July 3, 1928. 1,675,465

F. N. ROEHRICH

LOCKING MECHANISM FOR AUTOMOBILES

Filed Jan. 26, 1927 4 Sheets-Sheet 1

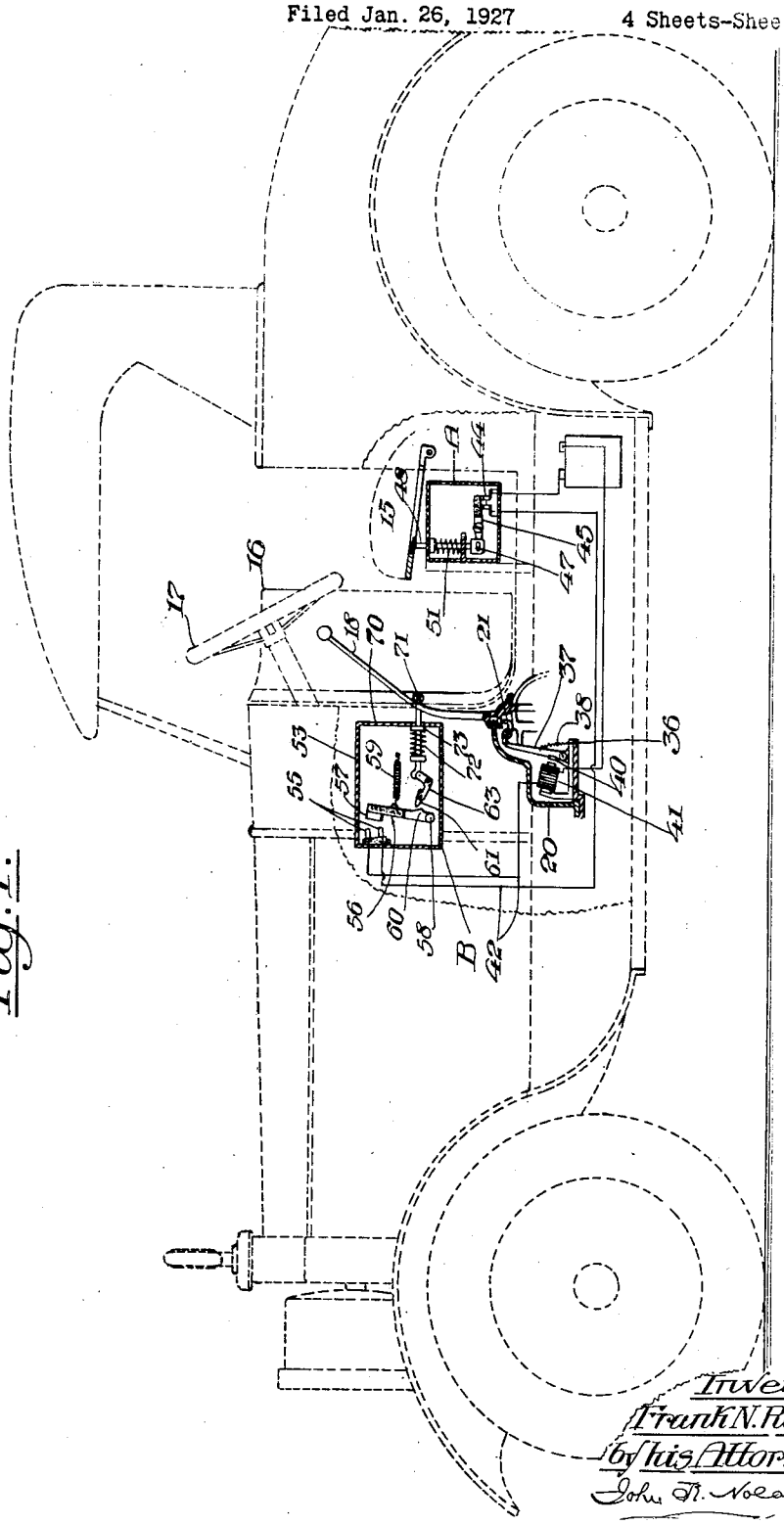


Fig. 1.

Inventor:
Frank N. Roehrich
by his Attorney
John F. Nolan

July 3, 1928. 1,675,465

F. N. ROEHRICH

LOCKING MECHANISM FOR AUTOMOBILES

Filed Jan. 26, 1927 4 Sheets-Sheet 2

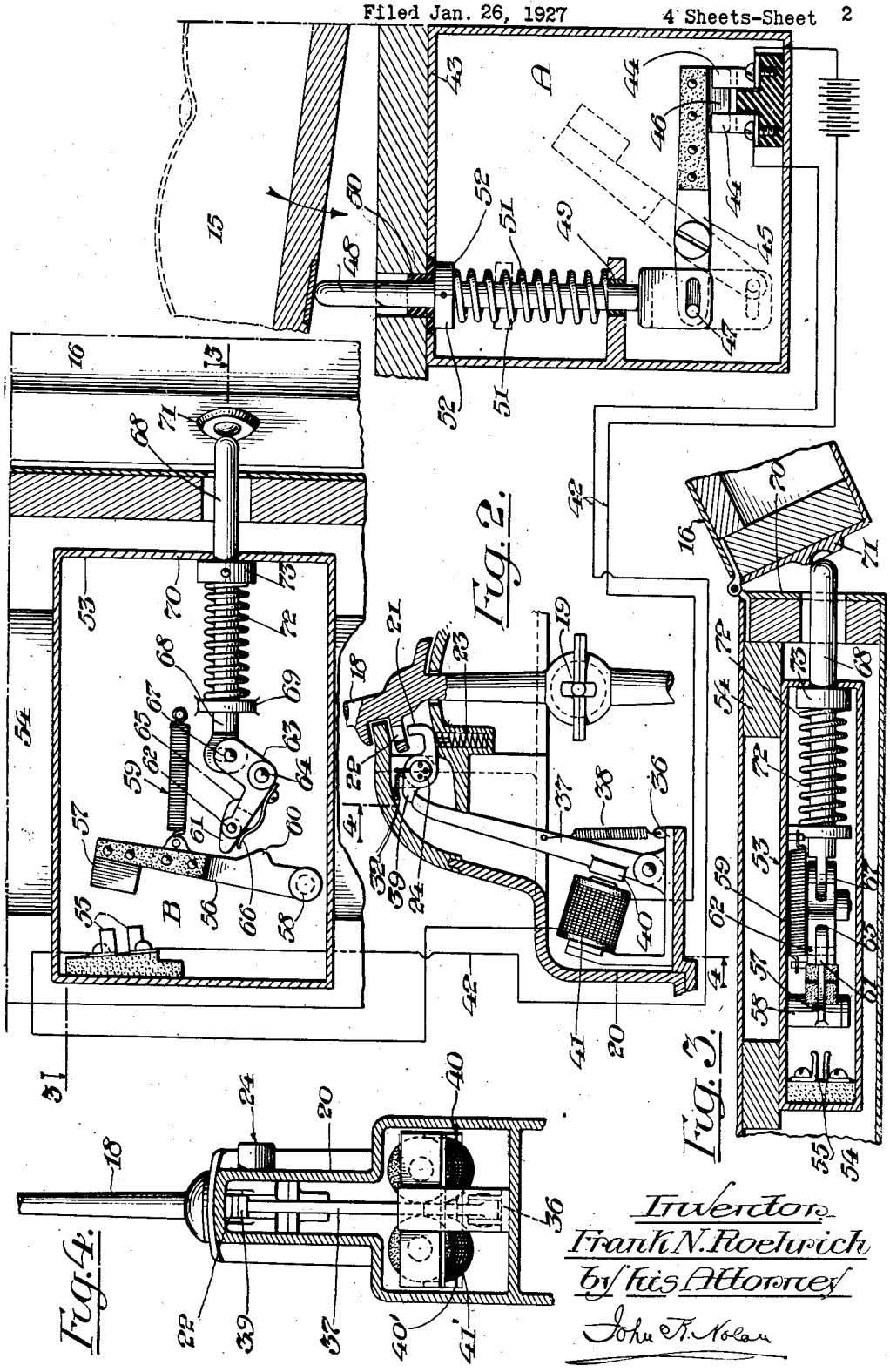


Fig. 2.

Fig. 3.

Fig. 4.

Inventor
Frank N. Roehrich
by his Attorney
John T. Nolan

July 3, 1928. 1,675,465

F. N. ROEHRICH

LOCKING MECHANISM FOR AUTOMOBILES

Filed Jan. 26, 1927 4 Sheets-Sheet 3

Fig. 5.

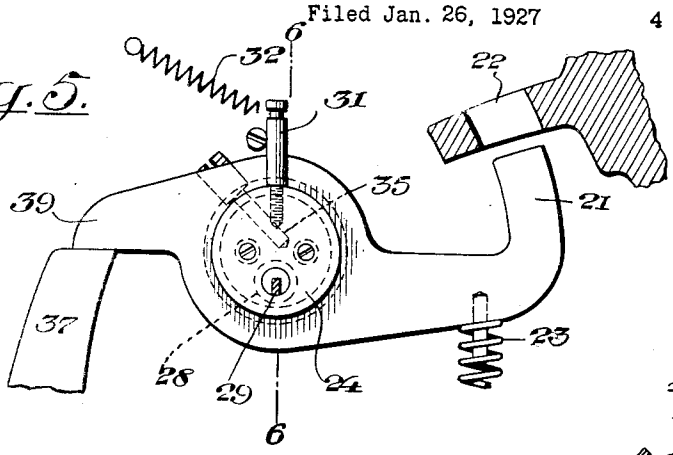


Fig. 7.

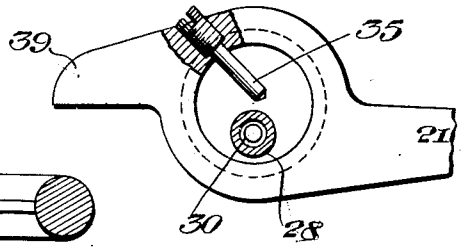


Fig. 8.

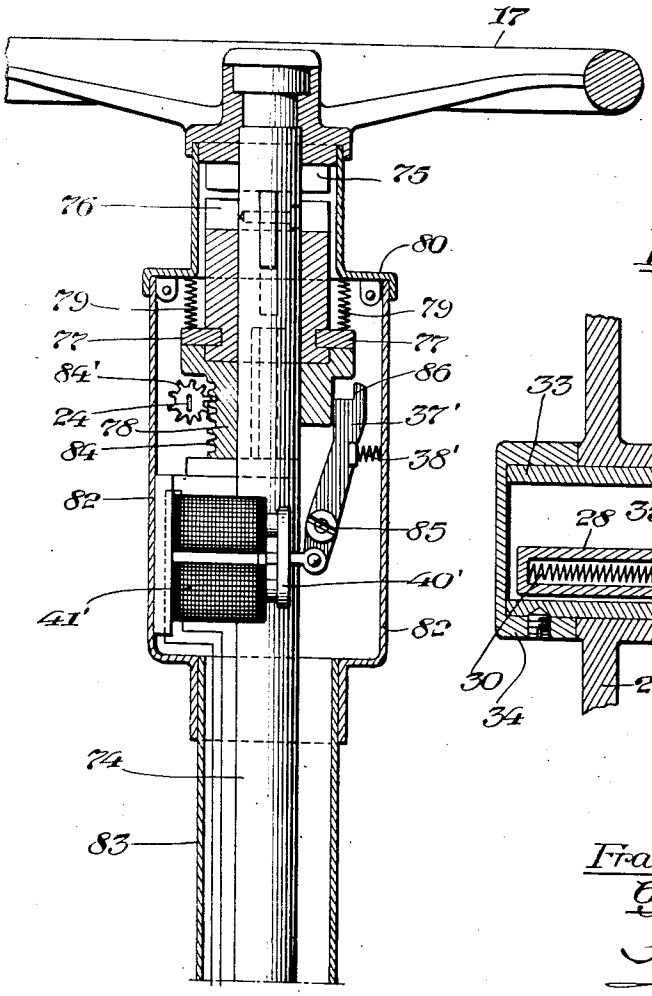
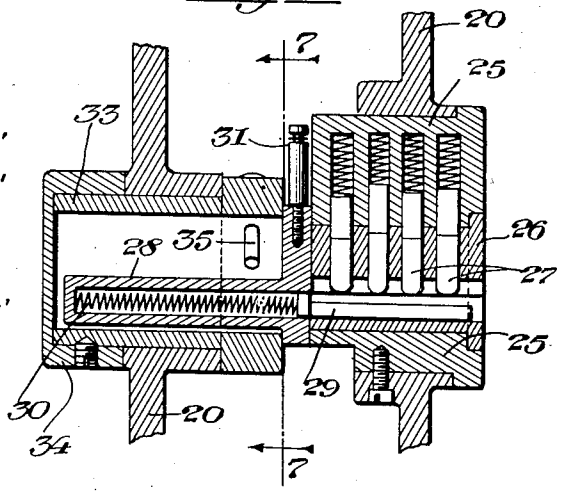


Fig. 6.



Inventor
Frank N. Roehrich
By his Attorney
John F. Nolan

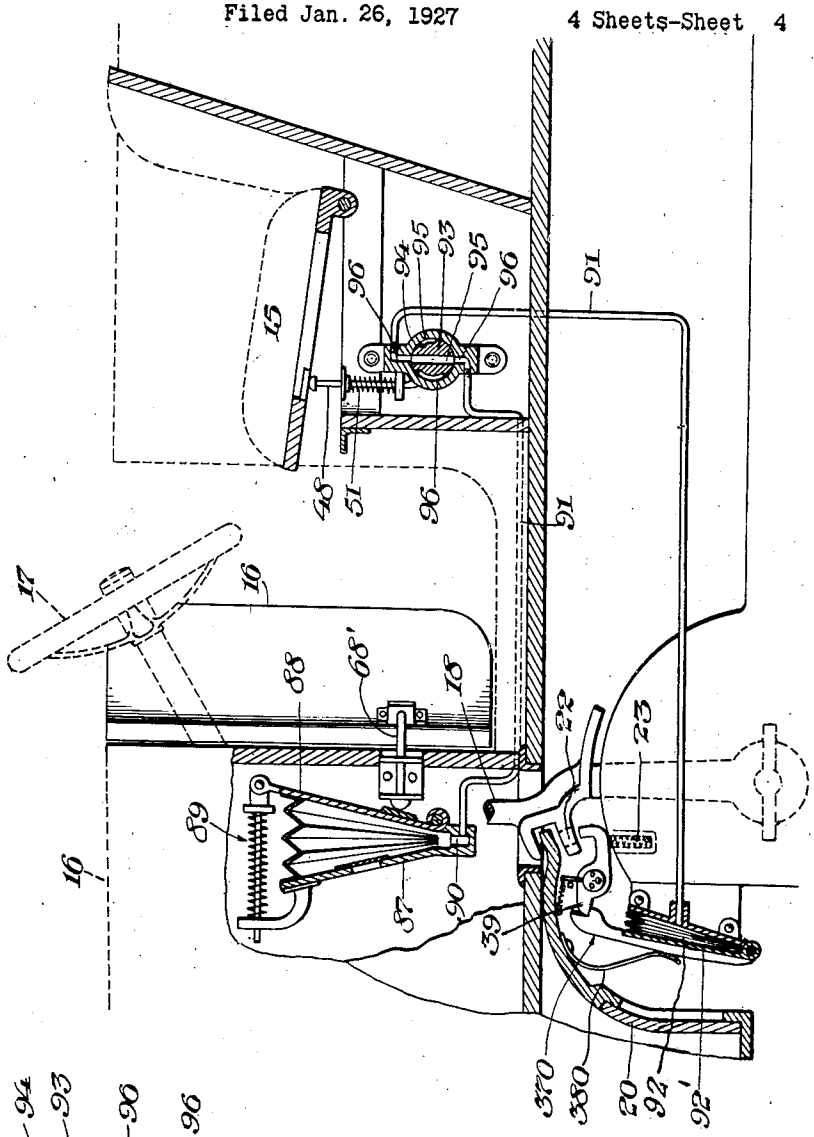
July 3, 1928. 1,675,465

F. N. ROEHRICH

LOCKING MECHANISM FOR AUTOMOBILES

Filed Jan. 26, 1927 4 Sheets-Sheet 4

Fig. 9.



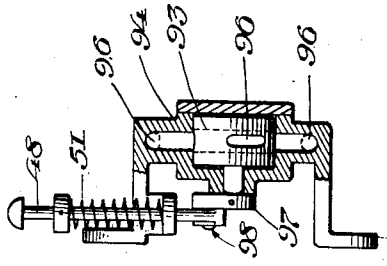


Fig. 11.

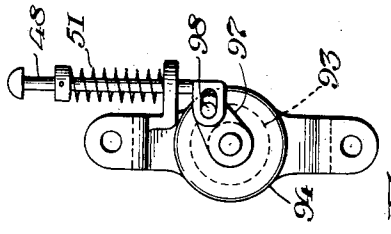


Fig. 10.

Inventor
Frank N. Roehrich
by his Attorney
John F. Nolan

Patented July 3, 1928. 1,675,465

UNITED STATES PATENT OFFICE.

FRANK N. ROEHRICH, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO WILLIAM H. LOUD, OF JERSEY CITY, NEW JERSEY.

LOCKING MECHANISM FOR AUTOMOBILES.

Application filed January 26, 1927. Serial No. 163,643.

This invention relates to locking mechanism for automobiles; its principal object being to provide simple and efficient means whereby an essential control element of a car is automatically rendered inoperative coincidental with the closing of the door after the driver has left his seat, which control element is effectively maintained in inoperative condition until the locking element therefor is released by manual actuation of a suitable key, or other means of exclusive control.

While locking mechanism embodying the principle of my invention is applicable to any operating or controlling instrumentality of a motor car, I prefer to apply it either to the transmission or to the steering mechanism of the machine.

According to the preferred form of my invention the locking action is effected through the medium of an electromagnet which is included in an electric circuit controlled by the joint operation of the seat and door of the car, consequent upon the natural actions of the driver when he is leaving the machine; but, in its broad aspect, my invention comprehends pneumatic or other pressure instrumentalities which are controllable by the joint operation of the seat and door to produce the desired locking effect.

My invention, generally stated, comprises automatically controlled locking mechanism of the character mentioned, embodying novel principles of operation, features of construction and combinations of parts, all of which will be hereinafter described and claimed.

In the drawings—

Figure 1 illustrates, in sectional elevation, a portion of an automobile equipped with electrically-controlled locking mechanism embodying one form of my invention.

Fig. 2 is a section, on a larger scale, through the component parts of the said mechanism.

Fig. 3 is a horizontal section through one side of the body of the car and the door-actuated switch therein, a portion of the partially-open door being indicated, as on the line 3—3 of Fig. 2.

Fig. 4 is a vertical section through the upper part of the transmission housing and the contained elements of the locking mechanism, as on the line 4—4 of Fig. 2.

Fig. 5 is a detail of the lock, the locking lever operable thereby, and adjuncts.

Fig. 6 is a vertical section through the lock and the walls of the transmission housing, as on the line 6—6 of Fig. 5.

Fig. 7 is a cross-section through the hub of the locking lever, as on the line 7—7 of Fig. 6.

Fig. 8 is a vertical section through the upper portion of a steering column, steering shaft and wheel, embodying a modified form of the invention.

Fig. 9 is a sectional elevation of a portion of an automobile equipped with a modified form of the invention wherein pneumatic controlling devices are employed.

Fig. 10 is an elevation of the rotary valve and immediate connections, operable through the medium of the car seat, for determining the operation of the pneumatic control devices.

Fig. 11 is a vertical section of the said valve and its adjuncts.

Referring to Figs. 1 to 8, inclusive, of the drawings, 15 designates a seat of an automobile; 16 the hinged door adjacent the steering wheel 17, and 18 the shift lever for the transmission gearing. This lever, which is fulcrumed, as at 19, in the transmission housing 20, is adapted to be automatically locked in neutral position by means of a suitable locking device embodying the principle of my invention. This device, in the form illustrated, includes a locking lever having a latch arm 21 which is movable into and out of engagement with a suitably-disposed keeper on the shift lever, which keeper, in the present instance, comprises a perforated lug 22 projecting from the shift lever. A spring 23 seated in a socket in the upper part of the housing and bearing against the latch arm of the locking lever, urges the latch arm to raised or locking position. The locking lever is under the influence of a suitable lock 24, such as the Yale type, operable by, in the present instance, means of an appropriate key to swing the latch arm 21 from the keeper against the action of the spring 23, thus releasing the shift lever 18.

The lock construction herein illustrated comprises a cylindrical body 25 which is mounted in one of the up-standing walls of the transmission housing, and is provided with a key-actuated rotatable barrel 26 with which the usual spring-pressed retaining pins 27 engage. The inner end of the barrel

is formed with a tubular extension 28 in alignment with the keyway of the barrel, which keyway contains a longitudinally slidable ejector rod 29 that is movable into and from the extension. A spring 30 confined within the extension presses the rod 29 normally into and lengthwise of the keyway. When the key is entered in the keyway, preparatory to turning the lock barrel, the rod is bodily pushed back into the extension, against the action of the spring 30, and thereafter when the barrel is turned by the key and the key manually released, such spring, expanding, presses the rod sharply forward in a manner to eject the key bodily from the lock, thus obviating any liability of the key's being carelessly left in the lock by the driver of the car. The lock barrel 26 is provided at its inner end with a projecting pin 31 to which and to an adjacent part of the housing is attached a retracting spring 32, which tends automatically to return the barrel to key-receiving position.

The locking lever has a hub 33 which is rotatably seated in a bearing formed in the adjacent wall of the housing, which hub encircles the tubular extension 28 of the lock barrel 26. A cap 34 fast on the outer end of the hub bears against the adjacent wall of the housing and maintains the locking lever in proper relation to the lock barrel. Extending through the wall of the hub and into the path of the extension 28 is a pin 35, against which the extension abuts during its rotation with the lock barrel and thereby moves the pin 35 and the locking lever in a manner to disengage the latch arm of the lever from the keeper 22 of the gear shift lever. (See Figs. 5, 6 and 7.)

Any other approved form of lock under the exclusive control of the driver of the car may be employed.

Pivoted to a bracket 36 within the housing 20 is the lower end of a lever 37 which is normally swung rearward, by means of a suitable spring 38, to position the upper end of the lever under the tail 39 of the locking lever when the latter is disengaged from the keeper 22, thus restraining the locking lever in its released position against the action of the spring 23. This done the shift lever may be manipulated by the operator in the usual manner. This locking lever is provided near its fulcrum with the armature 40 of an electro-magnet 41 supported by the bracket 36 and included in an electric circuit 42 under the control of suitable making and breaking devices comprising switches A, B, which are respectively actuated through the medium of the seat 15 and door 16 of the car, as will be hereinafter explained. If, when the shift lever 18 is unlocked, the magnet be energized by the completion of the electric circuit, the armature, together with the restraining lever 37, will be pulled forward in a manner to free the latter lever from the locking lever and permit the spring 23 to move the locking lever into engaging relation with the keeper 22.

The switch A is preferably arranged within a casing 43 located below the seat. This switch comprises spaced-apart contacts 44 having appropriate terminals for one of the leads of the electric circuit, and comprises also a pivoted lever 45 having on, but insulated from, one arm, a contact blade 46 which, by proper actuation of the switch lever, is movable into or out of engagement with the contacts in a manner to make or break the circuit. The other arm of the switch lever is jointed, as at 47, to the lower end of a vertically movable rod 48 that extends through suitably-disposed guides 49, 50. The upper end of the rod 48 projects above the casing and engages the forward portion of the seat frame, which frame, in the construction illustrated, is hinged at its rear so as to have capacity for vertical movement. A stout spring 51, encircling the rod 48 between the guide 49 and a collar 52 fixed on the rod, tends to maintain the rod, together with the seat, normally raised. When the said rod and seat are thus positioned, the contact blade 46 is engaged with the contacts 44, thereby electrically bridging the gap between the contacts, but when the seat is depressed, by the operator's weight thereon, the rod 48 is also depressed in a manner to rock the lever 45 and lift the contact strip from the contacts 44, thus breaking the circuit between the latter.

The switch B is of the snap or quick make-and-break type. It is preferably arranged within a casing 53 concealed in the hollow side 54 of the car body, adjacent the hinged edge of the door 16. This switch comprises two spaced contacts 55 having suitable terminals for one of the leads of the electrical circuit 42. A switch lever 56 having a contact strip 57 affixed to but insulated from it, is pivoted in the casing 53, at 58, so that, by actuation of the lever, the strip may be moved into or out of engagement with the contacts 55 in a manner to make or break the circuit between such contacts. This lever, which is held normally away from the contacts by means of a spring 59, is provided with a suitably-disposed cam-shaped projection 60, against which is adapted to bear a by-pass pawl 61 pivoted at 62 on one arm of a bell-crank 63 fulcrumed at 64 in the casing 53. The by-pass pawl is provided with a stop lug 65 which is yieldingly held against the adjacent arm of the bell-crank by means of a suitable spring 66. The other arm of the bell-crank is jointed, as at 67, to the inner end of a horizontal sliding rod 68 which passes through guides 69, 70 in the casing, and also projects through the jamb at the hinged portion of

the door so as to be opposed and held by a socket piece 71 on the latter when the door is closed. A spring 72 encircling the rod between the guide 69 and a collar 73 fixed on the rod tends to press the rod normally outward toward the door. The co-operative relation of the parts just described is such that when the car door is swung open the spring 72 presses the rod 68 sufficiently rearward to maintain the bell-crank 63 with its by-pass pawl 61 away from the switch lever 56 and above the cam projection 60. Hence the switch lever occupies its normal or outward position and the electric circuit is broken between the contacts 55. When the door is closed the socket piece 71 bears against the opposing end of the rod 68 and pushes the latter forwardly against the action of the spring 72, thereby partially turning the bell-crank and swinging the pawl 61 downward. In its descent the acting end of the pawl bears against the cam projection 60, thus swinging the switch lever forward and completing the circuit between the contacts 55. The instant the pawl 61 passes below the cam projection, the switch lever 56 is snapped back by the action of the spring 59, thereby breaking the circuit between the contacts 55. When the door of the car is again opened the rod 68 is urged outward by the spring 72 and the bell-crank 63 is partially turned to swing the pawl upward, which pawl rides idly against and past the cam projection and assumes its original position for re-engagement with such projection when the door is again closed.

Assuming a car equipped with my novel locking mechanism has been driven to a parking location and stopped, the transmission is automatically locked as follows: When, preparatory to leaving the car, the operator rises from his seat at the steering wheel, such seat, together with the rod 48, is raised by the expansion of the spring 51, thereby actuating the switch lever 45 and effecting the engagement of the contact blade with the contacts 44, thus closing the electric circuit between the latter. The operator next opens the door 16, thus swinging the socket piece 71 outward, and permitting the spring 72 to retract the rod 68 and rock the bell-crank in a manner to position the pawl 61 above the cam projection 60 and forwardly of the switch lever 56. Upon the closing of the door, the socket piece 71 presses the rod 68 forward, thus rocking the bell-crank in a manner to force the pawl 61 against and below the cam projection 60, the switch lever 56 thus being successively swung forward against, and sharply retracted by the action of the spring 72. In the forward movement of the switch lever 56 the contact blade thereof closes the circuit between the contacts 55, thereby, since the circuit is closed between the contacts 44 of the seat-controlled switch A, completing the electric circuit in which the electro-magnet is included. The quick retraction of the switch lever 56 when the pawl 61 in its down stroke escapes the cam projection, breaks the circuit. The instant the circuit is completed the magnet 41 is energized, thereby withdrawing the restraining lever 37 from the locking lever and permitting the latter to engage the keeper 22, thus locking the gear shift lever, as previously explained. Thereafter the opening or the closing of the door, or the vertical movement of the seat, has no effect on the operation of the locking lever; and consequently the latter must be released by actuation of the lock by means of a suitable key.

By controlling the electric circuit through the joint operation of the seat and door, as hereinbefore described, there is no liability of the accidental locking of the transmission by the opening and closing of the door while the operator is on his seat at the steering wheel; nor by the operator's rising from his seat while the door is closed. If the operator wishes temporarily to leave the car with the transmission unlocked, he has merely to leave the car door open; but if he desires to lock the transmission it is incumbent upon him to rise from his seat and then open and close the door, the closing of the door being effected after he has stepped from the car; or, if desired, while he is in the car.

If desired the electric circuit may include two switches under the operation of both side doors of the car, so that the locking will be effected by the act of opening and closing either door after the operator has left his seat.

In Fig. 8 I have illustrated a form of steering wheel lock operable by electric control devices embodying my invention. In this modification, the steering wheel 17 is adapted to be connected to or disconnected from the steering shaft 74 by a jaw clutch, comprising two complemental jaw members 75, 76. The member 75 is integral with the hub of the hand wheel and the member 76 is slidably mounted, but rotatable with, the steering shaft, by means, for example, of a key or feather connection, so as to permit its engagement with or disengagement from the clutch member 75, as desired. The clutch member 76 is connected by means of a coupling ring 77 to a sliding collar 78 on the steering shaft, which collar is normally depressed by springs 79 interposed between the ring 77 and the shouldered upper portion 80 of a stationary cylindrical casing 82 formed at the upper end of the steering column 83. The clutch member 76 and its adjuncts constitute, in effect, a locking element. When the collar 78 is depressed by the force of the springs 79, the clutch members are disengaged, and the steering wheel

is therefore freely rotatable independently of the steering shaft. In the present instance, the collar 78 is provided with lateral rack teeth 84 with which meshes a pinion 84′ on the barrel of a key-operated lock 24 mounted in the casing 82, which pinion, by the operation of the lock, raises the collar in a manner to effect the interlocking of the complemental clutch members, in order operatively to connect the steering wheel to the shaft. The clutch collar 78 is restrained in raised or locking position against the action of the springs 79, by means of a lever 37′ which is fulcrumed at 85, within the casing 82 of the steering column. This restraining lever is provided at its upper end with a latch head 86 which is automatically projected into engagement with the lower end of the clutch collar 78 when the latter is raised; such lever being moved to restraining position by means of a suitably-disposed spring 38′. The lower arm of the restraining lever is provided with the armature 40′ of an electro-magnet 41′ which is supported in the casing 82, and is included in an electric circuit having making and breaking devices under the control of the seat and door of the car as in the first described construction. When the electric circuit is completed by the automatic raising of the seat and the act of opening and closing the door, the magnet is energized, and the restraining lever, by the attraction of the armature, is swung in a direction to free the clutch collar 78, thereby permitting the disengagement of the complemental clutch jaws.

In Figs. 9, 10 and 11, I have shown a modification of my invention wherein pneumatic, instead of electrical, devices are actuated by the joint operation of the seat and door, in a manner to effect the automatic locking of the shift lever of the transmission gearing. In the particular construction illustrated a bellows 87 is arranged in the side wall of the body of the car adjacent the hinged portion of the door, the movable leaf 88 of the bellows being maintained normally open by means of a suitably-disposed spring 89. A sliding rod 68′ is interposed between the leaf 88 and the hinged edge of the door, which rod when the door is closed forces the opposing leaf forward in a manner to express the confined air from the outlet 90 of the bellows. When the car door is opened the leaf 88 resumes its open position, thus recharging the air chamber of the bellows and projecting the outer end of the rod 68′ beyond the door jamb. The bellows nozzle or outlet 90 is in communication with a tube 91 leading to a secondary bellows structure 92 located within the transmission housing 20, the movable leaf 92′ of the latter bellows being attached to the restraining lever 370 for the tail 39 of the locking lever when the latter is in unlocking position. The leaf 92′ is held normally in closing position by a suitable spring 380. The passage of the tube 91 between the two bellows is interrupted by a rotary valve 93 mounted in a casing 94 conveniently located below the hinged car seat 15, which valve and its casing have appropriate co-operating ports 95, 96, respectively, whereby communication between the two bellows can be interrupted or established by properly setting the valve. The valve is provided at one end with a crank 97 which is jointed at 98 to the lower end of the spring pressed rod 48 that bears against the seat frame and maintains the latter normally raised. When the seat is in raised position the valve establishes communication between the two bellows, as seen in Fig. 9. If then the door of the car be opened the restraining lever will remain in engagement with the locking lever to maintain the latter in unlocking position; but if the door be closed it will press the rod 68′ forward in a manner to close the bellows 87 and drive the contained air, under pressure, through the tube 91 into the bellows structure 92; thereby opening the latter and perforce releasing the locking lever, which latter lever coincidentally engages the keeper 22 on the gear shift lever. The locking lever is actuated to unlock the shift lever as in the first described construction. When the seat and the rod 48 are depressed by the weight of the driver, the valve 93 is partially turned through the rod and crank connections indicated in order to interrupt the communication between the bellows 87, 92. Hence the door may be opened or closed without affecting the locking position of the locking lever; but if such seat be unoccupied communication between the two bellows is established, and the act of opening and closing the door effects the transmission of air under pressure to the bellows 92, as hereinbefore mentioned.

From the foregoing it will be seen that my invention is characterized by the provision of instrumentalities which automatically effect the locking, or the unlocking, of a control element of an automobile coincidental with the closing of a door of the car, which instrumentalities must be returned to a definite position by the manipulation of a lock exclusively controllable by the operator preparatory to the driving of the car.

It is to be understood that my invention is not limited to the particular exemplifying forms or constructions of mechanisms herein disclosed, as the same may be variously modified within the principle of the invention and the scope of the appended claims.

I claim—

1. In motor vehicle locking mechanism, the combination of a locking member movable into locking and unlocking positions, means for urging said member normally to one posi-

tion, a lock effective by key actuation to move said member to the other position, a restraining element operable to engage the said member and hold it in such second position, an electric circuit, including an electro-magnet which, when energized, moves said restraining element to releasing position, switches included in said circuit, one of said switches being open when the seat is occupied and being closed when the seat is unoccupied, and the other switch being a quick make-and-break switch which is operated when the door is opened and closed, motion transmitting devices between the first-named switch and the seat, and motion transmitting devices between the other switch and the door, whereby when the seat is unoccupied and the door is opened and closed the circuit is momentarily completed by the joint action of the switches, thus energizing the electro-magnet.

2. In motor vehicle locking mechanism, the combination with an element adapted to be locked and unlocked, of a key operated lock, a locking member normally urged in locking relation to said element, but movable to unlocking position by key actuation of the lock, a restraining member operable to engage the locking member and hold it in unlocked position, an electric circuit, including an electro-magnet which, when energized, moves said restraining member to releasing position, switches included in said circuit, and operative connections between the said switches and the seat and a door respectively of the vehicle, whereby when said seat is unoccupied and the door is opened and closed the circuit is completed by the switches, thus energizing the electro-magnet.

3. In motor vehicle locking mechanism, the combination with an element adapted to be locked and unlocked, of a key operated lock, a locking member normally urged in locking relation to said element, but movable to unlocking position by key actuation of the lock, a restraining member operable to engage the locking member and hold it in unlocked position, an electric circuit, including an electro-magnet which, when energized, moves said restraining member to releasing position, switches included in said circuit, one of said switches being open when the seat is occupied and being closed when the seat is unoccupied, and the other switch being a quick make-and-break switch which is operated when the door is opened and closed, motion transmitting devices between the first-named switch and the seat, and motion transmitting devices between the other switch and the door, whereby when the seat is unoccupied and the door is opened and closed the circuit is momentarily completed by the joint action of the switches, thus energizing the electro-magnet.

4. In motor vehicle locking mechanism including a vertically-movable normally-raised seat, a hinged door, and an operating element adapted to be locked and unlocked, the combination of a key operated lock, a locking member normally urged in locking relation to said element, but movable to unlocking position by key actuation of the lock, a restraining member operable to engage the locking member and hold it in unlocked position, an electric circuit, including an electro-magnet which, when energized, moves said restraining member to releasing position, plural switches for said circuit, means between one of said switches and the seat normally operative to raise the seat and close the said switch, and means whereby another switch is operated to make and break the circuit by the act of closing the door.

5. In motor vehicle locking mechanism including a vertically-movable normally-raised seat, a hinged door, and an operating element adapted to be locked and unlocked, the combination of a key operated lock, a member normally urged in locking relation to said element, but movable to unlocking position by key actuation of the lock, a restraining member operable to engage the locking member and hold it in unlocked position, an electric circuit, including an electro-magnet which, when energized, moves said restraining member to releasing position, plural switches for said circuit, one switch being arranged beneath the said seat and normally closed and the other being a quick make-and-break switch arranged in the side of the car adjacent the said door, means between the first-named switch and the seat for normally raising the seat and closing the adjacent switch, and an operating member for the other switch adapted to be actuated to make-and-break the circuit by the act of closing the said door.

6. In motor vehicle locking mechanism, the combination with an element adapted to be locked and unlocked, of a lock, a locking member normally urged in locking relation to said element but movable to unlocking position by the operation of the lock, a restraining member operable to engage the said locking member and hold it in unlocked position, and means, including connections under the joint control of the seat and a door of the vehicle, for releasably actuating said restraining member when the seat is unoccupied and the door is opened and closed.

7. In motor vehicle locking mechanism, the combination with an element adapted to be locked and unlocked, of a lock, a locking member normally urged in locking relation to said element but movable to unlocking position by the operation of the lock, a restraining member operable to engage the locking member and hold it in unlocked po-

sition, an electric circuit, including an electro-magnet to move said restraining member to releasing position, plural switches for said circuit, means between one of said switches and the seat normally operative to raise the seat and close the said switch, and means whereby another switch is operated to make and break the circuit by the act of closing the door.

8. In motor vehicle locking mechanism, the combination of a locking member movable into locking and unlocking positions, means for urging said member normally to one position, a lock to move said member to the other position, a restraining element operable to engage the said member and hold it in such second position, and means, including connections under the joint control of the seat and a door of the vehicle, for releasably actuating said restraining element when the seat is unoccupied and the door is opened and closed.

9. In motor vehicle locking mechanism. the combination of a locking member movable into locking and unlocking positions, means for urging said member normally to one position, a lock to move said member to the other position, a restraining element operative to engage the said member and hold it in such second position, an electric circuit, including an electro-magnet to move said restraining element to releasing position, switches included in said circuit, and operative connections between the said switches and the seat and a door, respectively, of the vehicle, whereby when such seat is unoccupied and the door is opened and closed the circuit is completed by the switches and the electro-magnet is energized.

Signed at Jersey City in the county of Hudson and State of New Jersey this 29th day of December, A. D. 1926.

FRANK N. ROEHRICH.