

H. J. MURRAY.
SAFETY CONTROLLING DEVICE.
APPLICATION FILED AUG. 21, 1914.

1,268,264.

Patented June 4, 1918.
3 SHEETS—SHEET 1.

Fig. 1.

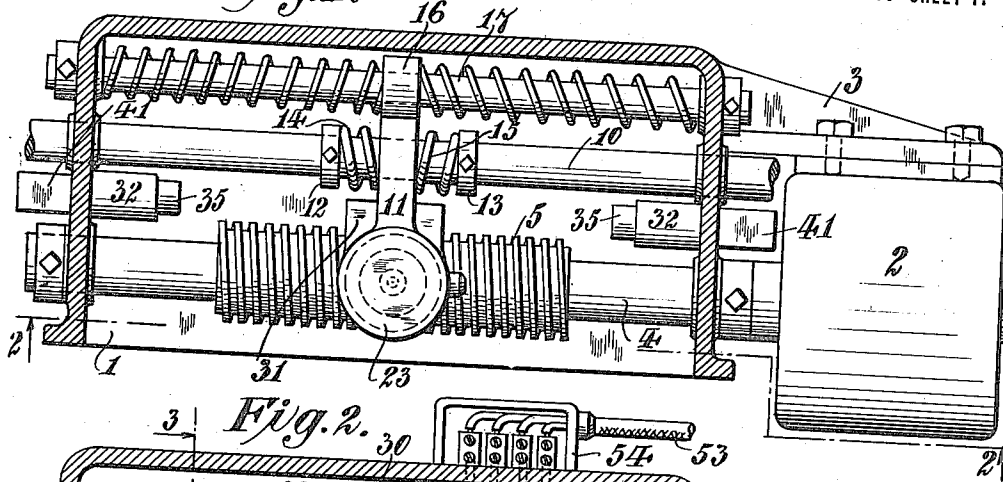


Fig. 2.

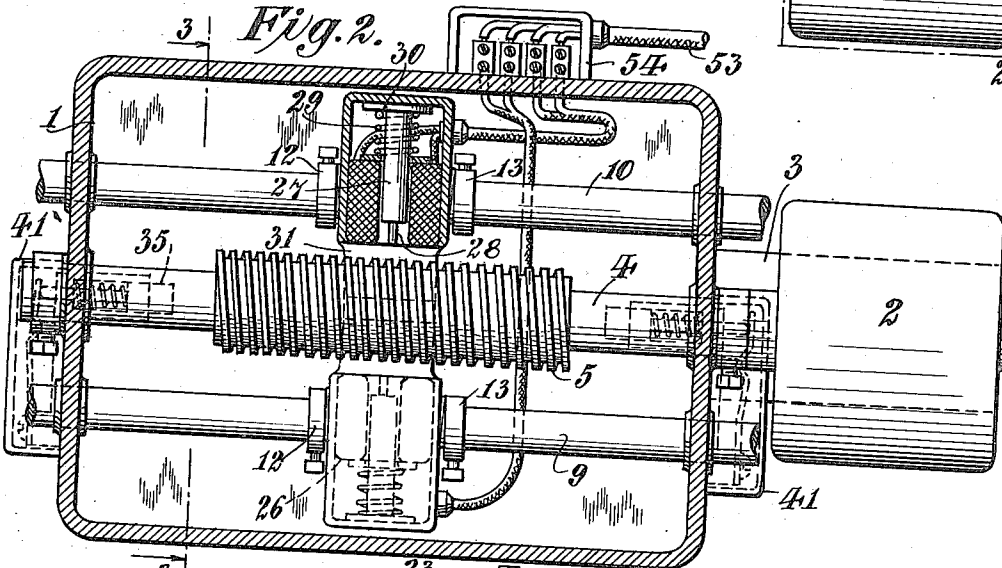
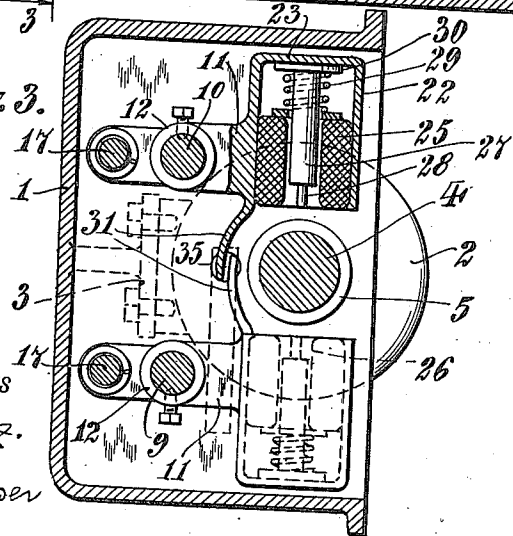


Fig. 3.



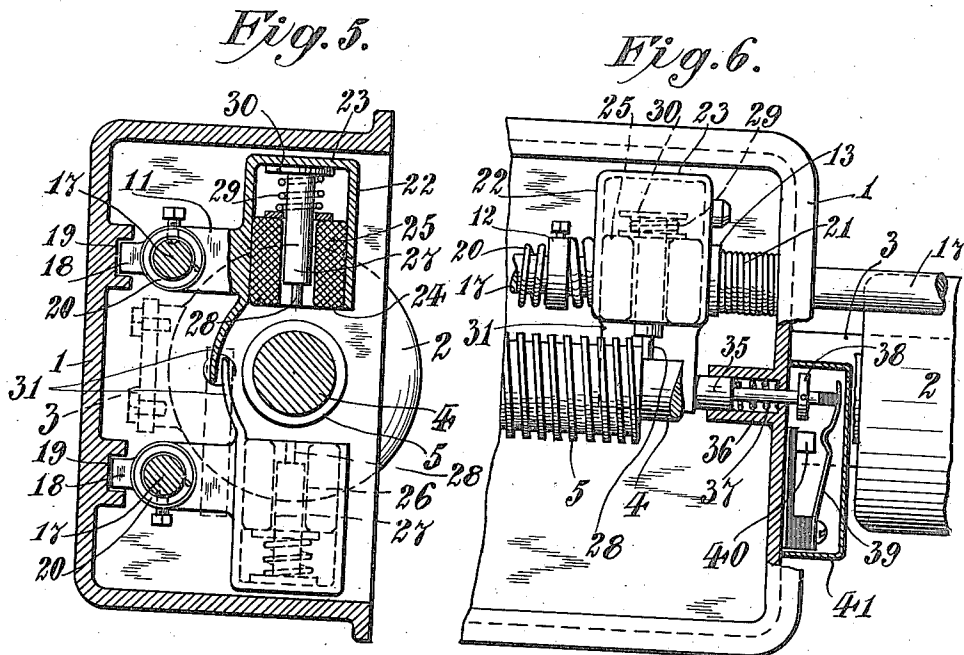
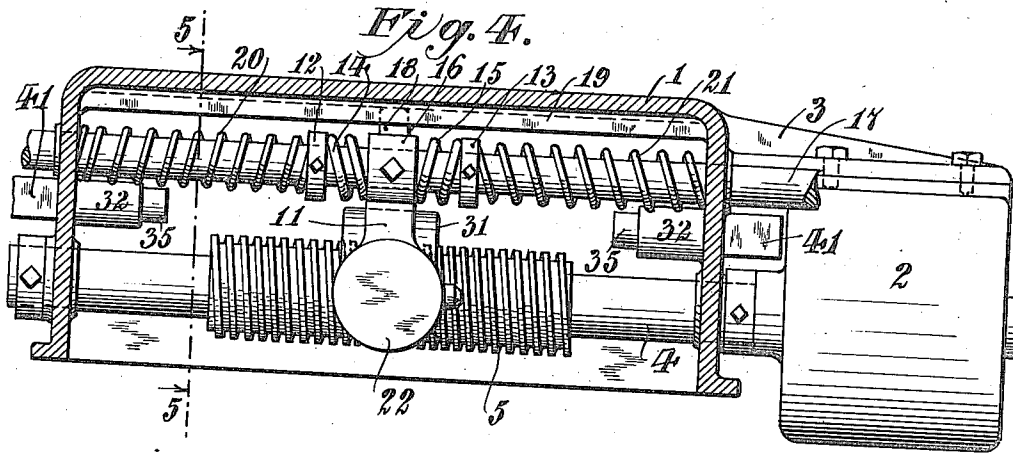
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

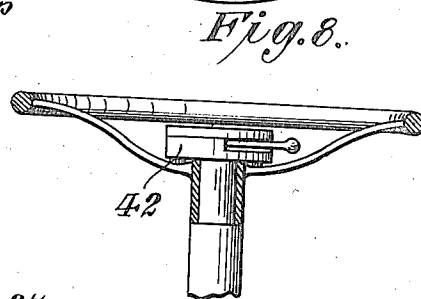
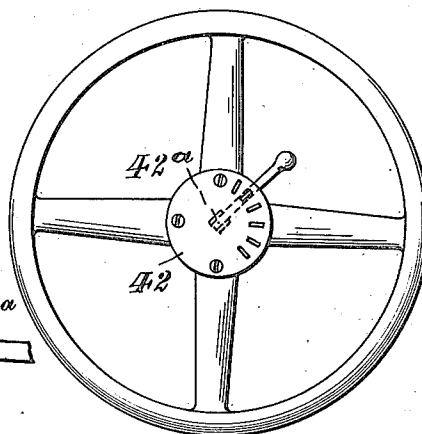
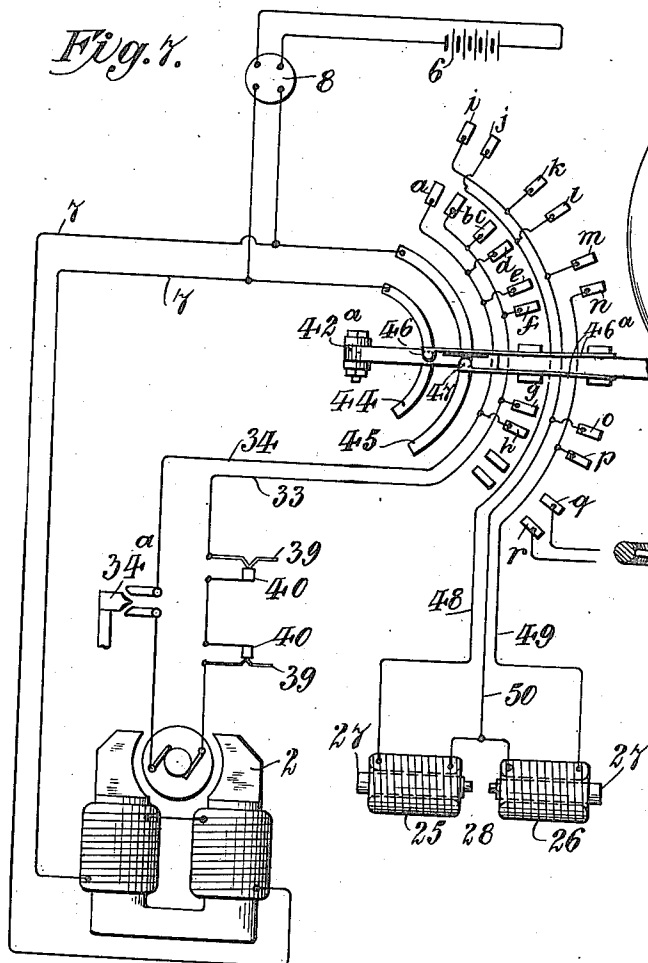
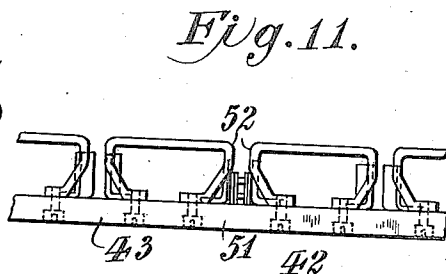
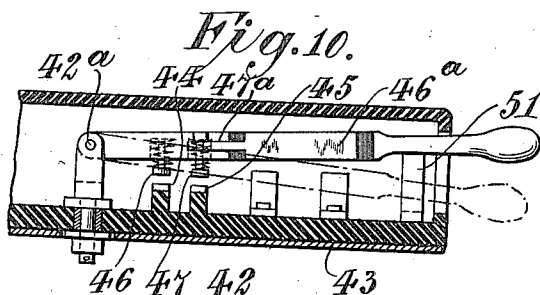


Fig. 9.



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SAFETY CONTROLLING DEVICE.

1,268,264.

Specification of Letters Patent.

Patented June 4, 1918.

Application filed August 21, 1914. Serial No. 857,838.

To all whom it may concern:

Be it known that I, HOWARD J. MURRAY, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Safety Controlling Devices, of which the following is a specification.

My invention relates to improvements in safety controlling devices such as are used for governing the action of the different operative mechanism on self propelled vehicles and relates particularly to electrically controlled means for positively shifting the transmission gears into their different positions.

One of the main objects of the invention is to provide a single control for governing the different driving mechanism usual with automobiles so that it will be impossible to operate any of the mechanisms out of their order and thus damage the same and an object incidental to this general object is to provide a gear shifting mechanism which will automatically and mechanically move the gears into an idle inoperative position in case of any accident to the controlling device, such as the breaking or short circuiting of the mechanism actuated circuit or the exhaustion of the source of electric energy for the circuit.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the drawings:

Figure 1 is a vertical sectional view through a mechanism containing casing carrying a preferred embodiment of my invention shown in side elevation and with parts of the shift rods exteriorly of the casing broken away;

Fig. 2 is a plan view taken on the line 2—2 of Fig. 1 looking upward in the direction indicated by the arrows;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 2 looking in the direction indicated by the arrows;

Fig. 4 is the view similar to Fig. 1 showing

a slightly modified form of the invention;

Fig. 5 is a transverse sectional view taken on the line 5—5 Fig. 4 looking in the direction indicated by the arrows;

Fig. 6 is a fragmentary view of the under side of the device shown in Fig. 4 with the clutch carriage shown in locked position;

Fig. 7 is a diagrammatic view of the mechanism and its electrical connections;

Fig. 8 is a plan view of the steering wheel showing the control switch mounted thereon;

Fig. 9 is a side elevation, partly in vertical section, of the device shown in Fig. 8;

Fig. 10 is an enlarged vertical sectional view of the outer portion of the control switch shown in Figs. 8 and 9, and

Fig. 11 is a front elevation of a portion of the switch locking device shown in side elevation in Fig. 10.

In connection with the device illustrated, the invention will be described as a gear shifting mechanism, but it will be obvious that the device may be used in connection with any character of machine which requires the shifting of its different parts. When used in connection with an automobile the device may be mounted in any desirable location on the vehicle and is inclosed in a suitable casing 1 designed to form the journal bearings and supports for the mechanism carried thereby. Power is supplied to the device from any suitable source, such as the motor 2, which may be mounted in any suitable position as on a bracket 3 affixed to the outside of the casing so that the device may be self-contained. The motor is operatively connected with a power shaft 4, extending into the casing, the central portion of which shaft is enlarged and provided with a feed screw 5 preferably of low pitch so as to obtain relatively great power from a small motor. The motor has its field normally connected with a battery 6, or other suitable source of electrical energy, by means of the conductors 7, leading through a snap switch 8, which may be arranged to be locked if desired. The motor is reversible and is controlled so as to run either in a forward or a reversed direction at will. Mounted in the casing is a pair of gear shift rods 9 and 10 and a pair of magnetically actuated clutches positioned on opposite sides of the shaft and similar in construction so that the detailed description

of one will answer for an arrangement employing two, or in fact, any number of different gear shifting rods and coaxing clutches. The rods may be so arranged and
 5 connected to the conventional transmission box (not shown, but commonly found on automobiles) that the movement of each rod in either direction longitudinally will connect a set of gears so that the two rods in
 10 the device illustrated may control four speeds, such as three speeds forward and one reversed. Each of the rods 9 and 10 has a clutch carriage 11 supported so as to be moved therewith when actuated by the feed
 15 screw. To permit a slight movement between the carriage and its actuated rod, two spaced collars 12 and 13 are fixed to the rod and coiled springs 14 and 15 are mounted on the rod on opposite sides of the carriage
 20 and each arranged to bear thereon and on the adjacent collar so that the carriage is resiliently held between the collars 12 and 13. The carriage is guided in its longitudinal movement and is held against turning by
 25 any suitable means, such as providing a portion of the carriage with a sleeve 16 slidably mounted on a guide rod 17 paralleling the shift rod and fixed to the casing, or as shown in Figs. 4 and 5, the upper end of the carriage may be reduced to form a gliding
 30 block 18 slidably mounted in a groove 19 affixed to or formed integral with the top of the casing. The carriage is normally maintained in position centrally of the feed screw
 35 by means of balanced springs 20 and 21 mounted on the guide rod and bearing on the sleeve 16, as shown in Fig. 1, or mounted on the shift rod itself and bearing on the outside of collars 12 and 13, as shown in Fig. 4.
 40 The outer ends of these springs 20 and 21 bear on the adjacent ends of the casing and are so arranged that the clutch member, hereinafter described, may move to either end of the feed screw and into locked position relative thereto, before the spring adjacent this end has been fully compressed.
 45 The carriage includes a barrel 22 with a closed outer end 23 and an open end 24 facing the feed screw. An electromagnet 25 is contained within one of the barrels and a similar electromagnet 26 is contained within the other barrel. Each electromagnet is provided with a normally retracted armature plunger 27 provided with a projecting
 50 finger 28 adapted to fit into one or more grooves of the feed screw. A spring 29 disposed between the rear end of the electromagnet and a head 30 on the plunger tends to maintain the finger disengaged from the
 55 feed screw.
 60

An arm 31 projects from the carriage, laps the corresponding arm from the oppositely disposed carriage and is adapted, at the end of its travel in either direction, to
 65 actuate one or the other of a pair of circuit

breakers 32 for interrupting the circuit through the conductor 33 of the pair of conductors 33 and 34 which are connected to the opposite poles of the motor armature. These circuit breakers are normally in circuit closed position and may be of any conventional form. In the device illustrated, a form of circuit breaker is used which comprises a plunger 35 mounted within a bearing 36 provided in the end of the casing above the power shaft, which plunger is normally held in position projected toward the carriage by means of a spring 37. The plunger is held in its projected position by means of a stop collar 38. The plunger in its circuit breaking movement, under the action of the carriage engaging the same, is adapted to bear on and is insulated from a spring contact 39 normally in circuit closed position with a suitable contact 40. So as to prevent any possible sparking within the casing the circuit breakers are preferably mounted exteriorly of the same and within a removable box 41. A circuit breaker 34^a controlled automatically from the clutch is preferably provided in the circuit 34.

The supply of current to the motor and to the electromagnets is controlled by a switch 42, which may be mounted, as shown, directly on top of the steering wheel of the vehicle although it is obvious that it may be mounted in any other convenient position. Said switch comprises a two blade lever pivoted at one end by means of a universally pivoted joint 42^a at the center of an insulating base plate 43 supported from the steering post. Concentrically disposed in an arc about the joint is a pair of parallel quadrant contact plates 44 and 45 constituting extensions from the conductors 7 so as to provide a shunt from the motor field and adapted to be electrically connected when the switch is closed by spring contacts 46 and 47. Each of the spring contacts depends from one of the blades of the switch and are each adapted to engage electrically with the top surface of the plates 44 and 45 respectively.

Exteriorly of the spring contacts, each blade is provided with a face plate 46^a insulated from the blade to provide a portion for connecting the contacts thereafter disclosed. One of these portions is electrically connected as by means of the tongue 47^a with one of the spring contacts 47 and the corresponding portion of the other blade is similarly connected to the other spring contact.

A set of contacts, *a, b, c, d, e, f, g, h* are disposed in pairs in any arc to the outside of the plate 45 and are connected to the conductors leading to the motor armature; contacts *a, b, e* and *h* being connected to the conductors 34, and the remaining contacts being connected to the other conductor 33.

Diametrically disposed relative to these contacts, and arranged in a similar arc are corresponding pairs of contacts *i, j, k, l, m, n, o* and *p*; the contacts *j* and *l* being connected to a conductor 48 leading to one of the electromagnets 25; the contacts *n* and *p* being connected to a conductor 49 leading to the electromagnet 26 and the contacts *i, k, m* and *o* being connected to a conductor 50 constituting the return connection for both of the electromagnets.

The device may be provided with other contacts *q* and *r* connected with an electric starter or other device indicated diagrammatically by the connections E S which it may be desired to actuate from the control switch. Still other contacts *s* and *t* corresponding to the neutral position of the switch may be "dead" or they may be connected to control some mechanism such as the vehicle brakes.

To secure the switch in any of its set positions an arc shaped locking device 51 may be positioned outside of the outer line of contacts and designed so as to clamp the switch between the spring walls 52, the openings between which are in line with the different spaces between the pairs of contacts connected with the motor and the electromagnets.

The several conductors leading from the switch may be contained within a cable 53, leading to a distribution box 54 mounted on the casing from which the several conductors are led to their respective electromagnets or motor.

In operation and with the several parts in the position shown in Figs. 1 and 4, the switch lever may be moved to engage any of the sets of contacts desired as, for instance, to engage the contacts *q* and *r* to actuate a self-starter. In this case the current from the battery 6 will pass through the contact plates 44 and 45, switch lever, and contacts *q* and *r* directly to the starter. The switch lever would then be lifted into a raised position, as shown in solid lines in Fig. 10, thus interrupting the circuit through the starter. From any position the switch lever may be raised to clear the locking device 51 and the contacts and rotated to engage with one of the sets of speed controlling contacts. For instance, should it be desired to run on first speed, the clutch lever couple be moved into position to engage with contacts *m, n, e* and *f* in which case the current would pass from the battery through switch 8 to plate 45 from which it would split, one shunt going to the motor and the other shunt going to one of the electromagnets. Tracing these circuits the motor actuating circuit would include in order, plate 45, spring contact 47, one of the face plates 46, contact *e*, conductor 34, the motor armature, conductor 33, contact *f*, the other face plate

46, plate 44 and back to the battery. The electromagnet circuit includes plate 45, contact *m*, conductor 50, electromagnet 26, conductor 49, contact *n*, back to the plate 44.

The energizing of the motor by this connection will rotate the feed screw in one direction and the simultaneous energizing of the electromagnet will move the clutch into engagement with the screw so as to advance the rod carrying the clutch in one direction, say in a direction to move the gears into mesh on the first speed. As the switch lever is held by the locking device 51, the circuits will be maintained until the clutch carriage engages one of the circuit breakers 31 to interrupt automatically the circuit through the motor at the end of the travel of the carriage and thus stop the feeding of the screw, but the circuit will be maintained through the electromagnet so long as the switch is closed. As the carriage approaches the end of its travel, the finger 27 will ride down the end of the enlarged portion of the shaft 4, as shown in Fig. 6, thereby locking the carriage and the shifted shaft as long as the controlling electromagnet is energized.

After the clutch has engaged with the feed screw it might be that the transmission gears were not in line to be meshed by the shift rod. The back play permitted by the springs 14 and 15 however, permit the feed screw to continue to turn compressing the springs on one side of the carriage until the gears are in line to intermesh and the parts will assume the position they would have had if the gears had gone in mesh in a normal manner.

Lifting the switch lever out of engagement with the contacts deenergizes the magnet and permits the spring 28 to draw the locking finger out of line of the screw and the spring 17 acts on the carriage to return the same to its initial position at the center of the feed screw. It will be noted that this occurs whenever the switch lever is raised from any one of its positions so that when passing from one speed to another all parts of the gear shifting mechanism are in their normal inoperative positions.

From this specific tracing of one of the sets of circuits, it will be obvious from following the diagram of Fig. 11 that each of the rods may be shifted longitudinally in either direction by making the proper contact with the switch lever. It will be noted for instance that bringing the lever into engagement with the contacts *g, h, o* and *p* will cause the circuit to be closed through the motor field instead of the armature and the direction of the motor will be reversed to feed whatever carriage is in engagement therewith in a reverse direction.

By means of a device of this character, I am enabled to provide a simple and com-

pact mechanism for controlling the different
 operating parts of machines to which a de-
 vice of this character is applicable and to
 provide an arrangement whereby relatively
 5 small magnets may be used to shift machine
 parts of relatively large mass. The device
 may be economically operative for the cur-
 rent is shut off from the field magnet and
 armatures automatically as soon as the
 10 armature has completed its work, and it is
 obvious that the locking magnet may be so
 wound as to require but little current to
 maintain the clutch in its operatively con-
 necting and locked position.

15 The mechanism described is intended pri-
 marily for use as a safety device on self
 propelled vehicles and with this object pri-
 marily in view the parts are so arranged
 that in case of any accident to the mecha-
 20 nism the different parts are automatically
 and promptly returned to their initial in-
 operative position and in this way the pos-
 sibility of running the machine without ab-
 solute control is eliminated. Should any-
 25 thing go wrong the vehicle would merely
 stop.

As the control switch lever can be in but
 one position at a time, it will be seen that
 it is impossible to make improper connec-
 30 tions as, for instance, when the circuit is
 completed through the self starter, the gears
 are in their normal inoperative position and
 the transmission will be inoperative until the
 lever is moved into a position to positively
 35 bring the gears of the transmission into
 mesh, and also the gears are unmeshed
 whenever the lever is being moved from the
 contacts controlling one speed to the con-
 tacts controlling another of the speeds, so
 40 that irrespective as to the number of shift
 rods employed, but one part can be in con-
 necting position at a time.

While I have shown and described and
 have pointed out in the annexed claims, cer-
 45 tain novel features of my invention, it will
 be understood that various changes may be
 made in the construction and arrangement of
 the several parts. It will also be understood
 that certain well known mechanical equiva-
 50 lents of the elements illustrated may be
 used, and that various other substitutions,
 omissions and changes in the form and de-
 tails of the device illustrated and in its
 operation may be made by those skilled in
 55 the art without departing from the spirit of
 the invention.

I claim—

1. In a device of the class described, the
 combination with a source of electric en-
 60 ergy, an electric motor, a plurality of electro-
 magnets, a switch including a plurality of
 separate contacts connected to the armature
 of said motor, and to each of said electro-
 magnets and a single switch lever adapted
 65 to engage said contacts to simultaneously

actuate said motor and one of said electro-
 magnets, and means controlled by said mo-
 tor for automatically breaking the circuit
 to said motor while permitting the electro-
 magnet to remain magnetized.

2. In a device of the class described, the
 combination with a rotating feed screw, of
 a gear shifting rod, a clutch operatively
 connected to said rod to move therewith and
 adapted to engage said screw whereby said
 70 rod may be shifted longitudinally by the ro-
 tating of the screw, means tending to main-
 tain said clutch disengaged from the screw,
 and electrically energized mechanism for
 moving said clutch into position to engage
 the screw, a switch for completing the elec-
 tric circuit through said mechanism and
 means acting on said rod tending to return
 the same to its initial position when the
 clutch is disengaged from the screw.

3. In a device of the class described, the
 combination with a source of electric en-
 ergy, a shunt wound motor, a power shaft
 actuated by said motor, conductors connect-
 ing said source with the field coils of said
 motor, metallic contact plates shunted off
 said conductors, a gear shift rod, an electro-
 magnet fixed to said rod and designed to
 engage said power shaft to shift the rod,
 a plurality of sets of contacts, certain con-
 80 tacts of each set connected to the armature
 coils of said magnet, certain other contacts
 of said set connected to said electromagnet
 and a switch lever adapted to connect said
 contact plates with each other and with the
 contacts leading to the electromagnet.

4. In a device of the class described, the
 combination with a gear shifting rod, of
 a reversible motor, a shaft operatively con-
 nected to be driven from the motor, a clutch,
 electromagnetically controlled means for
 moving said clutch into position to connect
 said shaft and rod whereby the rod may be
 shifted in either direction longitudinally,
 locking means for retaining said clutch in
 position for holding said rod in its shifted
 position in either direction, said rod adapt-
 ed to feed said clutch into position relative
 to said locking means.

5. In a device of the class described, the
 combination with a gear shifting rod of
 electrically operated means for moving said
 rod longitudinally, magnetically controlled
 clutch for connecting said means and said
 rod, a circuit breaker in series with said
 electrically operated means positioned at the
 limit of movement of said rod and adapt-
 ed to stop said electrically operated means
 when the rod has been shifted.

6. In a device of the class described, the
 combination with a gear shifting rod, of
 electrically operated means for moving said
 rod into a gear setting position, said means
 including a locking device moved by said
 rod into a locking position and magnetically

controlled means for maintaining said device in locked position.

7. In a device of the class described, the combination with an element of a gear shifting mechanism, of a power shaft for actuating said element, a clutch connection between said element and shaft, means for controlling said clutch connection to connect said element and shaft so that the movement of one will be transmitted to the other said clutch connection including resilient means permitting relative movement between said element and shaft when operatively connected.

8. In a device of the class described, the combination with an element of a gear shifting mechanism, of a feed screw, a clutch adapted to engage said screw to be fed thereby, magnetically controlled means for moving said clutch into operative position, and a resilient connection between said clutch and element permitting the element to be held while the screw continues to rotate.

9. In a gear shifting mechanism, the combination with a mechanism containing casing having a gear shifting rod extending from the same, of a reversible motor, a shaft connected to the motor armature shaft and having a feed screw, a clutch, electromagnetically controlled means for moving said clutch into position to connect said feed screw with said shifting rod whereby the rod may be shifted in either direction longitudinally.

10. In a gear shifting mechanism, the combination with a mechanism containing casing having a gear shifting rod extending from the same, of a reversible motor, a shaft connected to the motor armature shaft and having a feed screw, a clutch, electromagnetically controlled means for moving said clutch into position to connect said feed screw with said shifting rod whereby the rod may be shifted in either direction longitudinally, and locking means for retaining said clutch in position for holding said shifting rod in its shifted position in either direction, said screw adapted to feed said clutch into position relative to said locking means.

11. In a gear shifting mechanism, the combination with a power shaft having an enlarged portion provided with a feed screw, a gear shifting rod paralleling said power shaft, a clutch mechanism carried by said rod and adapted to engage said feed screw to be moved thereby to the end of the enlarged portion of the shaft, a spring tending to resist this movement of the rod and means for projecting an element of the clutch toward the shaft at the end of the feed screw, and said spring adapted to hold the clutch in locked position against the end of the enlarged portion of the shaft.

12. In a gear shifting mechanism, the

combination with a motor, a power shaft actuated thereby and having an enlarged portion provided with a feed screw, a gear shifting rod paralleling said power shaft, a clutch mechanism carried by said rod and adapted to engage said feed screw to be moved thereby to the end of said enlarged portion, means for holding said clutch in locked position at the end of the enlarged portion, a circuit breaker in series with said motor and adapted to be locked in circuit breaking position by said clutch when in its locked position.

13. In a gear shifting mechanism, the combination with a power shaft, and a gear shifting rod, of a clutch for transmitting the rotary movement of said shaft into rectilinear movement of said rod, means for guiding said clutch and for preventing rotary movement thereof and means paralleling said guiding means tending to return the clutch to its initial position when disengaged from the power shaft.

14. In a gear shifting mechanism, the combination with a power shaft and gear shifting rod, of a clutch for transmitting the rotary movement of said shaft into rectilinear movement of said rod to shift the same, means controlled by the position of said rod for interrupting the movement of said power shaft and automatically actuated means for locking said rod in its shifted position.

15. In a device of the class described, the combination of a casing, a power shaft mounted in said casing, a plurality of gear shifting rods mounted in said casing and disposed about said shaft and parallel thereto, means for connecting said shaft with any one of said rods, selective means for simultaneously controlling said connecting means and said power shaft and means for returning said rods to their initial position when said selective means are moved to an inoperative position.

16. In a device of the class described, the combination of a power shaft, a gear shifting rod, means independent of any frictional engagement for positively connecting said shaft and rod, magnetically actuated means for moving and holding said first named means in an operative position, and resilient means tending to maintain said first named means in an inoperative position when said magnetically actuated means are deenergized.

17. In a device of the class described, the combination of a power shaft, a clutch adapted to engage said shaft and to be moved thereby, a rod guided for longitudinal movement, a resilient connection between said clutch and said rod permitting slight relative movement between said clutch and rod when connected and means for simultaneously inaugurating the movement of

said power shaft and the movement of said clutch into operative position.

18. In a device of the class described, the combination with an electric motor, of a control switch including a pair of metallic contact plates adapted to constitute part of the electric circuit leading to the field coils of the motor, a plurality of sets of contacts, certain contacts of each set adapted to be connected to the armature coils of the motor and certain other contacts of each set adapted to be connected to an electromagnet, a single control lever adapted to be brought into position to connect electrically the contact plates to each other and to any one set of contacts.

19. In a device of the class described, the combination with a source of electric energy, a shunt wound motor, conductors connecting said source with the field coils of said motor, metallic contact plates shunted off said conductors, an electromagnet, a plurality of sets of contacts, certain contacts of each set connected to the armature coils of said magnet, certain other contacts of said set connected to said electromagnet and a switch lever adapted to connect said contact plates with each other and with the contacts leading to the electromagnet.

20. In a device of the class described, the combination with a source of electric energy, a shunt wound motor, conductors connect-

ing said source with the field coils of said motor, metallic contact plates shunted off said conductors, an electromagnet, a plurality of sets of contacts, certain contacts of each set connected to the armature coils of said magnet, certain other contacts of said set connected to said electromagnet and a switch lever adapted to connect said contact plates with each other and with the contacts leading to the electromagnet, and means for locking said switch lever in position electrically connecting said plates and contacts so as to prevent the connection from jarring loose.

21. In a gearing shifting mechanism, the combination with a motor, a power shaft actuated thereby, a gear shifting rod, a clutch carried by the rod and designed to engage the shaft and to be shifted thereby, means for holding the rod and clutch in shifted position and a circuit breaker controlling the current supplied to said motor and designed to be locked in circuit breaking position by said clutch when in its locked position.

Signed at New York in the county of New York and State of New York this 14th day of August A. D. 1914.

HOWARD J. MURRAY.

Witnesses:

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W. S. ORTON.