No. 827,496. PATENTED JULY 31, 1906.

E. BATISSE.

STARTING DEVICE FOR MOTORS.

APPLICATION FILED APR. 6, 1905.

2 SHEETS—SHEET 1.

Fig: 1.

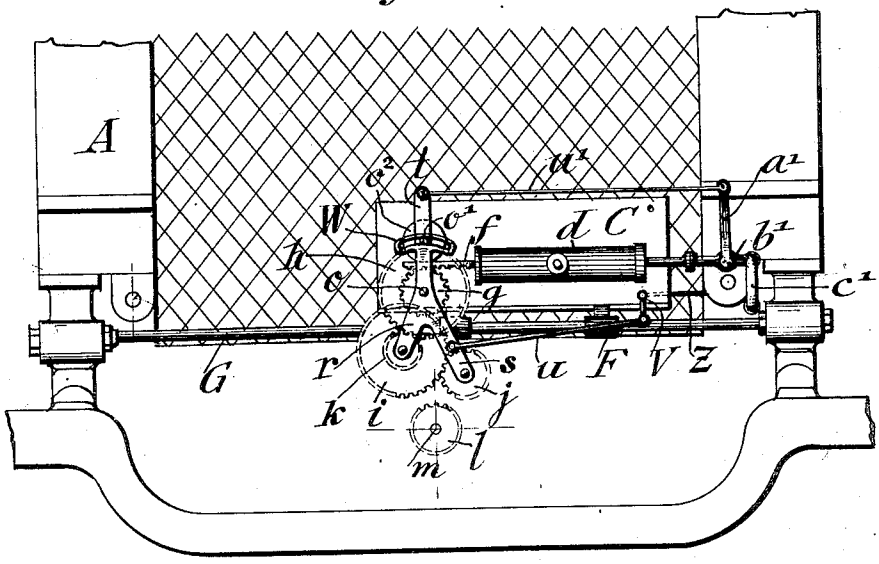
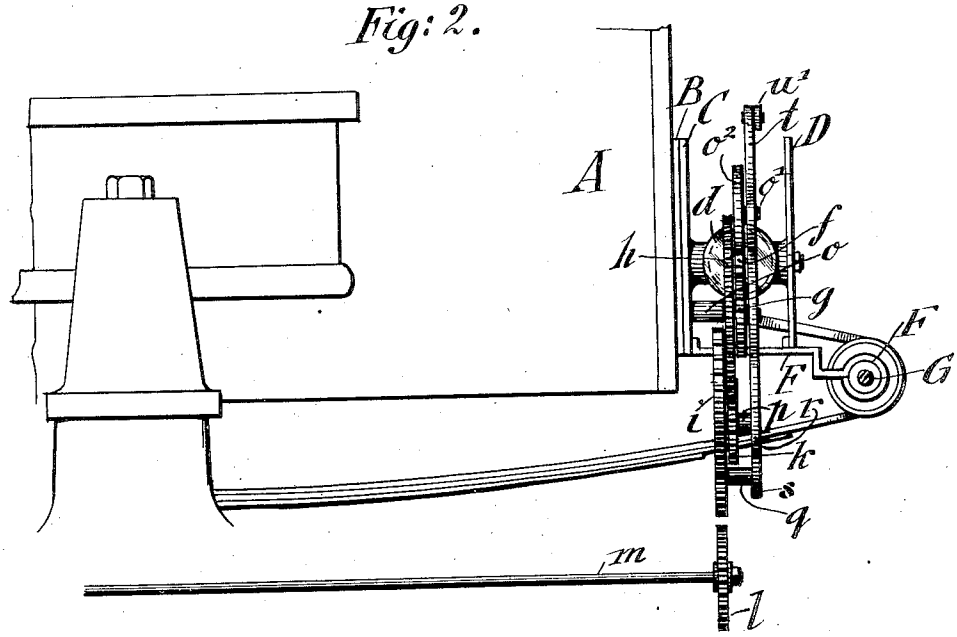


Fig: 2.



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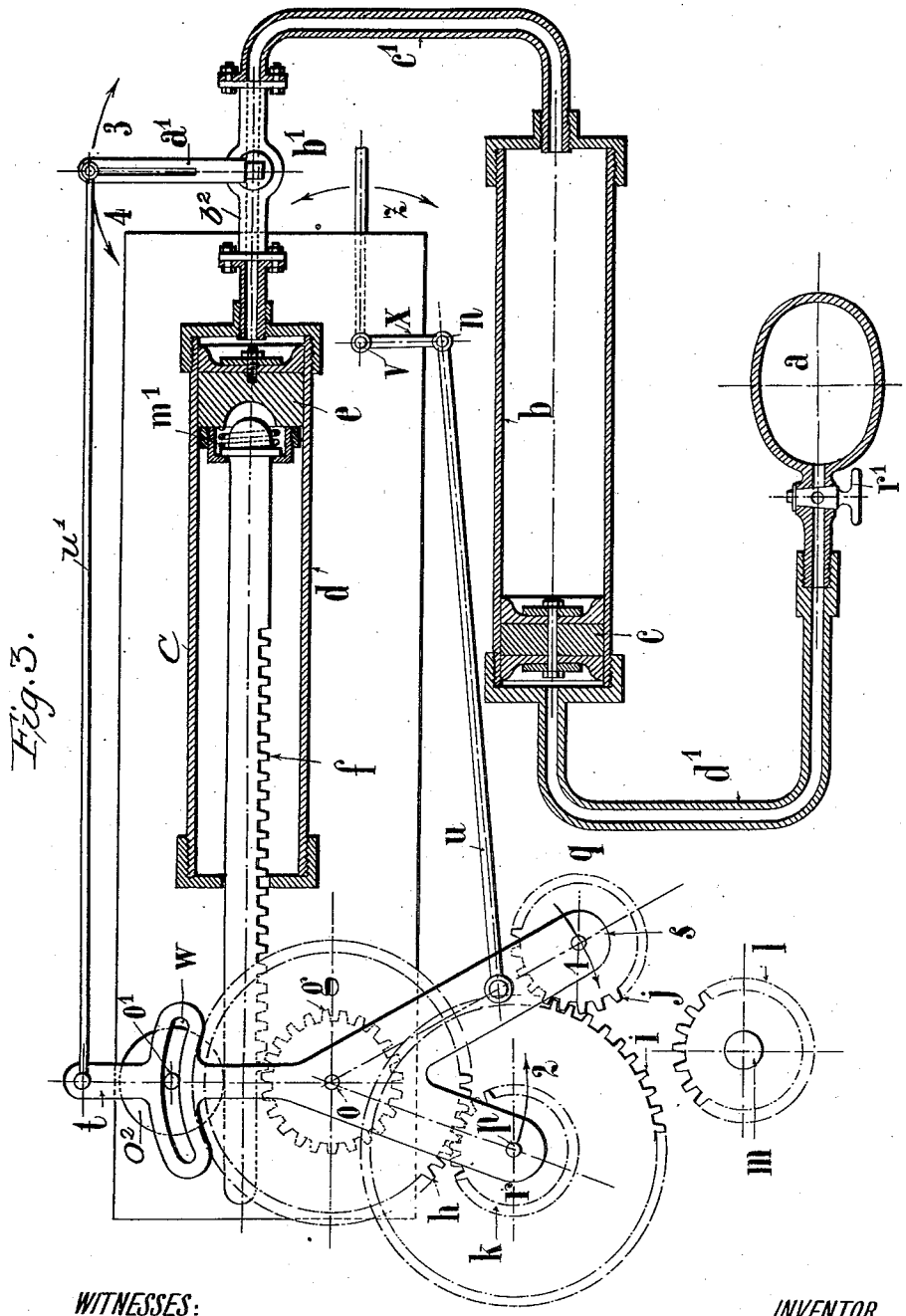
2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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STARTING DEVICE FOR MOTORS.

No. 827,496. Specification of Letters Patent. Patented July 31, 1906.

Application filed April 6, 1905. Serial No. 254,172.

To all whom it may concern:

Be it known that I, EMILE BATISSE, a citizen of the Republic of France, residing in Lyon, France, have invented certain new and useful Improvements in Starting Devices for Motors, of which the following is a specification.

This invention relates to mechanical devices for starting explosive-motors.

The invention has among its objects to provide a starting device which is particularly applicable to motor-cars and which is energized by the motor itself after the latter has been started.

The invention also contemplates the use of fluid-pressure as a motive power, thereby doing away with the use of springs or similar devices which are subject to rapid deterioration.

A further object of the invention is to provide a starting device so mounted with respect to the engine-shaft that the device may be operated so as to start the motor, to be energized by the same, or to be moved out of coöperative relation with said shaft by means, of a single lever, which in case of a motor-car can be operated from the driver's seat.

With these and other ends in view the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings, in which the same parts are denoted by the same reference characters throughout the several views, Figure 1 is a front elevation of the improved starting device, showing the same mounted upon a motor-vehicle. Fig. 2 is an enlarged side elevation of the device, certain parts of the motor-vehicle being removed for the sake of clearness; and Fig. 3 is a front elevation of the starting device, the front plate being removed and certain parts shown in section.

Referring to the drawings, A denotes the engine-hood of a motor-vehicle, and *m* the engine-shaft, which is disposed beneath the hood in the usual manner and has keyed to its forward end a gear-wheel *l*. To the front or face of the hood A and above and slightly to one side of the engine-shaft *m* are secured two rectangular plates B C. Extending forwardly from the lower edges of the front plate C are spaced brackets F, having sleeves at their forward ends, which embrace a rod G, extending between the forward ends of the vehicle-springs, as shown. A plate D, similar to the plates B C, is mounted in upright position across the brackets F, and between the plates C and D are supported the operative parts of the improved starting mechanism. This mechanism embodies a cylinder *d*, extending across the front of the hood in horizontal direction and supported at either side between the plates by means of bosses and screw-nuts or in any other suitable manner. Leading from the head of the cylinder *d* which is farthest from the engine-shaft *m* is a pipe b^2, controlled by an oscillating cock or valve *b'*, operated by a crank-arm *a'* and other mechanism to be presently described. The pipe b^2 is in turn connected to a pipe *c'*, which is preferably made of flexible material, and the latter pipe in turn connected to one head of a cylinder *b*, which is shown in Fig. 3 and in practice may be mounted upon any suitable part of the motor-car. A pipe *d'* leads from the cylinder *b* at the end opposite the connection of the latter with the pipe *c'*, and said pipe *d'* is in turn connected with a suitable receiver or reservoir *a*, as illustrated in Fig. 3. This receiver in practice is also mounted on or stored within any suitable part of the motor-car. For controlling the communication between the receiver *a* and the pipe *d'* a valve *r'* of any suitable type is provided.

In carrying out the invention the receiver *a* is filled with a highly elastic gas designed to act upon a piston *c*, which is freely movable throughout the length of the cylinder *b*. This piston acts in turn upon a body of liquid which is contained in the cylinder *b* and which may be forced by said piston into the pipe *c'* by the valve *b'* when the same is opened and thence into the cylinder *d*, where it acts upon a piston *e*. Secured to the side of the last-named piston, which is not in contact with the liquid, is a gear-actuating member, illustrated as a rack *f*, which is of considerable length and is movable through an opening in the cylinder-head nearest the engine-shaft. The teeth of the rack *f* are arranged at the lower edge of the same and are designed to act upon a coupling or transmitting mechanism to be described hereinafter. Between the rack *f* and the piston *e* a cushioning or lost-motion device *m'* is arranged for reducing the shocks upon the transmitting mechanism.

Above the engine-shaft and pivoted between the plates C and D at a point slightly below the axis of the cylinder *d* is a hanger or

carrier *r s t* in the form of an inverted Y, the pivot-pin *o*, upon which said hanger is pivoted, passing through the same at the intersection of the legs or branches thereof. At a point above the pivot *o* said hanger is enlarged to form a segment W, provided with a segmental slot by which the hanger is guided over a pin *o'*, extending from a roller o^2, disposed at the rear of the carrier and movable in contact with the upper edge of the rack *f*, so that said rack is efficiently guided and maintained against upward stress irrespective of the pivotal position of the hanger.

Journaled upon the pivot-pin *o* at the rear of the hanger *r s t* is a gear-wheel *g*, meshing with the rack *f*. A larger gear-wheel *h* is also journaled upon the stud or pin *o* at the rear of the hanger, and said gear-wheel *h* meshes with a small gear-wheel *k*, rotatable about a pin *p*, carried at the extreme end of one of the divergent hanger legs or branches. A large gear-wheel *i* is also rotatable about the pin *p* at the rear of the gear-wheel *k*, said wheels bearing a fixed relation to each other. A pin *q*, similar to the pin *p*, extends rearwardly from the end of the other hanger-leg and has rotatable about the same a small gear-wheel *j*, meshing with the large gear-wheel *i*. The train of gears described is so arranged upon the hanger that when the latter is oscillated on its pivot either of the wheels *i j* may be brought into mesh with the gear *l* upon the motor-shaft, depending upon the direction in which said hanger is moved.

In order to effect the oscillation of the hanger *r s t*, one of the lower legs thereof has connected thereto a connecting-rod *u*, which is pivoted at *n* to a system of levers X Z, fixed to a spindle V, extending between the supporting-plates. The lever Z is connected in any suitable way to a lever, (not shown,) which in case the device is used upon a motor-vehicle is arranged where it can be operated from the driver's seat.

In order to automatically operate the oscillating valve *b'*, and thereby control the admission of fluid into the cylinder *d*, a rod *u'* is attached at its ends to the top of the hanger *r s t* and to the upper end of the valve-operating crank-arm *a'*, respectively. It is therefore obvious that when the hanger is shifted in either direction the crank-arm *a'* will be shifted, as indicated by the arrows 3 and 4, and consequently the valve *b'* will be opened. In the position shown—that is to say, when the train of gears carried by the hanger is out of coöperative relation with the gear on the motor-shaft—said valve is closed, its crank-arm being disposed vertically.

The operation of the improved starting device is essentially as follows: Supposing the parts to be in the position shown in Fig. 3 and it is desired to energize the device from the motor, which will be considered as being in operation, the lever Z is so actuated by the driver or engineer that the hanger *r s t* is shifted in the direction of the arrow 2, so that the large gear-wheel *i* meshes with the driving-gear *l* and receives motion therefrom, such motion being transmitted throughout the train of gears to the gear-wheel *g* and thence to the rack *f*, which is driven inwardly against the liquid-pressure in the cylinder *d*. The shifting of the gear-carrying hanger as described causes, through the intermediary of the connecting-rod *u'*, the rocking of the crank-arm *a'* in the direction indicated by the arrow 4 and the consequent opening of the valve *b'*, which thus permits the liquid in the cylinder *d* to escape into the pipe *c'* under the pressure of the piston *e*. The liquid driven out of the cylinder *d* by said piston then enters the cylinder *b* and under the pressure generated by the motor forces the piston *c* toward the left, as indicated in Fig. 3, so that the highly-compressible gas filling said last-named cylinder at the side opposite the liquid is driven into the pipe *d'* and thence to the receiver *a*, where it is highly compressed. The valve or stop-cock *r'* is then closed in order to retain the gas in compressed condition in the receiver *a*. The lever Z is then actuated, so that the hanger is shifted into its median position—viz., so that its gears are out of engagement with the motor-shaft gear, and consequently the valve *b'* is closed through the medium of the rod *u'*. In this position the liquid is retained in the pipe *c'* and cylinder *b*, while the highly-compressible elastic fluid used (preferably carbonic-acid gas) is retained in compressed condition in the receiver *a*, a small amount being diffused in the pipe *d'*, as will be understood. When the motor has been stopped and it is desired to start the same, the operations previously described are reversed. The lever Z is thrown in a direction opposite to that first named, so that the gear-carrying hanger will be shifted to the left, as shown, and the small gear *j* will engage the motor-shaft gear *l*, which in this case is the driven member. It is obvious that when the hanger is shifted as indicated the crank-arm *a'* of the valve *b'* will be shifted, as indicated by the arrow 3, whereupon the liquid in the cylinder *b* and pipe *c'* will be driven by the gas in the receiver *a*, the cock *r'* of which has previously been opened, into the cylinder *d* with a degree of force corresponding to the pressure of the gas. The liquid accordingly acts upon the piston *e* of the rack-cylinder *d* and forces the rack *f* outwardly, thereby transmitting motion to the train of gears carried by the hanger and from the gear *j*, to which motion was last transmitted to the motor-shaft gear *l*. This last-named gear is therefore rotated at considerable speed and the motor started through the rotation of its shaft *m*. As soon as the starting operation has been completed the hanger which car-

ries the transmitting-gear is shifted into inoperative position and when it is desired to reënergize the starting device into the position first described.

By causing the compressed or liquefied gas or other elastic fluid to act upon the piston and rack *f* through the intermediary of a non-elastic fluid the advantage is obtained of suddenly suppressing all pressure in the cylinder *d* as soon as the valve *b'* is closed, which would not be the case if the gas acted directly upon the piston *e* by reason of the expansion of the former.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a motor-shaft gear, of a shiftable hanger mounted adjacent the same and having journaled thereon two gears of different diameters, means for throwing either of said gears into mesh with said motor-shaft gear, and a power-operated motor-energized device in operative connection with said gears.

2. A starting device including a shiftable hanger provided with separate legs, a gear journaled on each of said legs, said gears being of different diameters and intermeshing, and a device adapted to drive or to be energized by the motor-shaft through said gears.

3. A starting device embodying a **Y**-shaped hanger pivoted at the junction of its legs, a train of gears, one of said gears being mounted on the pivot of said hanger and another at the end of each leg, means for oscillating said hanger, and a power-actuated motor-energized device in operative connection with the gear mounted on said pivot.

4. In combination, with the motor-shaft and the gear thereon, the pivoted hanger in the form of an inverted **Y**, the train of gears mounted on said hanger and embodying gears journaled at the lower ends of the branches or legs of said hanger and disposed at opposite sides of said motor-shaft gear, the means for pivotally rocking said hanger, and the mechanism adapted to drive or to be energized by the motor-shaft through one of said gears.

5. The combination, with the motor-shaft, and the motor-shaft gear, of a pivoted hanger, a train of gears mounted on said hanger and embodying two gears either of which may be shifted by the movement of said hanger into engagement with said motor-shaft gear, another of said train of gears being mounted on the pivot of said hanger, and a power-operated motor-energized device in operative connection with said last-named gear.

6. The combination, with the motor-shaft *m*, and the motor-shaft gear *l*, of a pivoted hanger *r s t*, a gear *g* mounted on the pivot of said hanger, gears *i j* mounted on said hanger and each shiftable into engagement with the motor-shaft gear *l* by the pivotal movement of said hanger, means to transmit the movement of said gears *i j* to the gear *g* and vice versa, a rack engaging said last-named gear, and a power-actuated motor-energized device in operative connection with said rack.

7. In combination, a pivoted hanger, a train of gears mounted on said hanger, a slotted segment carried by said hanger, a pin movable in the slot of said segment and carrying a roller, a rack guided by said roller and permanently meshing with one of said gears, and a power-actuated motor-energized device in operative connection with said rack.

8. A starting device embodying a gas-receiver, a liquid-containing cylinder connected therewith, a piston in said cylinder dividing the gas from the liquid, a second cylinder connected with the first, a liquid-actuated piston in said second cylinder, and means for operatively connecting said last-named piston with a motor-shaft.

9. In combination, with a motor-shaft, a starting device including a fluid-actuated device, a valve for controlling the same, a transmitting mechanism shiftable into and out of coöperative relation with said motor-shaft, and means for automatically opening said valve when said transmitting mechanism is shifted into such coöperative relation.

10. In combination, with the motor-shaft, a starting device including a fluid-actuated device a valve for controlling the same, a transmitting mechanism shiftable into and out of operative connection with said motor-shaft, and means for automatically closing said valve when said transmitting mechanism is shifted out of operative position with respect to said shaft.

11. In combination, with a motor-shaft, a starting device embodying fluid-actuated motor-energized means, a valve for controlling the same, mechanism for transmitting motion from said means to said motor-shaft or vice versa, said mechanism being shiftable out of coöperative relation with the motor-shaft, and means for automatically opening said valve when said transmitting mechanism is shifted into position to drive or to be driven by the motor-shaft, and closing the same when said transmitting mechanism is shifted out of coöperative relation with said shaft.

12. In a device such as described, a cylinder, a piston in said cylinder, means for conducting a non-elastic medium into said cylinder, a valve for controlling the admission of such medium, transmitting mechanism in operative connection with said piston and shiftable into and out of coöperative relation to the motor-shaft, and means for automatically opening said valve when said transmitting mechanism is shifted into such rela-

tion and closing said valve when said transmitting mechanism is shifted into inoperative position.

13. In a device such as described, a fluid-pressure cylinder, a piston therein, means for conducting a non-elastic fluid into said cylinder, an oscillating valve for controlling the admission of such medium, a transmitting mechanism embodying the pivoted hanger having a train of gears mounted thereon, and a rod connecting said hanger and said valve.

14. The combination with the motor-shaft gear *l*, of the hanger *r s t* pivoted at the junction of its legs or branches, a train of gears mounted on said hanger, either of two of said gears being shiftable into mesh with the gear *l*, the fluid-cylinder *d*, the piston *e* in said cylinder, the rack *f* attached to said piston, the valve *b'*, the crank-arm *a'* applied to said valve, and the rod *u'* connecting said arm with the upper portion or shank of the hanger as described.

15. In a device such as described, the combination, with the motor-shaft gear, of a hanger of inverted-Y shape pivoted at the junction of its legs or branches and having the latter disposed at either side of said motor-shaft gear, a train of gears mounted on said hanger and embodying a gear journaled on the pivot thereof, and gears journaled at either end of said branches, means for shifting said hanger so that either of the gears carried at the ends of the branches or legs will mesh with said motor-shaft gear, a power-cylinder, a piston in said cylinder, a rack attached to said piston and in permanent engagement with the gear journaled on the pivot of said hanger, a pipe for conducting a non-elastic medium to said cylinder, an oscillating valve in said pipe, a crank-arm attached to said valve, and a rod connecting said crank-arm with the upper portion or shank of said hanger.

16. In combination, with the motor-shaft gear, a pivoted hanger, a train of gears mounted thereon, power-operated means in operative engagement with one of said train of gears, and a lever mechanism for rocking said hanger in either direction and thereby engaging either of two of the gears thereon with said motor-shaft gear.

17. In a starting device for explosive motors, the combination of a fluid-pressure cylinder, a piston movable therein, a rack attached to said piston, a cushioning device interposed between said rack and piston, and a transmitting or coupling mechanism operable by said rack.

18. In a starting device for motors, the combination, with a device operated by elastic-fluid pressure, of a transmitting or coupling mechanism embodying a train of gears, a piston operated by said elastic-fluid device through the medium of a liquid, a rack operated by said piston and engaging one of said gears, and a cushioning device interposed between said rack and said piston.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EMILE BATISSE.

Witnesses:
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