHANGEABLE SPEED GEARING.

(Application filed Jan. 20, 1898.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES :—

H. Smallman.
H. E. Smallman.

INVENTOR :—

William Coker Iliffe,
By his Attorney,
James W. Smallman.

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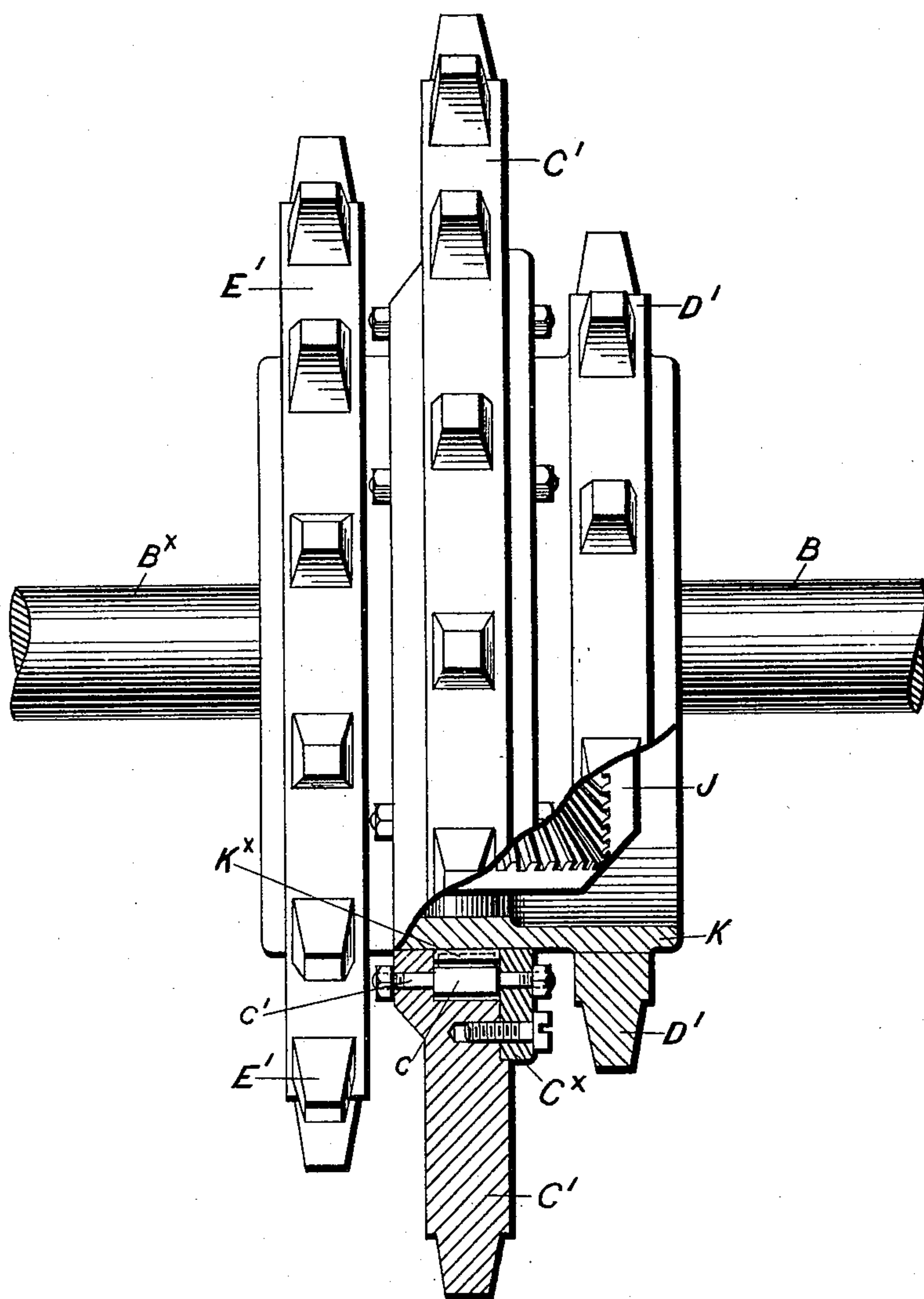
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3 Sheets—Sheet 2.

FIG. 2.



WITNESSES :—

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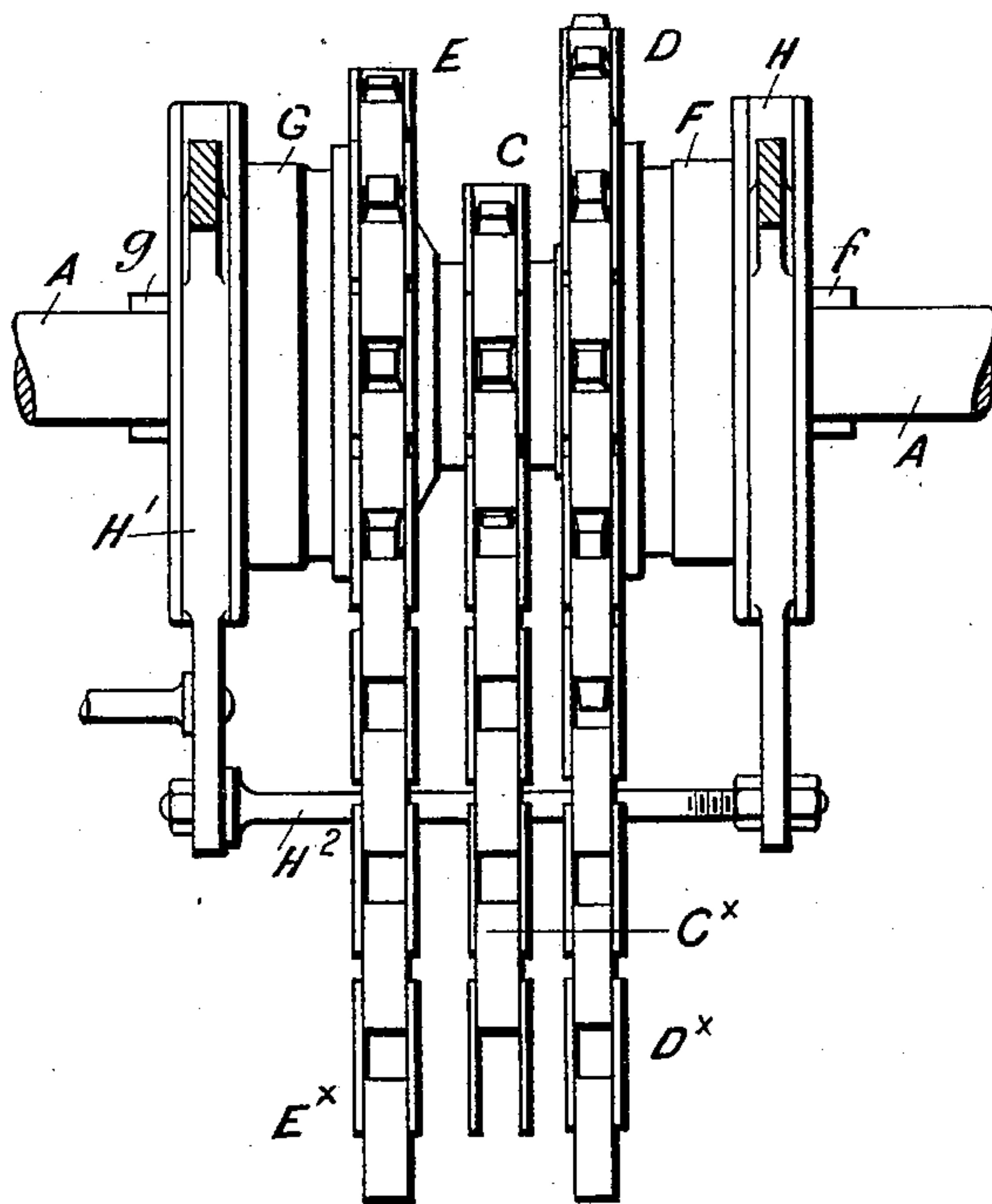
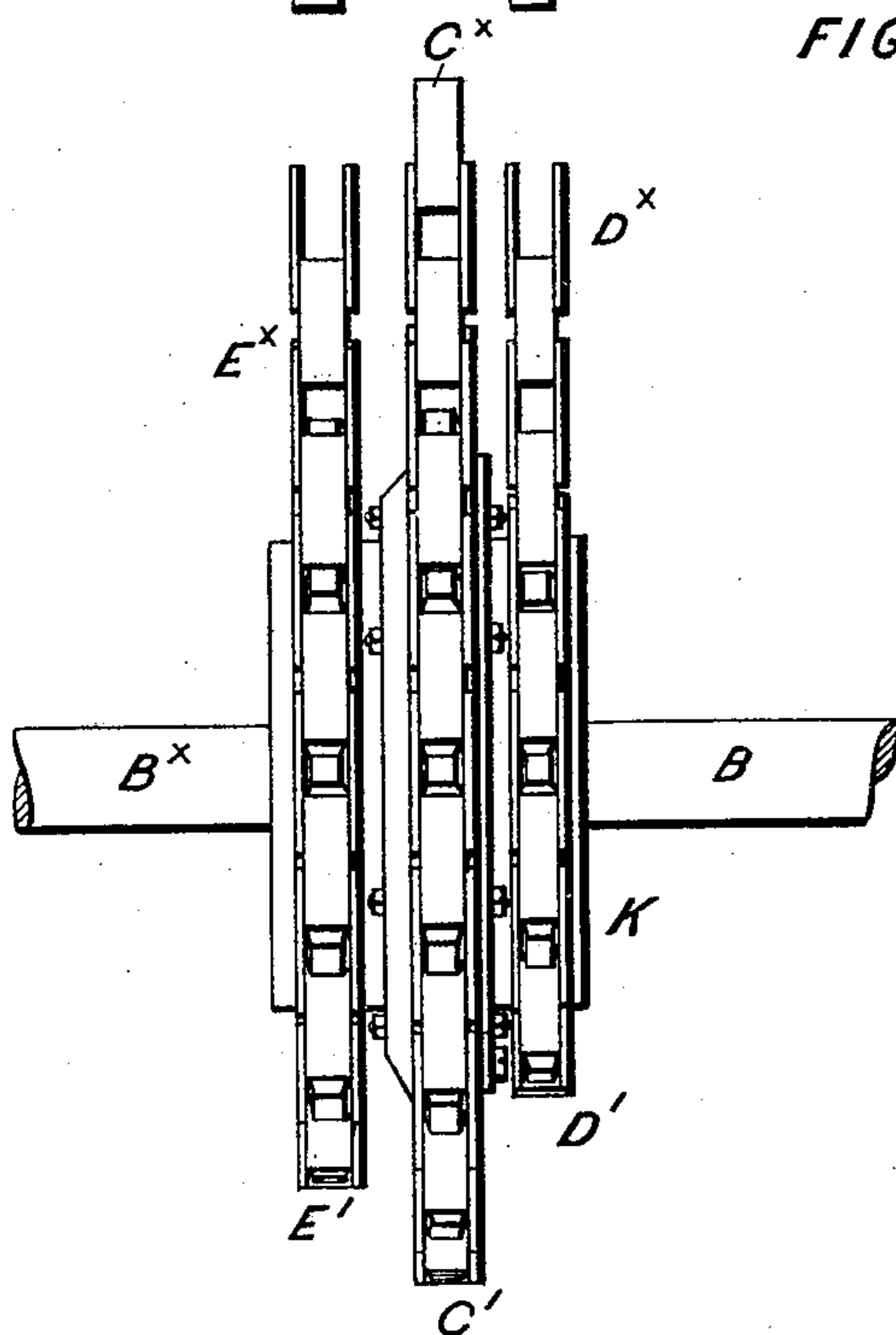


FIG. 3.



WITNESSES:—

Ruben Smallman
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INVENTOR:—

William Coker Iliffe,
By his attorney,
James W. Smallman.

UNITED STATES PATENT OFFICE.

WILLIAM COKER ILIFFE, OF ALLESLEY, ENGLAND.

CHANGEABLE-SPEED GEARING.

SPECIFICATION forming part of Letters Patent No. 620,325, dated February 28, 1899.

Application filed January 20, 1898. Serial No. 667,254. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM COKER ILIFFE, a subject of the Queen of Great Britain and Ireland, residing at Allesley House, Allesley, near Coventry, in the county of Warwick, England, have invented new and useful Changeable-Speed Gearing, (in respect whereof I have applied for but not yet obtained a patent in Great Britain, No. 27,278, to bear date November 20, 1897,) of which the following is a specification.

My invention refers to changeable-speed gearing, particularly gearing suitable for connecting the driving-shaft with the driven shaft in autocars.

The accompanying drawings show how my invention may be carried into effect.

Figure 1 is a view, partly in side elevation and partly in section, illustrating the gear-wheels and clutches of the driving-shaft. Fig. 2 is a similar view representing the gear-wheels and balance-gear of the driven shaft. Fig. 3 is a plan drawn to a smaller scale than the previous figures, showing the complete set of gear-wheels and the chains that connect them.

In three-speed gearing constructed according to my invention only one hand-lever is necessary for changing the gear, and either speed ("high," "intermediate," or "low") of the driven shaft can be readily obtained by moving this hand-lever into one of its three positions. The low gearing is independent of the hand-lever, which is consequently only required to throw the high or intermediate gearing into or out of gear. The low gearing comes automatically into gear directly when the lowest relative speed of the driven shaft is reached and goes automatically out of gear directly when that speed is exceeded.

A is the driving-shaft, which is always positively connected to the driven shaft B B^x. The low-speed pinion C is forged on or firmly fixed to the driving-shaft A. The high-speed gear-wheel D and the intermediate-speed gear-wheel E are mounted loosely on the driving-shaft, one of the gear-wheels on each side of and in contact with the low-speed pinion C, which serves as a stop. The high-speed gear-wheel D can be locked to and caused to rotate with the driving-shaft A by a sliding cone-clutch F, mounted upon and connected

by feathers *f* and corresponding feather-ways to said shaft A. The intermediate gear-wheel is also provided with a similar clutch G, mounted upon and connected by feathers *g* and corresponding feather-ways to the said shaft A. The two clutches F and G are united by a rigid frame, upon which the hand-lever (not illustrated) acts. This frame may comprise a ring H, fitted in a groove in the clutch F, and a similar ring H', fitted in a groove in the clutch G, the rings H and H' having arms united by three bars. One of the bars (marked H²) is shown. Any other suitable clutches may be used instead of cone-clutches.

The driven shaft is in two parts B and B^x, these parts being connected by a balance-gear J, surrounded by a drum K. The balance-gear is of the ordinary well-known kind and is therefore not drawn in detail. Upon the drum K are three gear-wheels C', D', and E'. The outside gear-wheels D' and E' are fixed to the drum K and are for the high and intermediate relative speeds. The driven shaft B B^x can overrun the low-speed gear-wheel C', and that gear-wheel can drive said shaft at the lowest relative speed. This gear-wheel C' is connected to the drum K on the driven shaft B B^x by means, such as silent roller-clutches or a ratchet and pawls, that permit of said gear-wheel C' turning in one direction independently of said shaft B B^x. In the construction illustrated a ratchet and pawls are used.

c is a pawl mounted on a pin *c'*. One end of the pin passes through a hole in the gear-wheel C' and the other end through a hole in a ring C^{xx}, which is screwed to said gear-wheel.

K^x is a ratchet on the drum K, with which the pawl *c* engages. There may be any suitable number of pawls, such as *c*.

The three positions of the hand-lever may be marked "high," "intermediate," and "low" to correspond with the three relative speeds. The gear-wheels C, D, E, C', D', and E' are formed with teeth to engage with endless chains C^x, D^x, and E^x; but it will be obvious that the two shafts may, if preferred, be connected through spur-gearing.

While the hand-lever is in the low position the clutches F and G are inoperative and the low-speed pinion C drives the driven shaft B

B^x through the low-speed gear-wheel C', its
 pawls, the ratchet K^x, the drum K, and the
 balance-gear J; the gear-wheels D and E (by
 reason of their connection through endless
 5 chains with the gear-wheels D' and E') rotat-
 ing idly on the driving-shaft. When the
 hand-lever is in the high position, the clutch
 F locks the gear-wheel D to the driving-shaft
 A, the low-speed pinion C serving as a stop.
 10 The driven shaft B B^x then rotates at the
 highest relative speed and overruns the low-
 speed gear-wheel C', which necessarily rotates
 at a lower speed than said shaft by reason of
 its connection through an endless chain with
 15 the pinion C, the intermediate gear-wheel E ro-
 tating idly on the driving-shaft. If the hand-
 lever be moved over to the intermediate po-
 sition, the clutch G locks the gear-wheel E to
 the driving-shaft A, the low-speed pinion C
 20 again acting as a stop. The shaft B B^x then
 rotates at the intermediate relative speed and
 continues to overrun the low-speed gear-wheel
 C', the high-speed gear-wheel D rotating idly
 on the driving-shaft.
 25 An important feature of my invention is
 that owing to the low gear being always ready
 for action directly the high or intermediate
 gear is thrown out of action the driving-shaft
 cannot race while the speed is being changed.
 30 In carrying out my invention I do not limit
 myself to any particular details, as variations
 may be made according to circumstances.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a driving and a 35
 driven shaft, of chains and gear-wheels con-
 necting said shafts, means to permit the driven
 gear-wheel of lowest gear turning in one di-
 rection independently of the driven shaft, and
 means for connecting the driving gear-wheels 40
 of higher gear to the driving-shaft.

2. In changeable-speed gearing, the combi-
 nation, with a driving and a driven shaft, of
 a pinion fixed upon the former, gear-wheels
 having different numbers of teeth rotatably 45
 mounted upon the driving-shaft, clutches for
 fixing said gear-wheels upon the driving-
 shaft, a drum mounted upon the driven shaft,
 gear-wheels fixed upon said drum, a gear-
 wheel loosely mounted upon the said drum, a 50
 pawl-and-ratchet connection between said
 gear-wheel and the said drum, chains connect-
 ing the said gear-wheels, and a balance-gear
 within the said drum, substantially as de-
 scribed. 55

3. Changeable-speed gearing comprising a
 pinion C, a gear-wheel C', gear-wheels D and
 E, clutches F and G, gear-wheels D' and E',
 a drum K, and balance-gear J, substantially
 as described.

WILLIAM COKER ILIFFE.

Witnesses:

AMBROSE VALINTINE,
 ERNEST OVERTON.