

Nov. 15, 1932.

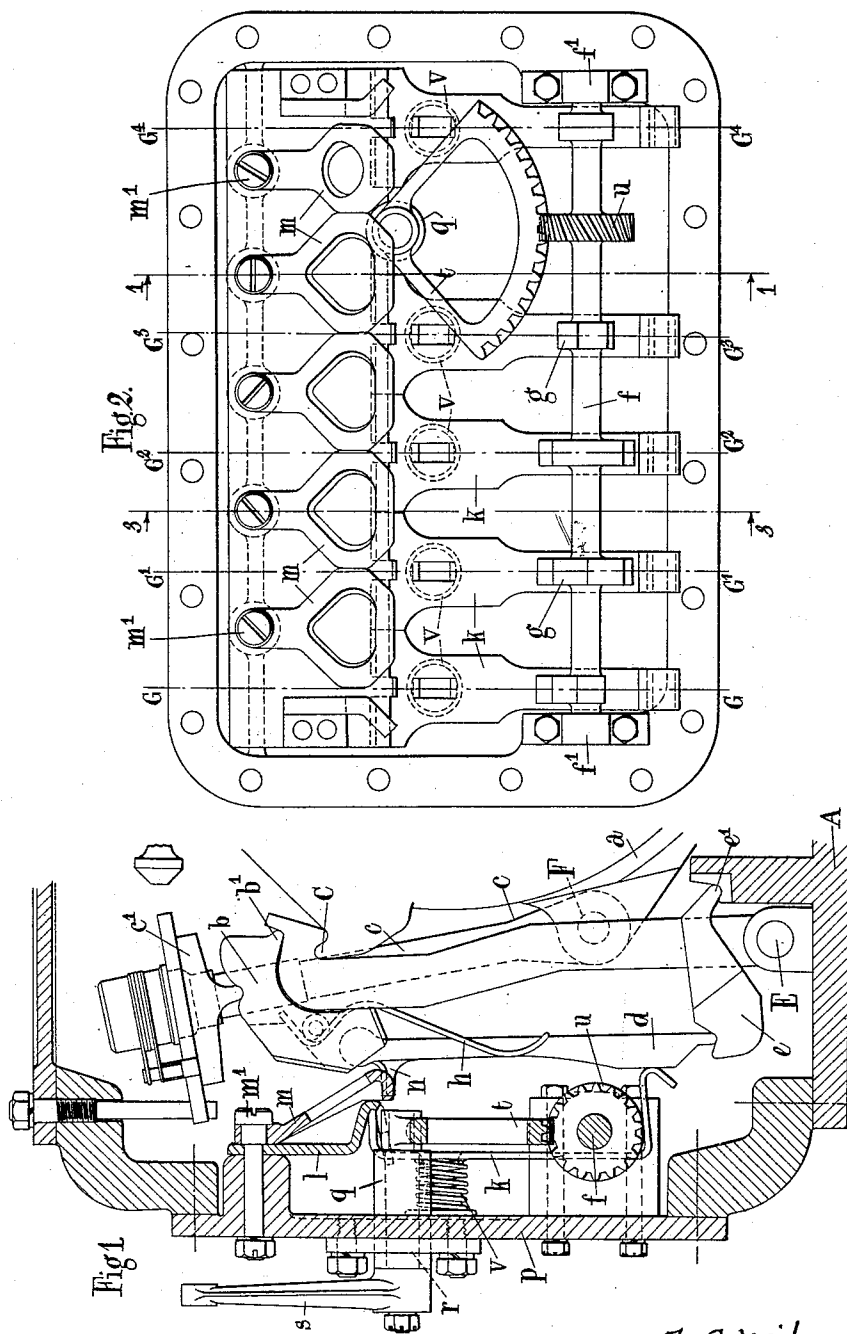
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1,888,191

CHANGE SPEED GEAR BOX

Filed March 8, 1932

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

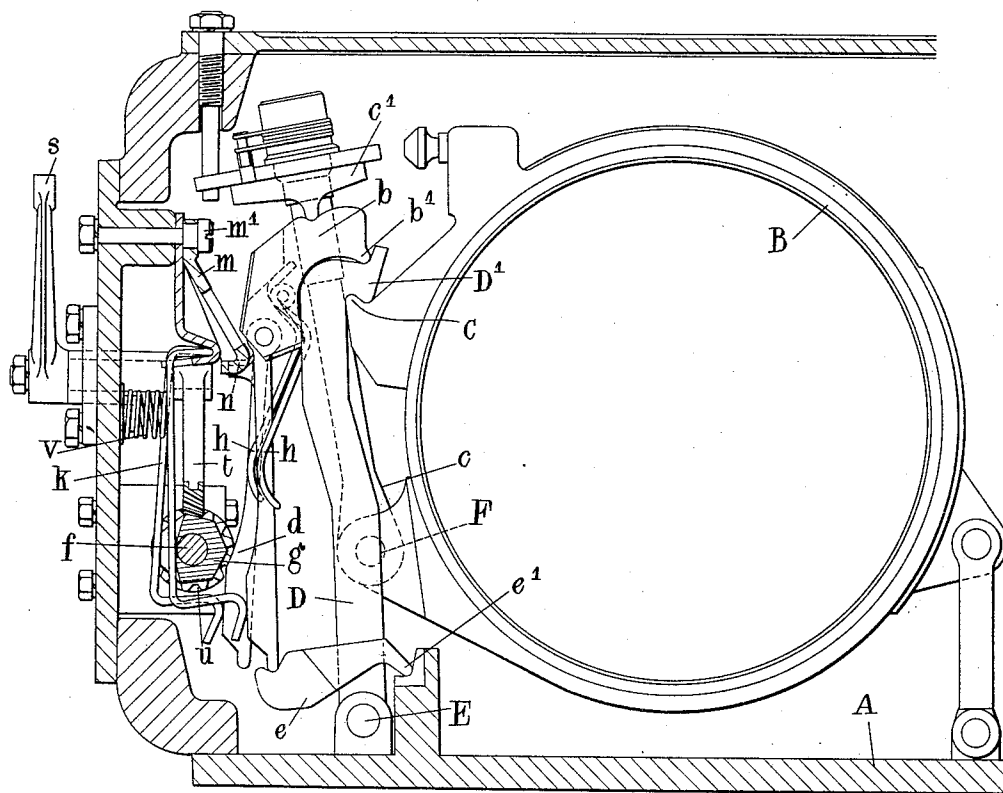


Fig. 3.

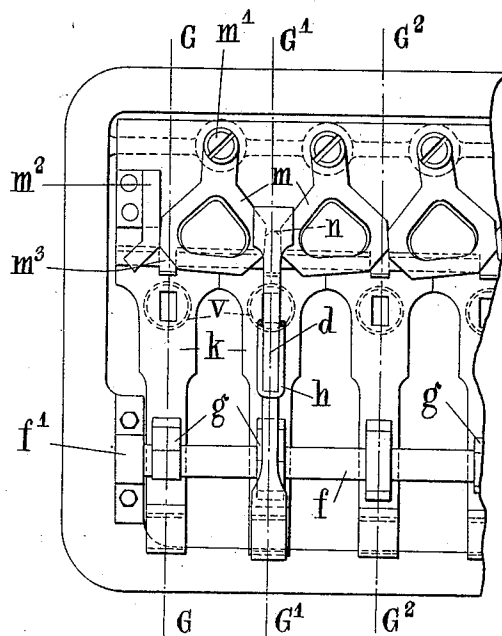


Fig. 4.

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CHANGE SPEED GEAR BOX

Application filed March 8, 1932, Serial No. 597,527, and in Great Britain December 8, 1930.

This invention and for which I have filed an application in Great Britain December 8, 1930, relates to change speed gear boxes of the type containing a number of constant mesh epicyclic gear trains, any one of which may be selectively brought into action by the tightening of a reaction brake band around the particular gear train it is desired to bring into action. To render the interior of such gear boxes accessible it is usual sometimes to fit them with a detachable cover plate carrying on the inside some of the selective gear which is thus brought away with the cover plate when the latter is removed.

The present invention consists in a cover plate for a change speed gear box of the type hereinbefore referred to, in which such plate carries a cam shaft having a plurality of spaced cams thereon corresponding in number to the various epicyclic gear trains, each cam being adapted to act upon its own particular gear train, and means for turning the cam shaft so that any one of the cams may be selectively brought into position to bring into action a particular gear train desired, and leaving the others out of action.

The invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a vertical transverse section of a gear box to which the invention relates, taken on the line 1—1 of Figure 2.

Figure 2 is an elevation of the inside of the cover of the gear box.

Figure 3 is a sectional view similar to Figure 1 but taken on the line 3—3 of Figure 2, and showing the whole of the gear box, and

Figure 4 is a fragmentary view similar to Figure 2 but on a smaller scale showing a different position of the parts.

The various epicyclic trains are arranged side by side in the gear box A and each has its complementary reaction drum B, one of these being shown complete in Figure 3. When it is desired to bring into operation any particular gear train, a flexible band brake *a* associated with the reaction drum B concerned, is tightened upon the said drum by a toggle lever mechanism set shown in Figures 1 and 3. For this purpose one end

of the band brake is hooked at C to engage with a correspondingly hooked finger D which is rigidly anchored at E to the bottom of the box A. The other end of the band is pivoted at F to a link *c* that terminates in a toggle head *c'* and is adapted to be strained upward by a toggle lever *b* to draw the band brake *a* tightly round the drum B. To effect this the toggle lever *b* is swung upwards around the nose *b'* by the rising movement of a strut *d* actuated in turn by a buss bar *e* common to all of the gear trains and struts. The toggle mechanism above described is repeated for each gear train and each arranged on the centres G, G' G⁴ respectively and one of the struts *d* is shown in position in Figure 4, corresponding to the centre G'. As will hereinafter appear only one strut *d* at a time can assume a position in the path of movement of the bar *e* and such bar has a rocking movement about the nose *e'*. The toggle mechanism described does not form part of the present invention and the means for rocking the buss bar form the subject matter of British Patent No. 328,660.

For the purpose of actuating the various struts *d* so that any one of them may be adjusted to assume a position in the path of the buss bar *e*, a cam shaft *f* adapted to be actuated by a setting lever hereinafter referred to, is arranged to extend along in front of them and carries a number of cams *g*, the position of each cam being in line with one of the struts. The operating phase of each cam is displaced relatively to that of the others, so that a determined movement of the setting lever will have the desired selective action on the strut concerned in order that with the operation of the buss bar *e* (through the change or clutch pedal) the strut concerned will bring the desired gear change into action. The various struts *d* are each under spring control for example a spring *h* that normally tends to throw them forward so that their lower ends are clear of the buss bar *e* but the arrangement of the cams ensures that one strut *d* will always be pressed back against its spring *h* so that when the buss bar *e* is swung up-

ward, the particular strut with which it is engaged will be pressed upward, and through its associated toggle mechanism will tighten the corresponding brake band of the selected gear train and bring it into action.

It will be understood during this action that all the remaining struts are pressed forward out of engagement with the buss bar *e* by their springs *h* so that these struts are out of action.

The various cams *g* are designed to act upon the various struts by means of spring bars or yokes *k* that are arranged to pivotally depend from a fixed hooked bracket *l* and in order to prevent two struts from simultaneously assuming a selective position, a multiple locking piece *m* is adapted to engage small projecting pieces *n* at the upper ends of the struts *d*.

The locking pieces *m* are of somewhat triangular form each pivoted at the apex *m'*. They hang normally in such a way that their sides are in contact, and the outer sides of the two end pieces remain spaced a short distance from stops *m''*. The lower corners of each piece *m* is chamfered so that between each pair of members *m* a Λ -shaped recess *m³* is provided, adapted to engage with a lug *n* projecting from each strut *d* and of corresponding Λ -shape. With the parts in their normal operative positions all the lugs *n* are in engagement with their corresponding recesses *m³* so that the locking members are in the position shown in Figure 2. When however one of the struts has been selected and the buss bar *e* is swung upwards the selected strut with its lug *n* are raised whereby the lug thrusts apart the two locking pieces *m* between which it is engaged, the other pieces also moving aside to the extent allowed by the end stops *m''*, as shown in Figure 4 and thereby prevent any other strut from moving with the buss bar.

In such gear boxes as hitherto constructed, the cam shaft *f*, the spring bars or yokes *k* and the hooked bracket *l* are designed to be carried by and between a pair of plates (not shown) mounted within the gear box, these parts being made accessible from outside by a convenient hand opening closable by a cover plate.

The object of the present invention is to facilitate access to those parts within the gear box, as well as those devices with which they are associated.

For this purpose and according to the present invention, the cam shaft *f* supported in bearings *f'*, the spring bars or yokes *k*, the hooked brackets *l* and the locking pieces *m* are all arranged to be carried on or by the cover plate *p* so that when such is detached and withdrawn, all the parts carried thereby are all brought away bodily with the plate, inspection and repairs being thus facilitated not only of the parts on the cover plate but

also those parts in the gear box which lie immediately behind.

As shown in the accompanying drawings, the cover plate is fitted with a suitable bearing *q* to receive a shaft *r*, through which the cam shaft *f* is operated from the setting lever carried on the steering wheel of a vehicle or elsewhere close on the dashboard. For this purpose, the external end of the shaft carries a short lever or crank *s* which is operable from the selection lever (not shown) whilst its inner end is fitted with a segment or quadrant *t* having skew teeth thereon. These teeth are in engagement with similar teeth on a pinion *u* carried on the cam shaft *f* so that the latter is readily operable as and when desired. Any other form of drive may be used to actuate the cam shaft either by bevel gear, hydraulic gear or otherwise.

Such a means for obtaining access to the gear box makes the construction easier and facilitates fitting and repair and substantially decreases working costs.

To keep the spring yokes *k* constantly pressed forward a coil or other spring *v* is arranged behind each yoke, the spring at one end abutting on the cover plate and at the other end on the yoke.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a change speed gear box containing a plurality of constant mesh epicyclic gear trains, reaction brake bands for controlling said gear trains, and toggle mechanism for actuating said brake bands, and having an aperture for rendering said gear trains accessible from the exterior of said box, a detachable cover plate for closing said aperture, a cam shaft mounted on the inner side of said cover plate, a plurality of spaced cams corresponding in number to said gear trains arranged in relatively different phase on said cam shaft, spring members operatively associated with said cams, toggle mechanism actuating struts responsive to the movement of said spring members, and means carried by said cover plate and operable from the exterior of said box for turning the cam shaft in order to move any one of the struts into an operative position for the purpose described.

2. A change speed gear box according to claim 1, in which the spring members are formed at their upper ends with suspension hooks and are arranged so that their lower ends engage the corresponding struts.

3. In a change speed gear box according to claim 1, means for preventing more than one strut at a time being moved into an operative position.

4. A change speed gear box according to claim 1, in which the cam operating means comprise a shaft passing through the cover plate, a lever on the external end of the shaft,

a quadrant having skew teeth on the inner end of the shaft, and a pinion having similar teeth mounted on the cam shaft so that the teeth of the quadrant intermesh with those
5 on the pinion.

In testimony whereof I have signed my name to this specification.

ANDREW GORDON WILSON.

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