June 25, 1957 L. R. ISERMAN 2,796,997

REMOTE CONTROL SYSTEM FOR TRUCK MOUNTED CRANES

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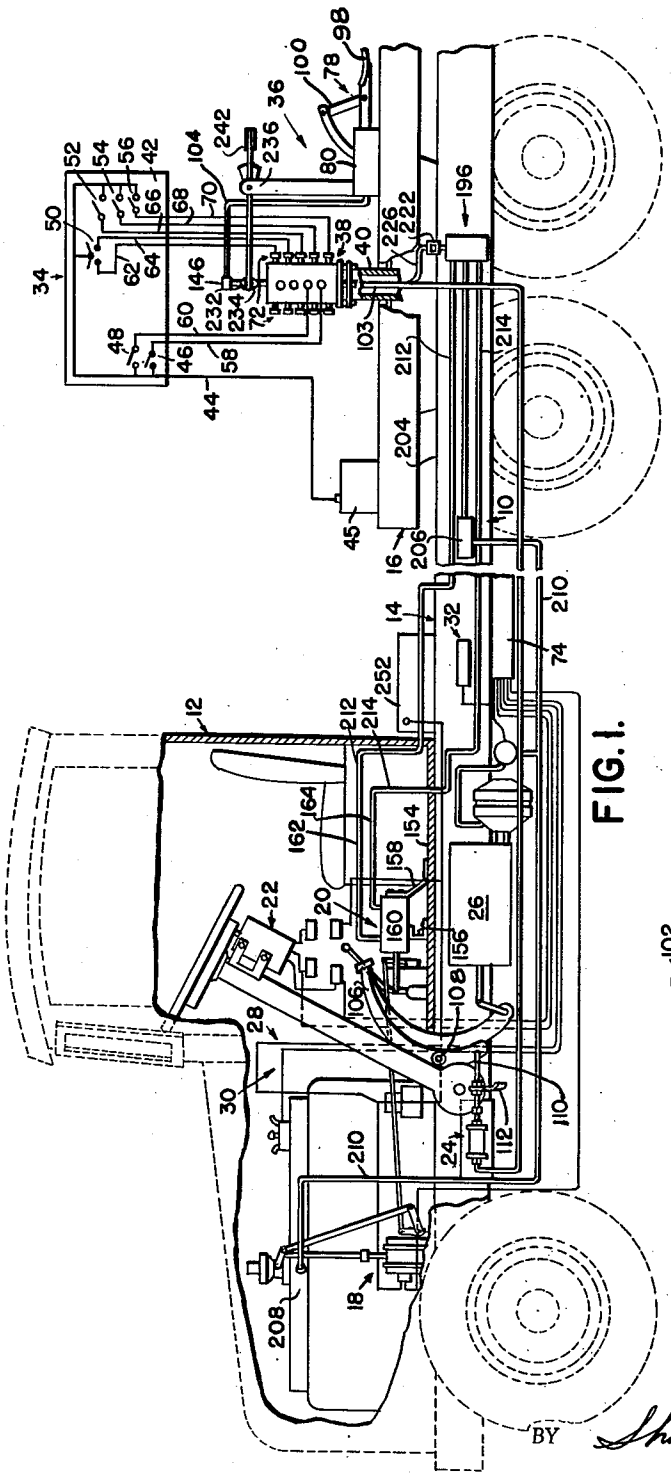


FIG. 1.

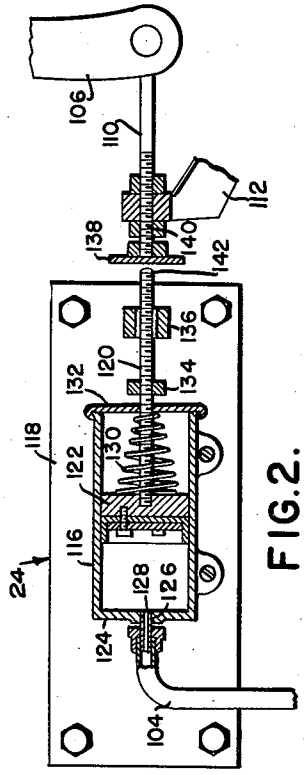


FIG. 2.

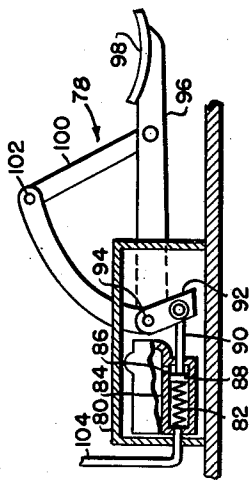


FIG. 3.

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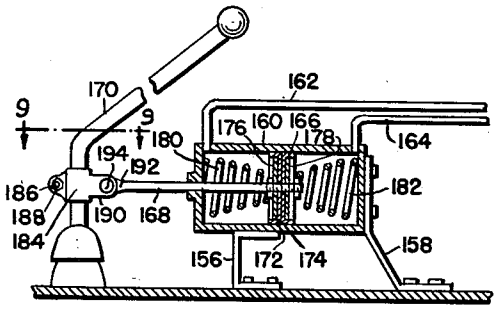



FIG. 4.

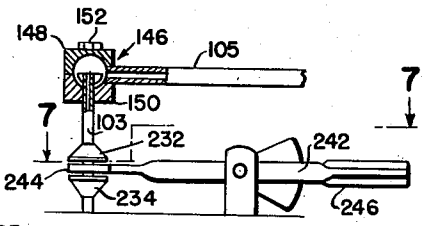



FIG. 5.

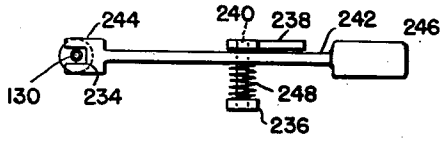



FIG. 7.

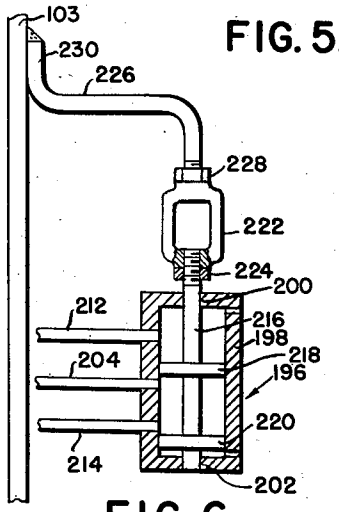



FIG. 6.

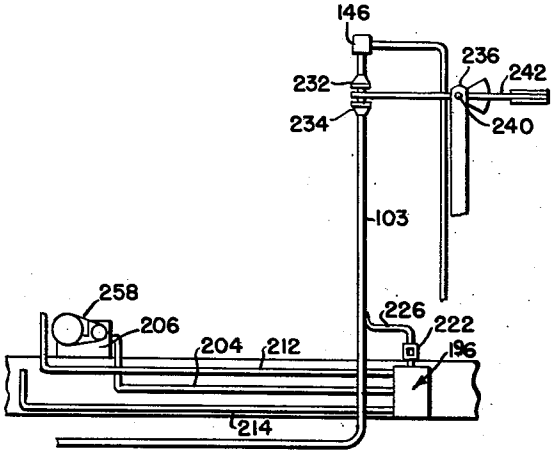



FIG. 8.

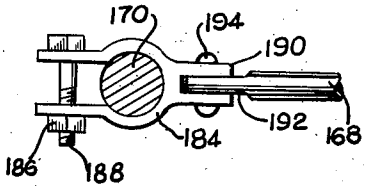



FIG. 9

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# REMOTE CONTROL SYSTEM FOR TRUCK MOUNTED CRANES

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Application November 27, 1953, Serial No. 394,700

6 Claims. (Cl. 212—38)

The present invention relates to improvements in remote control systems and more particularly to an improved system for remotely controlling a truck from the swing platform crane cab rotatably mounted thereon. The present invention constitutes an improvement over the unit disclosed in my copending application Serial No. 292,219 filed June 6, 1952, and now Patent No. 2,761,569.

While it has been desirable to effect operation of both the declutching and shifting mechanisms of the truck by means other than electrical controls of the crane cab a serious limitation has been present in view of the relative rotation between the crane cab and truck chassis. Specifically, it has been found that the interconnection between the control means of the crane cab and the operating mechanism on the truck must be made through the center pin conventional in such arrangements. In my prior application, operation of the declutching mechanism was effected by a foot operated pressure cylinder mounted on the crane cab, the interconnection being by means of the conduits passing through the center pin, which conduit was provided with a rotatable coupling about the center pin whereby relative rotation between the operating lever on the swing platform and truck chassis would not be interfered with.

It is therefore a primary object of the present invention to provide an improved remote control system wherein not only the declutching means is non-electrically effected but also wherein shifting is effected by non-electrical control means on the crane cab swing platform.

It is a further object of the present invention to provide an improved remote control system for truck mounted cranes wherein the interconnection between the non-electrical control means on the swing platform and the operating mechanism on the truck occupies a minimum of space so that the bore through the center pin need not be of excessive size.

Another object of the present invention is to provide an improved remote control system wherein the interconnection between the clutching and shifting control means on the crane cab swing platform and the respective operating means therefor on the truck utilize a common member which extends through the center pin to effect operative interconnection through the center pin.

Various other objects and advantages will become apparent from the detailed description to follow. Generally speaking, my invention utilizes declutching means similar to that disclosed in my referred to copending application. However, the conduit section extending through the centerpin must have its lower end formed from flexible material and its upper end must be modified by the inclusion of a rotatable coupling to which a lever is connected whereby upon operation of the lever the conduit section through the centerpin is longitudinally reciprocated. Connected with the portion of the conduit below the centerpin is a valve means which is operated by reciprocation of the conduit section and which controls fluid pressure to a cylinder which constitutes a housing for a piston and plunger arrangement which is



connected with the shifting lever of the truck for operation thereof.

The best form in which I have contemplated applying my invention is illustrated in the accompanying drawings wherein:

Fig. 1 is a side elevational view of the remote control system of the present invention as applied to a truck mounted crane;

Fig. 2 is a detail sectional view of the clutch operating means;

Fig. 3 is a detail sectional view of the remote control means for the clutch operating means;

Fig. 4 is a detail sectional view of the operating means for shifting;

Fig. 5 is a detail view showing the remote control means for the shifting means;

Fig. 6 is a detail view showing the valve means by which shifting is effected in response to operation of the means of Fig. 5;

Fig. 7 is a horizontal sectional view taken substantially along the plane of line 7—7 of Fig. 5;

Fig. 8 is a detail somewhat diagrammatic view showing a modified arrangement utilizing pressure rather than vacuum; and

Fig. 9 is a sectional view taken substantially on the line 9—9 of Fig. 4.

Referring particularly to the drawings wherein like numerals designate like parts throughout, and with particular attention being given to Fig. 1, it will be seen that there is provided a truck mounted crane designated generally by the numeral **10** which includes a truck cab **12** and chassis **14** with a swing platform **16** rotatably mounted on the chassis **14**. In the truck cab a plurality of operating mechanisms are provided, each of which is adapted to operate one of the essential driving mechanisms of the truck. Of these operating mechanisms, there is included an acceleration operator designated generally by the number **18**, a shifting operator designated generally by the numeral **20**, a steering operator designated generally by the numeral **22**, a clutching operator designated generally by the numeral **24** and a braking operator designated generally by the numeral **26**. There is also provided a parallel ignition circuit designated generally by the numeral **28** for effecting ignition of the truck electrical system. Still further, there is provided a starter operator designated generally by the numeral **30**, a brake locking means designated generally by the numeral **32**. Of the foregoing operators the acceleration operator **18**, steering operator **22**, braking operator **26** and also the ignition circuit **28**, starter opertor **30**, and brake locking means **32** are substantially identical with that disclosed in the above referred to copending application. Therefore, it is deemed that a more detailed description of these operators is unnecessary as reference may be had to that application for the details of construction and operation.

The remote control system for effecting operation of the operating mechanism above referred to is comprised of electrical control means designated generally by the numeral **34** and non-electrical control means designated generally by the numeral **36**. The electrical control means **34** are substantially identical with that disclosed in my copending application with the exception that there is omitted the electrical switch means for controlling the operation of the shifting mechanism of the truck. The electrical control means **34** utilize sleeve means **38** which is associated with the center pin **40**. The sleeve means **38** is substantially identical with that disclosed in the referred to application with the exception that fewer brush means are required in view of the omission of electrical controls for the shifting operator.

The remote control means is comprised of a plurality

of electrical switches mounted on a panel **42** carried by the swing platform **16**. The lead wire **44** extends from the control panel **42** that is connected to the battery **45** mounted on the swing platform **16**. The other lead from the battery is of course grounded. On the panel **42** is provided an ignition switch **46**, a push button starter switch **48**, a single pole, double throw momentary contact steering switch **50**, acceleration switch **52**, brake switch **54** and brake locking switch **56**. A plurality of conductors **58**, **60**, **62**, **64**, **66**, **68** and **70** interconnect the switch contacts on the panel **42** with the sleeve means **38** on which there are a plurality of brush assemblies **72** identical with those referred to in my copending application. A cable **74** interconnects the plurality of brush assemblies with the various operating mechanisms of the truck, as for example the acceleration operator **18**, steering operator **22** and braking operator **26**. The intermediate portion of the cable **74** extends through the bore of the center pin.

The control means **78** by which the clutch operator **24** is operated is as shown in Fig. 3 comprised of a casing **80** in which is mounted a pressure cylinder **82** having a fluid reservoir **84** integrally formed therewith and in communication with the interior of the cylinder **82** by means of the bleed opening **86**. A piston **88** is reciprocably mounted in the cylinder **82** and has a shaft **90** extending therefrom for pivotal connection with the lower end of the lever **92**. The lever **92** is pivotally mounted about the pin **94** extending transversely of the housing **80** but has its upper end extending outwardly of the housing. A manually operable lever **96** having a pedal **98** secured to its outer end is also pivotally mounted about the pin **94** and has a link **100** interconnecting an intermediate portion thereof with the free end of the lever **92** by means of the pivot pin **102**. It will thus be seen that upon depression of the foot pedal **98**, the piston **88** will be axially moved within the fluid pressure cylinder **82** delivering fluid pressure through a conduit generally designated **104** and embodying the two sections **103** and **105**.

The clutch operating mechanism **24** is best shown in Fig. 2, reference also being made to Fig. 3 to show the manner in which the fluid pressure is delivered from the remote control to the operating mechanism **24**. In conventional truck clutch arrangements, depression of the clutch pedal **106** effects pivoting about the pivot **108** whereby movement of the clutch linkage rod **110** is effected. The clutch operating fork **112** is adjustably mounted on the externally threaded rod **110** by means of a pair of nuts **114**. The operative connection between the clutch fork and the clutch is substantially conventional.

In order to effect remote control of the movement of the clutch fork **112**, without utilizing a positive mechanical connection, there is provided a single action cylinder **116** carried by the bracket plate **118** which in turn is suitably secured to the frame so as to align the plunger **120** of the piston **122** with the rod **110** of the conventional linkage. The end plate **124** of the cylinder is provided with an opening **126** and nipple **128** to which is connected an end of section **103** of the fluid pressure conduit **104** for supplying fluid pressure upon depression of the pedal **98** (see Fig. 3). The light stopper spring **130** is disposed within the cylinder between the piston **122** and the end **132** to resiliently limit the piston movement and return it to starting position as hereinafter set forth. A stop nut **134** is adjustably mounted on the plunger **120** for engagement with the stop **136** fixedly carried by the bracket for limiting the movement of the plunger. The conventional rod **110** has a push plate **138** suitably carried by the end **140** adjacent the end **142** of the rod **120**.

It will thus be seen that clutch release must be accomplished by the depression of the pedal **98** on the swing platform which thereby supplies fluid pressure through the conduit **104** to the cylinder **118** whereby the plunger **120** engages the push plate **138**, thus effecting movement of the rod **110** and clutch fork **112** connected thereto. Upon release of the pedal **98** the spring **130** in the control means effects return of the pistons to their initial positions. Of course, clutch release by an operator in the truck cab is not hampered.



In order to permit relative rotation between the swing platform **16** and the truck chassis, the conduit **104** is constituted of a pair of sections swivelly and sealingly interconnected by the swivel joint end **146**. Details of the swivel joint **146** are shown in Fig. 5. The joint **146** is thus seen to comprise a pair of recessed elements **148** and **150** joined together by bolts **152**. The substantially vertically extending conduit section **103** is sealingly engaged through an opening in the lower portion **150** while the other conduit section **105** is sealingly connected with the pair of recess elements **148** and **150**. Thus the swivel connection **146** is stationary relative to the conduit section **105** and the two rotate relative to the conduit section **103** as the swing platform rotates relative to the truck chassis. It is to be particularly noted that as opposed to the arrangement as shown in my copending application the conduit section **103** is extended somewhat above the top of the sleeve means **38** for a purpose to be presently described. Furthermore, it is to be particularly noted that the conduit section **103** is at least in part formed of flexible material especially at the portion thereof beneath the center pin, the reason for which will become apparent in the description which follows.

The shift operating mechanism is best shown in Fig. 4 and is mounted on the floorboard **154** of the truck cab by a pair of brackets **156** and **158** which support the double acting cylinder **160**. The pair of ports at **162** and **164** are provided for communicating opposite sides of the piston **166** with a source of vacuum by the hereinafter described conduits whereby the plunger **168** connected to the gear shift lever **170** effects shifting into either "forward" or "reverse" from "neutral." While truck structures as well as other automotive vehicles have a number of positions for the gear shift other than the forward, reverse and neutral positions referred to, in the operation of the shift mechanism from the swing platform while the crane is in use, it is only necessary to use the forward and reverse positions. When the shift mechanism is operated from the truck cab the connection between the plunger **168** and the gear shift lever **170** may be broken so that the other shift positions can be employed. The piston **166** is comprised of a pair of discs **172** and **174** clampingly securing therebetween a pair of leather discs **176** and **178**. On opposite sides of the piston **166** are positioned a pair of springs **180** and **182** for normally retaining the piston in the gear shift "neutral" position. The connection between the plunger **168** and the gear shift lever **170** includes a clamp element **184** held on the gear shift lever **170** by means of the nut and bolt **186** and **188**. The clamp element **184** is bifurcated at **190** so as to receive the flat end **192** of the plunger **168** therebetween. Aligned openings are formed in the flat end **192** and bifurcated portion **190** respectively and a coupling pin or rivet **194** is engaged through the openings.

In order to control operation of the piston **166** I provide a valve means **196** which is fixedly carried by the frame of the chassis preferably adjacent the lower portion of the conduit section **103** as shown best in Fig. 6. The valve means includes the housing **198** of cylindrical form having a shaft opening at **200** and **202** adjacent its upper and lower closed ends. The medial wall portion of the housing **198** is formed with an opening and a conduit **204** is connected with the housing **198** at this opening, the opposing end of the conduit **204** being connected with tank **206** which in turn is connected with the intake manifold of the engine **208** by means of the conduit **210**. Spaced above and below the conduit **204** are additional

conduits **212** and **214** which communicate upper and lower portions of the valve housing **198** with opposing ends of the cylinder **160** by the connections or ports **162** and **164**. Reciprocably mounted in the valve housing **198** is a plunger **216** which carries a pair of spaced pistons **218** and **220**, the spacing of which is such as to afford communication between the conduit **204** and only one of the conduits **212** and **214** at any given time. As shown, when the conduit **204** is communicated with the conduit **214**, the plunger **216** and pistons **218** and **220** are so positioned as to communicate the conduit **212** with atmosphere by means of the ports **198***a*.

In order to effect operation of the valve means **196**, the upper end of the plunger **216** is threadably engaged in a turnbuckle **222**, a lock nut fixing the relative adjustment between the turnbuckle and valve plunger **216**. The opposing end of the turnbuckle **222** has a link rod **226** threadably engaged therein and locked by the nut **228**. The link rod **226** is arcuated and has its upper end portion at **230** lying against the lower end portion of the conduit **103** at which point it is secured by any suitable means such as solder or weld.

The portion of the conduit **103** between the coupling **146** and upper end of the sleeve means **38** is provided with a pair of spaced collars **232** and **234**. On the swing platform **16** are fixed a pair of upstanding posts **236** and **238** through which a pin **240** extends. A hand lever **242** is pivotally mounted on the pin **240** and has one end portion thereof bifurcated at **244** so as to slidably engage the conduit section **103** between the collars **232** and **234**. The opposing end of the lever **242** is formed with a handle **246**. In order to frictionally limit the free pivoting movement of lever **242** a spring **248** is provided and encircles the pin **240** between one of the posts as, for example **236**, and the lever **242** whereby the lever **242** frictionally abuts the opposing post **238** (see Figs. 5 and 7).

In operation, when it is desired to shift from reverse to low or vice versa, the operator on the crane cab swing platform **16** depresses the pedal **98** so as to deliver fluid pressure through the conduit **104**, embodying sections **105** and **103** joined by the swing coupling **146**. The fluid pressure is thus delivered to the cylinder **118** and longitudinal movement of the rod **120** effects disengagement of the clutch. The operator then moves the lever **242** about its pivotal axis, either up or down depending upon the required shifting. Pivoting of the lever **242** effects vertical movement of the conduit section **103** and the link rod **226** connected therewith. In this manner the valve plunger **216** is moved to either of two positions whereby either side of the cylinder **160** is connected with the vacuum of the cylinder **206** while the other side of the cylinder **160** is connected with atmosphere by one of the ports **198***a* thus effecting movement of the piston within the cylinder **160** and shifting of the shift lever in the truck cab. As soon as the desired shifting has been effected the operator removes his foot from the foot pedal so as to achieve clutching action.

In view of the foregoing, it will be realized that the flexibility of the sections **103** and **105** embodied in the conduit **104**, are necessary so as to permit reciprocation of the section **103** whereby operation of the valve means **196** is achieved.

While it has been shown that the shifting is accomplished by vacuum means, Fig. 8 shows in somewhat diagrammatic form the provision of a compressor **258** connected with the reservoir **206**, the compressor being operated in any desired fashion that is either by a power take-off from the truck or by its own internal combustion engine, or by an electric motor run on the truck battery **252**. With this arrangement, of course, the reservoir **206** is not connected with the exhaust manifold of the engine and thus pressure can be delivered to either side of the cylinder **160** for effecting operation of the shift lever from the cab.

As this invention may be embodied in several forms



without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents, are therefore intended to be embraced by those claims.

What is claimed is:

1. In an earth working machine embodying a motorized truck having, a crane swing platform rotatable on the truck chassis about a pivot post, gear and clutch shift elements; mechanism for remotely controlling the clutch shift element from the crane swing platform comprising a fluid actuated element, means forming an operative coupling between said element and the clutch shift element whereby to effect declutching operation of the shift element when said fluid element is actuated, a power cylinder on the platform, a fluid conduit coupling the power cylinder with the fluid actuated element and having a portion passing axially through said pivot post, said conduit including a swivel coupling positioned to permit turning movement of the power cylinder with the platform, and means on the platform for actuation of the power cylinder by a person thereon for effecting actuation of the fluid actuated unit, and said means forming the operative coupling between the fluid actuated element and the clutch shift element being so constructed and arranged that the clutch shift element is actuatable in the conventional manner from the truck independently of the fluid actuated element.

2. The invention according to claim 1 wherein the said portion of the fluid conduit extends vertically through the pivot post and terminates above the post in said swivel coupling.

3. The invention according to claim 1 wherein the fluid actuated element embodies a fluid cylinder, a piston therein, and a plunger operatively connected with said piston for reciprocal movement and having a free outer end, and said last means comprising a thrust receiving element secured to the clutch shift element in opposed relation with said free outer end of the plunger.

4. The invention according to claim 1 wherein said clutch shift element embodies a threaded stem between the clutch operating foot pedal and the clutch shift fork and said fluid actuated element embodies a fluid cylinder, a piston therein and a plunger connected with the piston and the means forming said operative coupling between the fluid actuated element and the clutch shift element comprising the alignment of said free end of the plunger with said threaded stem and a thrust receiving element on the stem.

5. The invention according to claim 1 wherein said portion of the conduit is axially movable in the pivot post, power means operatively coupled with the gear shift element for actuating the latter in either of two selected directions, means governing operation of the power means, means connected with said axially movable portion of the conduit for shifting the latter, and an operative coupling between said governing means and said portion of the conduit whereby axial movement of said conduit portion in either of two directions effects actuation of the power means through said governing means.

6. In an earth working machine embodying a motorized truck having, a crane swing platform rotatable on the truck chassis about a pivot post, gear and clutch shift elements; mechanism for remotely controlling the gear and clutch shift elements from the crane swing platform comprising a fluid motor for the clutch shift element, a fluid motor for the gear shift element, each of said motors including a reciprocable piston and a plunger connected therewith, means forming an operative coupling between the plunger of the first motor and the clutch shift element, means forming an operative coupling between the plunger of the second motor and the gear shift element,

an operating fluid carrying conduit connected at one end with the motor and having a first portion passing freely axially through said pivot post and a second portion supported on the swing platform, a swivel coupling between said portions of the conduit and the top part of the pivot post whereby the second portion may move with the platform around the pivot thereof, piston means on the platform connected with the other end of said conduit for operation by a person on the platform to effect actuation of the first motor for declutching movement of the clutch shift element, fluid conduits connected with the second motor for connecting a selected side of the piston thereof with a source of operating fluid, means providing a source of operating fluid, valve means for selectively coupling said source with the last named conduits, means for manually moving the first portion of the first named conduit axially in the post, and an operative coupling between said first conduit portion and said valve means whereby actuation of the valve means is effected by axial movement of the said first conduit portion.



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