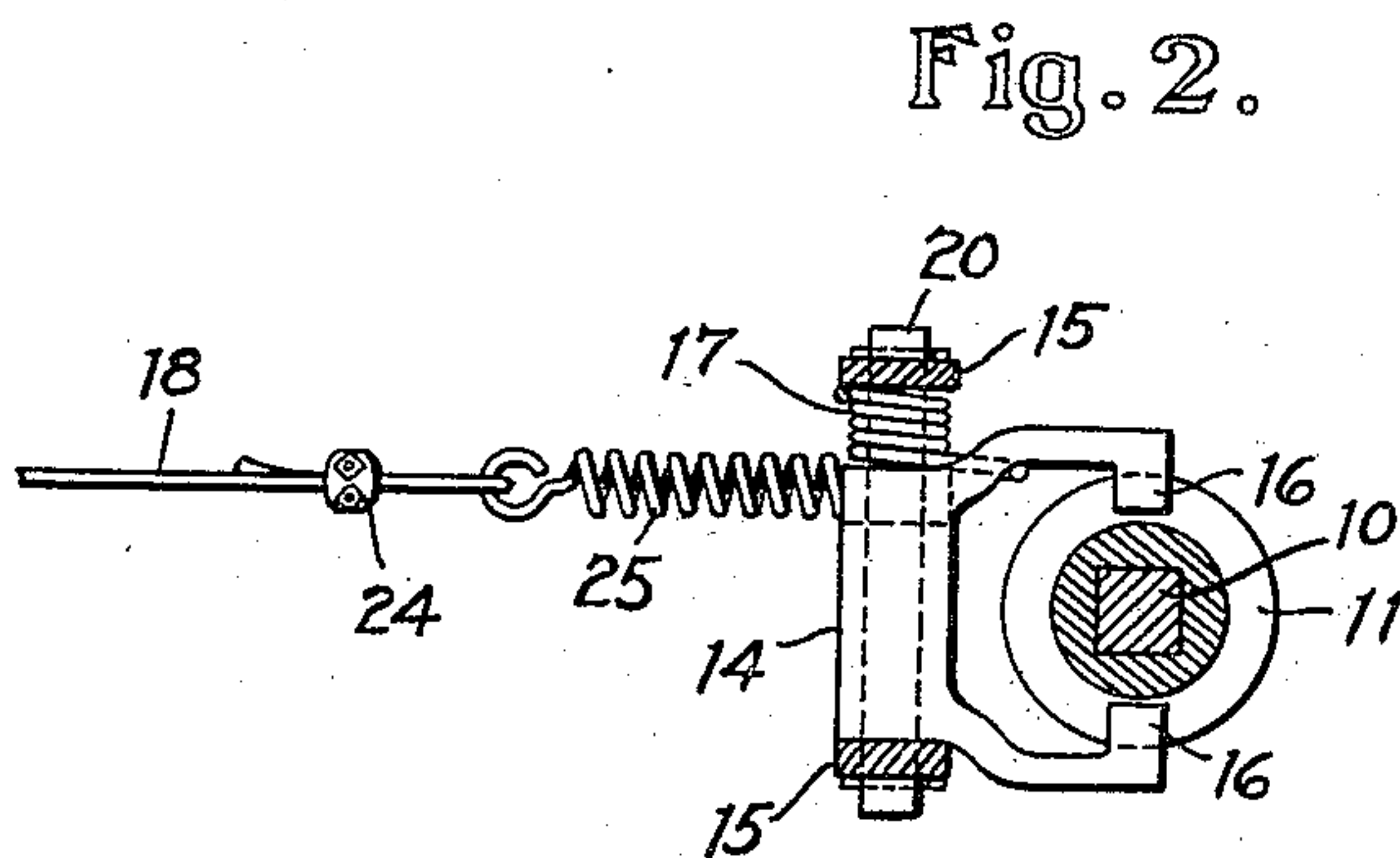
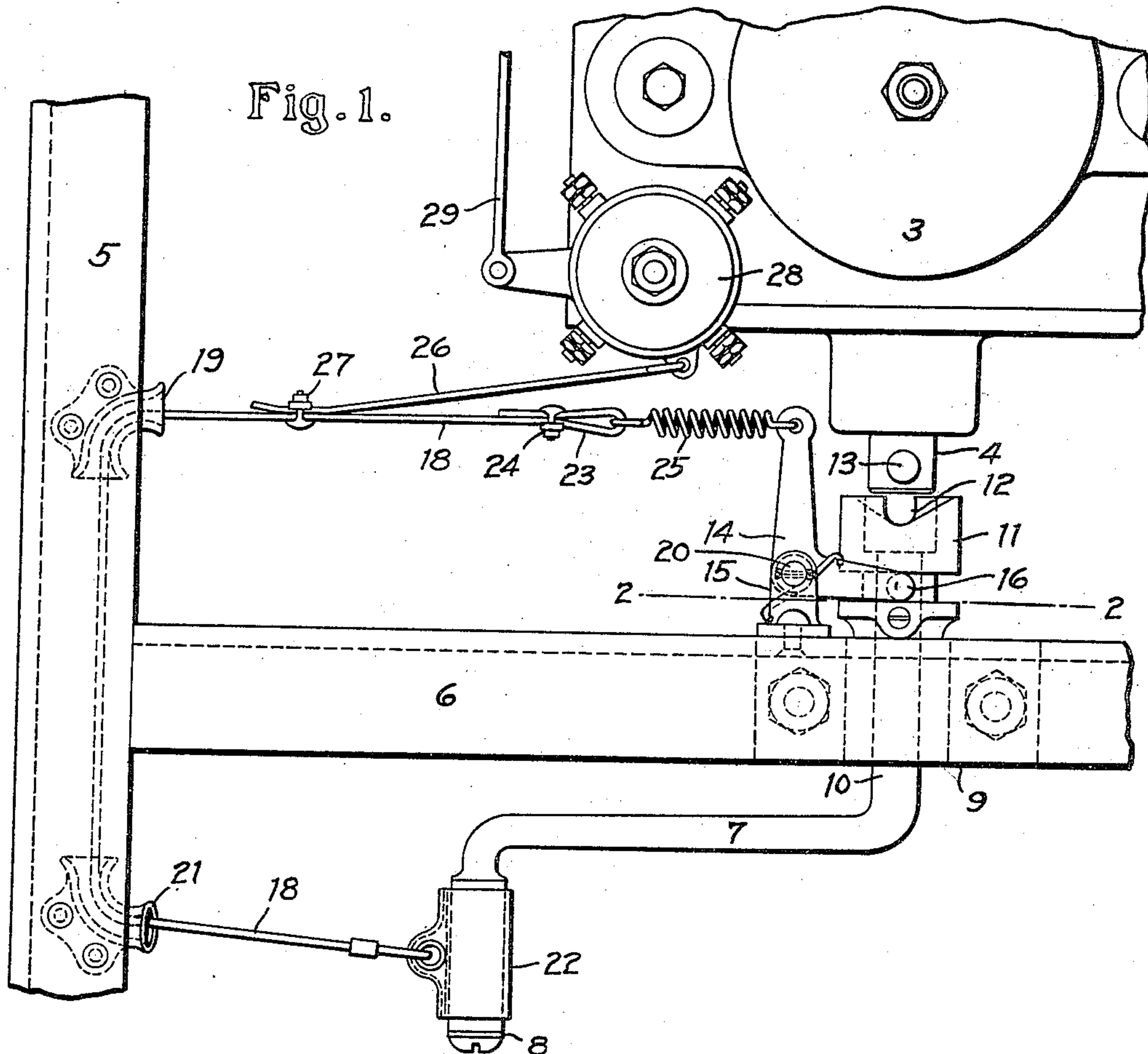


P. W. HODGKINSON.
ENGINE STARTER.
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Patented Apr. 25, 1911.



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ENGINE-STARTER.

990,556.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PERCY W. HODGKINSON, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

This invention relates to means, of the manually-operated type, for starting internal-combustion engines employed in connection with motor-vehicles.

For the purpose just referred to it is common to employ a crank mounted upon the front end of the vehicle and operating, through suitable clutching devices, to rotate the engine-shaft when the crank is turned by hand. To hold the crank normally out of engagement with the engine it is common to employ a spring which acts to thrust the crank forward in its bearing and disconnect the clutch-members. In using a device of this kind the crank must be forced rearwardly in its bearing, against the resistance of the spring, to engage the engine-shaft, and this operation is more or less inconvenient, since it cannot usually be done by thrusting rearwardly against the crank-handle, owing to the tendency of the crank-shaft to bind in its bearing. This inconvenience is particularly great where a spring is employed of sufficient strength to prevent the crank from rattling when the vehicle is running.

One object of the present invention is to improve devices of the kind just described by providing simple and convenient means by which operative connection between the crank and the engine-shaft may be secured when required without the necessity of pressing the crank itself rearwardly in the manner just described. To this end I employ a flexible member, such as a cable or chain, which is connected with the crank-shaft, or with the clutch-mechanism thereon, in such a manner that when the flexible member is pulled it forces the clutch-mechanism into operative position against the opposition of the spring. This flexible member extends from the clutch-mechanism to a suitable guide, or guides, at or near the side of the vehicle, and extends to a position in front of the vehicle and at one side of the starting-crank, where it terminates in a handle of convenient form. With this ar-

range ment the operator grasps the crank-handle in one hand, and at the same time pulls upon the flexible member with the other hand, thereby throwing the crank into operative connection with the engine, which may then be started by turning the crank.

A further object of the invention is to simplify and improve the starting mechanism by combining in the flexible member just described the functions of throwing the clutch mechanism into operation, when the engine is to be started, and of supporting the handle of the crank when the crank is not in use. To this end I provide the flexible member before referred to with a sleeve or other device adapted to be removably secured to the handle of the starting-crank. This sleeve may also constitute the handle, before referred to, for pulling upon the flexible member. By this arrangement I dispense with the sleeve and strap commonly employed for the purpose of connecting the crank-handle with the frame to hold the crank in or near horizontal position when not in use.

A third object of the invention is to protect the operator of the starting-crank against the danger of reverse rotation of the starting-crank due to back-kicking on the part of the engine. To this end I employ a manually-operable device, as before described, for throwing the crank into connection with the engine, and I also connect this manually-operable device with the ignition-mechanism of the engine in such a manner that when the device is operated it acts to shift the time of ignition of the engine into a position of late ignition, at the same time that it throws the crank into operative connection.

In the accompanying drawings: Figure 1 is a plan-view of mechanism embodying the present invention, together with a portion of the automobile in connection with which it is used; and Fig. 2 is a front-elevation, in section on the line 2—2 in Fig. 1, showing, in detail, the bell-crank lever and the parts immediately connected therewith.

In the drawings the invention is shown as applied to an automobile of ordinary construction, only so much of the automobile being shown as is necessary for an understanding of the invention. Fig. 1 shows a portion of the engine with the engine-shaft 4 projecting from the forward end of

the crank-case. The figure shows also a portion of the side frame-member 5 and the front frame-member 6 of the automobile.

The starting-crank 7 is provided with a handle 8, and is provided with an integral crank-shaft 10 journaled, in the usual manner, in a bearing 9 on the front frame-member 6. The crank-shaft is free both to rotate and to slide longitudinally in the bearing 9. Upon the inner end of the crank-shaft is fixed the usual clutch-member 11, which is provided with notches 12 adapted to cooperate with a pin 13. The pin 13 is fixed in the end of the engine-shaft, and constitutes a clutch-member cooperating with the clutch-member 11. The notches 12 are beveled at one side, as illustrated, so that when the engine begins to operate the pin 13 rides automatically out of the notches.

In place of the usual spring for holding the starting crank normally in inoperative position, I employ mechanism comprising a bell-crank lever 14, which is pivoted in a bearing member 15 fixed to the frame-member 6. This bell-crank lever has two laterally-projecting arms, terminating in lugs 16 which enter the groove in the clutch-member 11. A spring 17 is coiled about the pivot 20 of the bell-crank lever, and one end of this spring engages the lever so that the spring acts normally to swing the lever to the right, thereby moving the clutch-member 11 and the crank-shaft forwardly, so as to hold the clutch-members out of engagement. To throw the clutch-members into engagement, the bell-crank lever has a rearwardly-projecting arm 14, which is actuated by means of a flexible member 18 consisting in a suitable cord, cable or chain. This flexible member extends from the bell-crank lever to a tubular guide 19 mounted on the side frame-member 5. From the guide 19 the flexible member passes forwardly to a second guide 21, which is located at the front of the vehicle and at one side of the starting-crank. At the forward end of the flexible member is a manually-operable member or handle 22, by means of which the flexible member may be pulled to operate the clutch-mechanism. The handle 22 is in the form of a sleeve, so that it may be also employed, as shown in Fig. 1, as a holder for the crank when the latter is not in use, the sleeve being slipped over the handle 8 of the crank and holding the crank in substantially horizontal position.

When the engine is to be started the operator removes the sleeve 22 from the crank-handle, holds it in his left hand, and pulls upon the flexible member 18. Through this operation the bell-crank lever is rocked to the left, and the clutch-member 11 is moved rearwardly into engagement with the pin 13. The operator now turns the starting-crank, thereby rotating the engine-shaft and

starting the engine. As soon as the engine is started the operator ceases to pull on the flexible member 18, thereby permitting the clutch-member 11 and the crank to move out of engagement with the engine-shaft, and the sleeve 22 is then slipped on the handle of the crank again. When the engine starts, the forward rotation of its shaft, acting through the pin 13 upon the inclined sides of the notches 12, causes the clutch-member 11 to be thrust forward and the bell-crank lever to be rocked to the right. To prevent a severe pull upon the flexible member at this time, a spring 25 is interposed between the latter and the bell-crank lever. This spring also facilitates the application of the sleeve 22 to the crank handle. The looped end 23 of the flexible member is secured to the spring 25 adjustably, by means of a clamp 24, so that the device may be readily applied to vehicles of different design, and the guides 19 and 21 may be secured in any convenient position upon the side-frame member 5, or upon other parts of the vehicle. In some cases a single guide will suffice in place of the two guides illustrated.

It is essential for the safety of the operator that the time of ignition of the engine be delayed when the engine is started, in order to prevent the possibility of a back-kick on the starting-crank. To insure such delayed ignition, I embody, in connection with the mechanism hereinbefore described, a device for automatically adjusting the ignition-apparatus of the engine, to delay the ignition when the starting-mechanism is employed. As a simple device for accomplishing this purpose, Fig. 1 illustrates a cord or other suitable connection 26, which is secured adjustably, at one end, to the flexible member 18, by means of a clamp 27. The other end of the connection 26 is fixed to the ignition-timer 28 of the engine. This timer is ordinarily controlled, through a connection 29, by the usual manually-operable devices for this purpose, and the flexible connecting-member 26 does not interfere with the normal movements of the timer. When the flexible member 18 is pulled, however, to engage the clutch-members 11 and 13, the connecting-member 26 acts to move the timer to its position of delayed ignition, unless the timer has previously been so moved by means of the connection 29, and it is thus impossible for the timer to be in the position of advanced ignition when the starting-crank is in operative connection with the engine.

It will be apparent that, by locating the guide or guides for the flexible member 18 at the front of the vehicle, and at one side of the starting-crank, the handle 22 is brought to a position where it may be conveniently operated with the left hand, while the right hand is employed in turning the

starting-crank, and the operator may thus use the crank without the usual necessity of pressing against the crank with the knee, or with one hand, when forcing the clutch-members into engagement. By forming the handle 22 as a sleeve adapted to receive the crank-handle 8, I dispense with the usual device for this purpose, comprising a sleeve connected with the side frame-member by a strap, and thus the flexible member and the sleeve 22 perform a double function. This arrangement conduces to the convenience of the operator, since the sleeve 22, when withdrawn from the crank-handle, is retained in the hand while the crank is operated, and thus the manipulation of the mechanism is simplified.

I am aware that arrangements have been previously proposed in which the starting-crank is so connected with the ignition-mechanism of the engine that the operation of pressing the crank rearwardly into connection with the engine-shaft moves the ignition-apparatus to a position of delayed ignition, but the effect of such an arrangement is to further increase the difficulty of so moving the starting-crank, which it is the object of the present invention to avoid, and so far as I am aware it is novel to employ a manually-operable member located conveniently adjacent to, but independent of the starting-crank, and so connected as to perform the double function of adjusting the ignition-mechanism and throwing the starting-crank into operative connection with the engine.

I claim:—

1. In combination with a motor-vehicle provided with an internal-combustion engine and a starting-crank, clutch-mechanism for temporarily connecting the starting-crank with the engine-shaft to start the engine, a spring for holding said mechanism normally in inoperative position, and means for throwing the clutch-mechanism into operation comprising a handle, a flexible member connecting the handle with the clutch-mechanism, and a guide for the flexible member located at the front of the vehicle and at one side of the starting-crank, whereby the handle is arranged in convenient position for manual operation simultaneously with the starting-crank.

2. In combination with a motor-vehicle provided with an internal-combustion engine and a starting-crank, clutch-mechanism for temporarily connecting the starting-

crank with the engine-shaft to start the engine, means for holding said mechanism normally in inoperative position, a flexible member connected with the clutch-mechanism and manually-operable to throw said mechanism into operation, a guide for the flexible member located at the front of the vehicle and at one side of the starting-crank, and means for normally securing the end of the flexible member to the starting-crank to constitute a holder for the crank.

3. In combination with a motor-vehicle provided with an internal-combustion engine and a starting-crank, clutch-mechanism for temporarily connecting the starting-crank with the engine-shaft to start the engine, means for holding the clutch-mechanism normally in inoperative position, a manually-operable member located at the front of the vehicle and at one side of the starting-crank in convenient position to be manually operated simultaneously therewith, and connections between said manually-operable device and said clutch-mechanism and the ignition-apparatus of the engine, whereby said device operates simultaneously to retard the ignition of the engine and to throw the clutch-mechanism into operation.

4. In combination with a motor-vehicle provided with an internal-combustion engine, a starting-crank for the engine movable toward and from the engine-shaft, co-operating clutch-members on the crank and the shaft for operatively connecting the crank and the engine to start the latter, a bell-crank lever connected with the crank and operable to move the crank rearwardly to throw the clutch-members into or out of engagement, a spring connected with one of said parts and operating normally to hold the clutch-members out of engagement, a flexible member connected with the bell-crank lever to move it in opposition to said spring, a guide for the flexible member located at the front of the vehicle and at one side of the starting-crank, and a sleeve fixed to the end of the flexible member to serve both as a handle to pull the latter and as a holder for the crank-handle.

In testimony whereof, I affix my signature in presence of two witnesses.

PERCY W. HODGKINSON.

Witnesses:

D. GURNEE,
L. THON.