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PATENT SPECIFICATION

675,794



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COMPLETE SPECIFICATION.

Improvements in or relating to Clutch Mechanism and Control Means therefor for Agricultural Vehicles and the like.

We, THOMAS ARTHUR HILL, a British Subject, of 20, Gladstone Terrace, Grantham, Lincolnshire, and BARFORD (AGRICULTURAL) LIMITED, a British Company, of Grantham, Lincolnshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to clutch mechanism and its control means for agricultural vehicles and the like and is generally applicable to light or heavy duty agricultural or horticultural vehicles incorporating clutch mechanism for controlling the drive from a prime mover to a driven part of the apparatus or alternatively for controlling the drive between a driven part of the apparatus and another part which is driven thereby.

Although not so limited, the invention may advantageously be employed on comparatively light duty vehicles suitable for use by smallholding farmers and market gardeners for operating hoes, ploughs, cultivators, seeders, tedders and other like implements.

According to the present invention there is provided clutch mechanism and control means therefor, for agricultural vehicles and the like, wherein the drive from a prime mover or a driven member is transmitted to another part of the apparatus by the wedge action of a "vee" belt in the groove of a pulley having co-acting disc-like halves, one of which is movable axially relatively to the other to interrupt the belt drive upon operation of a Bowden cable connected at one end to a member acting on the movable half of the pulley and connected at its other end to a manually operable element with which is associated means for holding the element in a clutch released position.

The clutch mechanism and control means therefor is particularly applicable to a light

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duty agricultural vehicle disclosed in our co-pending Application No. 2733/50 (Serial No. 675,019) and comprising a chassis for supporting an internal combustion engine for driving a single ground wheel or the equivalent, e.g. a ground rotor, tyred or having strakes or spuds, through the intermediary of a gear box also mounted on the chassis, the latter being adapted at both of its ends to be fitted with ground or earth working tools. The engine is mounted off centre nearer one end of the chassis, and for convenience this end will be hereinafter referred to as the front or forward end, although in use the direction of movement of the vehicle may be in either direction. The chassis is provided with a rearwardly extending pair of handles by means of which the apparatus or vehicle can be steered wheelbarrow fashion, the handles being detachable.

In order that the invention may be more fully understood, reference will now be made to one illustrative embodiment thereof as applied to a light duty agricultural vehicle of which only the parts essential to an understanding of the present invention are shown in the drawings, of which:—

Fig. 1 is a side elevation of the clutch and control means therefor;

Fig. 2 is a plan view corresponding to Fig. 1;

Fig. 3 is a sectional plan view, on an enlarged scale, of the clutch shown in Fig. 1, the section being taken on the line III—III thereof; and

Fig. 4 is an enlarged view, partly in section, of the right hand end of Fig. 1.

According to this embodiment, the clutch mechanism is fitted to the output shaft 1 of the engine 2, Fig. 1, which is supported at the front end of the chassis 3 and the drive is transmitted to the single ground wheel or rotor, not shown, by way of a gear box 4 supported at the rear end of the chassis.

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This clutch mechanism is controlled by the wedge action of a "vee" belt 5, Fig. 1, working in the groove 6 of a pulley having co-acting disc-like halves 7, 8. The part 7 is fixedly secured to the engine shaft 1 and the other part 8 is movable axially towards and away from the fixed half but connected so as to rotate therewith. The fixed half 7 of the pulley is secured to the engine shaft by a set screw 9 which extends radially through a boss or hub 10 of the fixed pulley part 7 and engages at its inner end with the said shaft, the axially movable part 8 of the pulley fitting over a part of the shaft which extends through the fixed part of the pulley and being formed with a recess 11 in its face which is opposed to the fixed part of the pulley for accommodating the hub or boss 10 of said fixed part, the opposed faces of the pulley halves adjacent to their peripheries being inclined relatively to form the truncated "V" shaped groove 6 for accommodating the "vee" belt 5, which also engages a pulley 12 secured to a shaft 13 extending from the gear box 4. The axially movable part 8 of the pulley is connected to the fixed part so as to rotate therewith by means of three or any other suitable number of screws located parallel with the axis of the pulley and which have plain outer parts 14, upon which the movable part of the pulley may slide, and screw-threaded extremities 15 screwed into the fixed part of the pulley. The movable part 8 of the pulley can therefore slide on the plain parts 14 of these screws towards and away from the fixed pulley part 7 while at the same time it is rotated by these screws.

The outer end of the hub or boss 16 of the slidable part of the pulley is fitted with a plug or button 17 of plastic material impregnated with graphite to make it self-lubricating and this button is engaged by a hardened steel stud 18 provided at one end of a link or lever 19 which pivots between its ends on a pivot pin 20 bridging two spaced apart flanges 21 of a bracket 22 secured to a suitable part of the structure of the apparatus. This stud 18 is normally retained pressed against the button so as to urge the slidable part of the pulley towards its fixed part by means of a torsion spring 23 which comprises at one side of the pivot pin a "U" shaped portion 24 which bears on the end of the lever having the hardened steel stud and the parallel limbs of this "U" shaped part of the spring are coiled around the pivot pin 20 on either side of said lever, the coils terminating in portions 25 which are directed oppositely to the "U" shaped part of the spring and which engage respectively with the flanges of said brackets, Fig. 1, so as to form anchorages for holding the U-shaped end of

the spring urged against the end of the lever.

The end of the lever remote from the end fitted with the hardened steel stud 17 has connected thereto one end 26 of a Bowden wire cable 27 which extends rearwardly of the apparatus and along one of the steering handles 28 to a clutch lever 29.

This clutch lever has ears 30 which are pivoted at 31 between two parallel brackets 32 depending from the underside of the rear end of the handle 28. This lever is adapted to hold the clutch mechanism in an engaged position when it is moved away from the handle and conversely in a disengaged position when it is squeezed towards said handle. This lever is fitted with a yoke 33 pivoted at 34 between the ears 30. The inner wire 35 of the Bowden cable 27 is connected to the yoke at 36. The lever 29 is also provided with a trigger 36<sup>1</sup> which co-acts with a sear 37 on the supporting bracket 32, such trigger being acted upon by a spring 38. The arrangement is such that when the lever is squeezed towards the handle to disengage the clutch, the trigger is raised with the lever and snaps over the said sear, the spring loading the trigger yielding to permit this action to take place and then reasserting itself to retain the nose of the trigger over the sear to prevent unintentional movement of the lever downwardly to a clutch engaging position. Fig. 4 shows the clutch lever parts in the positions occupied when the clutch is disengaged. During this action the lever 19 is swung against the influence of the torsion spring 23 which loads it and the stud 18 moves away from the button 17 to permit the movable part 8 of the pulley to slide axially away from the fixed part under the action of a spring 39, Fig. 3, disposed within the boss 16 and acting against the inner surface of the button 17. The V-groove 6 of the two-part pulley is thus enlarged to interrupt the belt drive from the engine shaft.

When it is desired to engage the clutch, the operator exerts a light pull on the lever sufficient to overcome the influence of the trigger-loading spring 38 when the nose of the trigger will ride over the sear 37 and allow downward movement of the lever to the position indicated in dotted lines in Fig. 1. This movement takes place automatically under the influence of the torsion spring 23 loading the lever 19 of the clutch, the lever acting to pull the inner wire of the cable which is fitted at its other end to the yoke 33 fitted to the ears 30 of the clutch lever 29.

Belt-engaging elements are provided to prevent any tendency for the belt to grip on the bottom of the pulley groove at the front part thereof when the clutch is out, 130

such elements being in the form of two  
 5 pegs 40 provided on the bracket 22, said  
 pegs acting on the belt at the positions indicated  
 in Fig. 1 when the clutch is out and  
 causing the belt to curve slightly outwards  
 with respect to the front part of the pulley  
 groove.

The belt can be tensioned and wear compensated  
 10 for by sliding the engine forwardly on the  
 chassis which is provided with slotted mounting  
 holes for this purpose.

What we claim is:—

1. A clutch mechanism and control  
 15 means therefor, for agricultural vehicles and  
 the like, wherein the drive from a prime mover  
 or a driven member is transmitted to another  
 part of the apparatus by the wedge action of  
 20 a "vee" belt in the groove of a pulley having  
 co-acting disc-like halves, one of which is  
 movable axially relatively to the other to  
 interrupt the belt drive upon operation of a  
 Bowden cable connected at one end to a member  
 acting on the movable half of the pulley and  
 25 connected at its other end to a manually  
 operable element with which is associated  
 means for holding the element in a clutch  
 released position.

2. A clutch mechanism and control  
 30 means therefor according to Claim 1, wherein  
 the Bowden cable is connected at one end to  
 a clutch lever pivotally supported by a part  
 of the vehicle in a position accessible to the  
 operator and is connected at the other end to  
 35 a spring-controlled member which tends to  
 move the movable half of the pulley into the  
 clutch engaged position.

3. A clutch mechanism and control  
 40 means therefor according to Claim 2, wherein  
 the clutch lever carries part of a latch which  
 holds the lever in the clutch disengaged  
 position at which the spring-controlled member  
 is retracted by the Bowden cable to free the  
 45 movable half of the pulley.

4. A clutch mechanism and control  
 means therefor according to Claim 3, wherein  
 upon retraction of the spring-controlled  
 member, the movable half of the pulley is  
 50 slid axially outwards under spring action.

5. A clutch mechanism and control  
 means therefor according to any of Claims  
 2—4, wherein the spring-controlled member  
 55 comprises a lever pivotally mounted intermediate  
 its ends, one end of the lever co-acting with  
 the end of a central boss provided on the  
 movable pulley half, and the other end having  
 attached thereto the Bowden cable, and wherein  
 the spring for controlling the lever comprises  
 60 a torsion spring located on the lever pivot at  
 each side of the lever and arranged so that one  
 inverted U-shaped end acts on the boss-  
 engaging end of the lever.

6. A clutch mechanism and control  
 means therefor according to Claim 4 or 5,  
 wherein belt-engaging elements are employed  
 to prevent the part of the belt in the pulley  
 groove from moving into gripping engagement  
 70 with the bottom of the V-groove of the pulley  
 when the latter is disengaged.

7. A clutch mechanism and control  
 means therefor according to any of the  
 preceding Claims 3—6, wherein the latch  
 comprises a spring-controlled trigger pivoted  
 near to the clutch lever pivot and having a  
 nose which, in the clutch disengaged position  
 of the lever, releasably engages a sear on  
 80 a bracket to which the clutch lever is  
 pivotally connected.

8. A clutch mechanism and control  
 means therefor constructed and adapted to  
 operate substantially as hereinbefore described  
 with reference to the accompanying drawings.

EDWIN C. AXE, ASSOC. I. MECH. E.,  
 27, Chancery Lane, London, W.C.2.  
 Agent for the Applicants.

#### PROVISIONAL SPECIFICATION.

### Improvements in or relating to Clutch Mechanism and Control Means therefor for Agricultural Vehicles and the like.

90 We, THOMAS ARTHUR HILL, a British Subject,  
 of 20, Gladstone Terrace, Grantham, Lincolnshire,  
 and BARFORD (AGRICULTURAL) LIMITED, a British  
 Company, of Grantham, Lincolnshire, do hereby  
 declare this invention to be described in the  
 following statement:—

95 This invention relates to clutch mechanism  
 and its control means for agricultural vehicles  
 and the like and is generally applicable to  
 light or heavy duty agricultural or horticultural  
 vehicles incorporating clutch

mechanism for controlling the drive from  
 100 a prime mover to a driven part of the apparatus  
 or alternatively for controlling the drive between  
 a driven part of the apparatus and another part  
 which is driven thereby.

105 Although not so limited, the invention may  
 advantageously be employed on comparatively  
 light duty vehicles suitable for use by  
 smallholding farmers and market gardeners  
 for operating hoes, ploughs, cultivators,  
 110 seeders, tedders, and other like implements.

According to the present invention there is provided clutch mechanism and control means therefor, for agricultural vehicles and the like, wherein the drive from a prime mover or a driven member is transmitted to another part of the apparatus by the wedge action of a "vee" belt in the groove of a pulley having co-acting disc-like halves, one of which is movable axially relatively to the other against the influence of spring means to increase the size of the groove to overcome the wedge action and interrupt the drive, and wherein the action of the spring means is controlled by a Bowden cable connected at one end to a member acting on the movable half of the pulley and at its other end a hand lever supported by a part of the vehicle in a position accessible to the operator, means being associated with said hand lever holding it in a clutch engaged or disengaged position.

To enable the invention to be clearly understood, one embodiment thereof will now be described purely by way of example, as applied to a light duty agricultural vehicle comprising a chassis for supporting an internal combustion engine for driving a single ground wheel or the equivalent, e.g. a ground rotor, tyred or having strakes or spuds, through the intermediary of a gear box also mounted on the chassis, the latter being adapted at both of its ends to be fitted with ground or earth working tools. The engine is mounted off centre nearer one end of the chassis, and for convenience this end will be referred to as the front or forward end, although in use the direction of movement of the vehicle may be in either direction. The chassis is provided with a rearwardly extending pair of handles by means of which the apparatus or vehicle can be steered wheelbarrow fashion, and the handles are detachable so that they may be mounted at either end of the chassis.

According to this embodiment, the clutch mechanism is fitted to the output shaft of the engine which is supported at the front end of the chassis and the drive is transmitted to the single ground wheel or rotor by way of a gear box supported at the rear end of the chassis.

This clutch mechanism is controlled by the wedge action of a "Vee" belt working in the groove of a pulley having co-acting disc-like halves, one of which is fixedly secured to the engine shaft and the other of which is movable axially towards and away from the fixed half but rotatably connected therewith. The fixed half of the pulley is secured to the engine shaft by a set screw which extends radially through a boss or hub of the fixed pulley part and engages at its inner end with the said shaft, the axially movable part of the pulley fitting over a part of the shaft which ex-

tends through the fixed part of the pulley and being formed with a recess in its face which is opposed to the fixed part of the pulley for accommodating the hub or boss of said fixed part, the opposed faces of the pulley halves adjacent to their peripheries being inclined relatively to form a truncated "V" shaped groove for accommodating the "Vee" belt, which also engages a pulley extending from the gear box. The axially movable part of the pulley is rotatably connected to the fixed part by means of three or any other suitable number of screws located parallel with the axis of the pulley and which have plain outer parts upon which the movable part of the pulley may slide and threaded extremities which can be screwed into the fixed part of the pulley. The movable part of the pulley can therefore slide on the plain parts of these screws towards and away from the fixed part while at the same time it is rotated by these screws.

The outer end of the hub or boss of the slidable part of the pulley is fitted with a plug or button of plastic material impregnated with graphite to make it self-lubricating and this button is engaged by a hardened steel stud provided at one end of a link which pivots between its ends on a pivot pin bridging two spaced apart flanges of a bracket secured to a suitable part of the structure of the apparatus. This stud is normally retained pressed against the button so as to urge the slidable part of the pulley towards its fixed part by means of a torsion spring which comprises at one side of the pivot pin a "U" shaped portion which bears on the end of the link having the hardened steel stud and the parallel limbs of this "U" shaped part of the spring are coiled around the pivot pin on either side of said lever, the coils terminating in portions which are directed oppositely to the "U" shaped part of the spring and which engage respectively with the flanges of said brackets so as to form anchorages for holding the U-shaped end of the spring urged against the end of the link.

The end of the link remote from the end fitted with the hardened steel stud has connected thereto one end of a Bowden wire which extends rearwardly of the apparatus and along one of the steering handles to a clutch lever.

This clutch lever has ears which are pivoted to a bracket depending from the underside of the rear end of the handle and is adapted to hold the clutch mechanism in an engaged position when it is moved away from the handle and conversely in a disengaged position when it is squeezed towards said handle. This lever is fitted with a pivoted yolk to which the inner wire

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- of the Bowden cable is connected and is also provided with a spring loaded trigger with a sear on the supporting bracket. The arrangement is such that when the lever is squeezed towards the handle to disengage the clutch, the trigger is raised with the lever and snaps over the said sear, the spring loading the trigger yielding to permit this action to take place and then reasserting itself to retain the nose of the trigger over the sear to prevent unintentional movement of the lever downwardly to a clutch engaging position. During this action the link is swung against the influence of the torsion spring which loads it and the stud moves away from the button to permit the movable part of the pulley to slide axially away from the fixed part.
- When it is desired to engage the clutch, the operator exerts a light pull on the lever sufficient to overcome the influence of the trigger loading spring when the nose of the trigger will ride over the sear and allow downward movement of the lever which then takes place automatically under the influence of the torsion spring loading the link of the clutch, the link acting to pull the inner wire of the cable which is fitted at its other end to the yolk fitted to the clutch lever.
- To prevent any tendency for the belt to grip on the front of the bottom of the pulley groove when the clutch is out, two pegs are provided on said bracket which act to curve the belt slightly away from the pulley groove.
- The belt can be tensioned and wear compensated for by sliding the engine forwardly on the chassis which is provided with slotted mounting holes for this purpose.

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EDWIN C. AXE, A.I.M.E.,  
27, Chancery Lane, London, W.C.2.  
Agent for the Applicants.

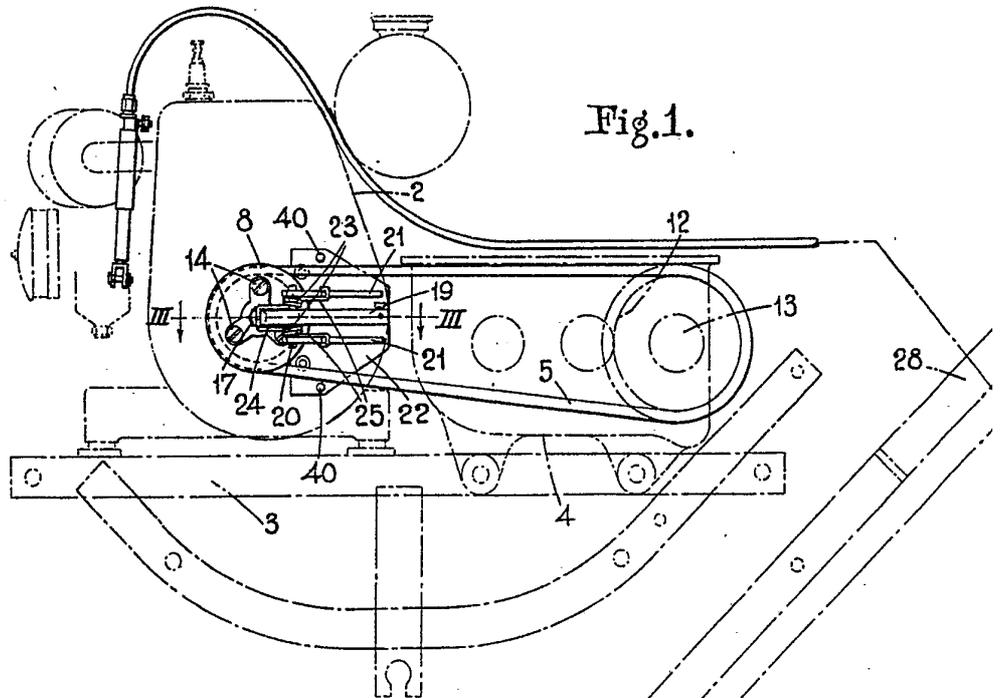


Fig. 1.

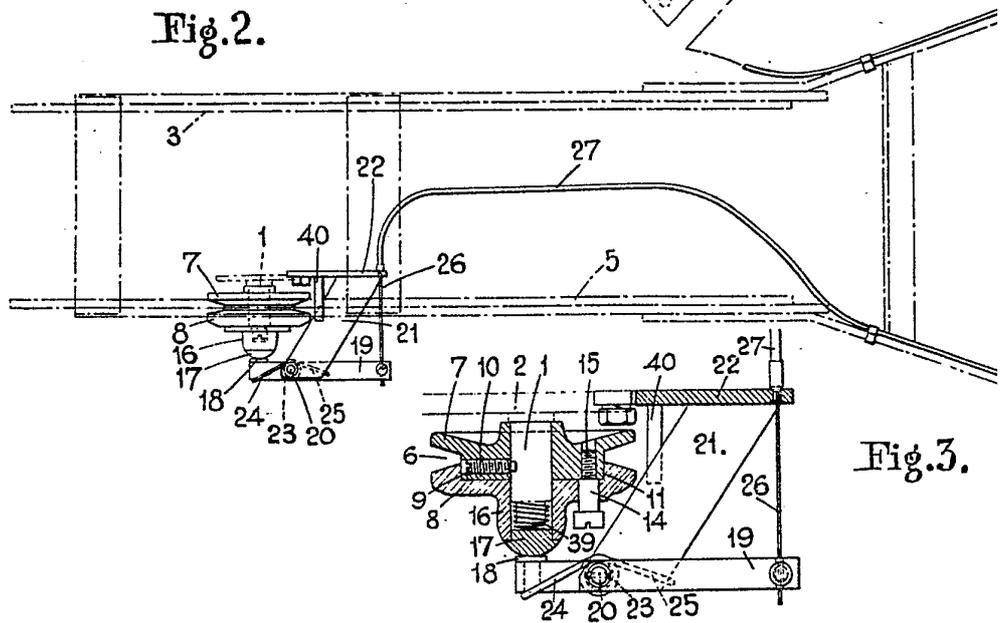


Fig. 2.

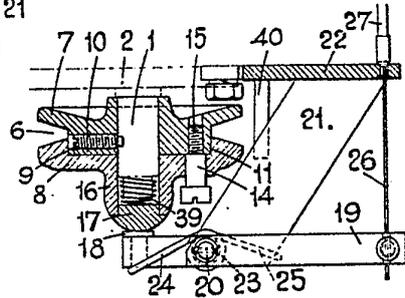


Fig. 3.

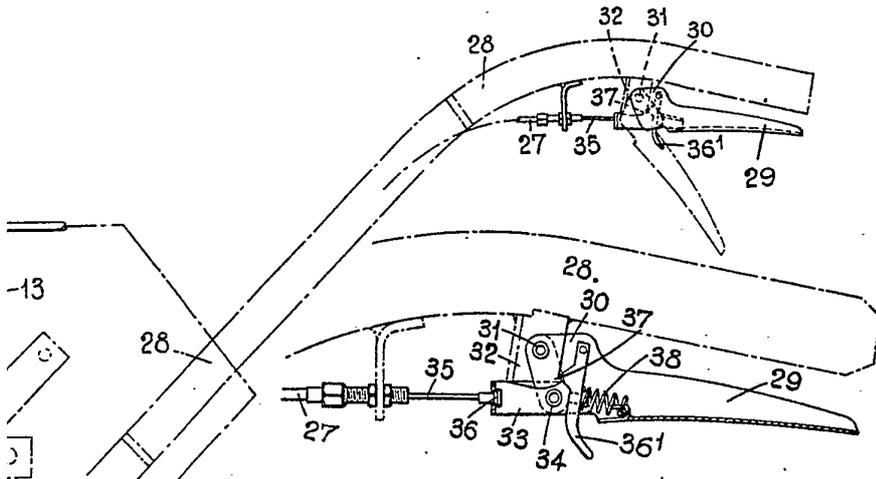


Fig. 4.

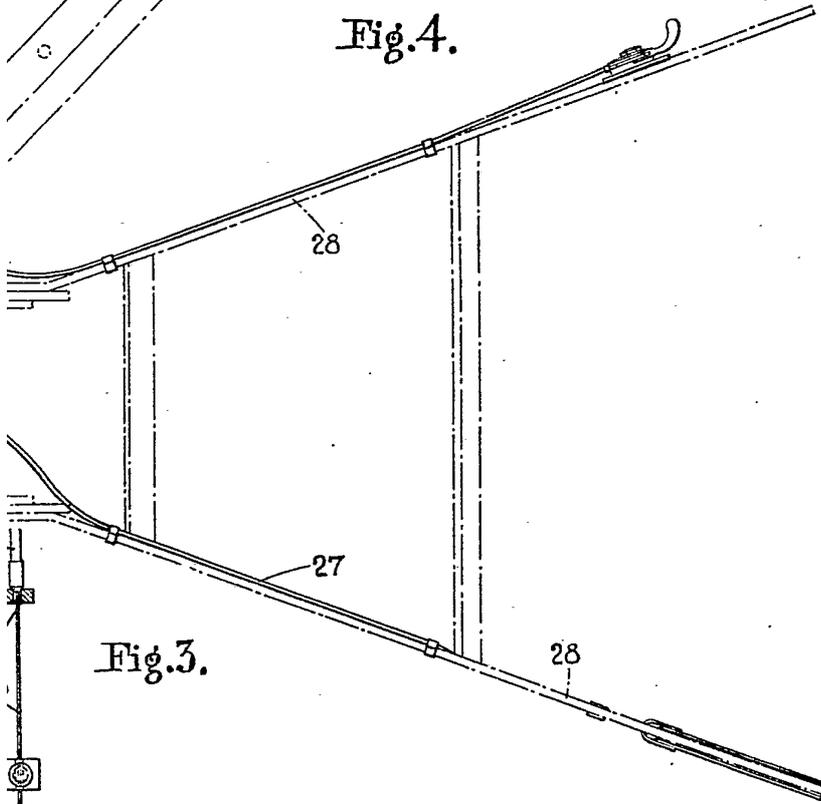


Fig. 3.

675794 COMPLETE SPECIFICATION  
 1 SHEET  
 This drawing is a reproduction of  
 the Original on a reduced scale.

