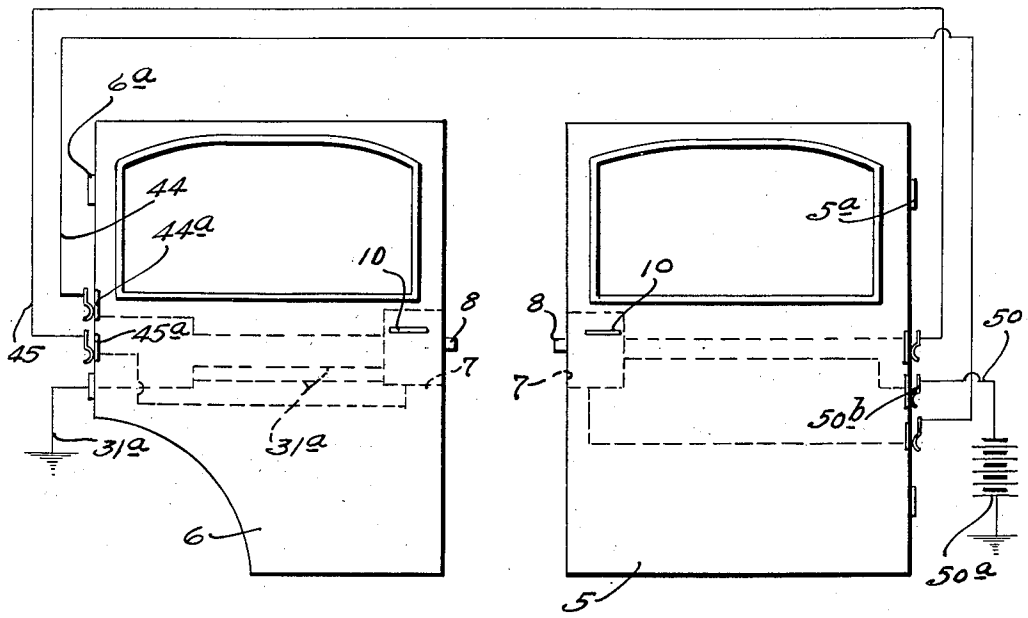
March 14, 1933. C. J. ULRICH 1,901,541

DOORLOCK ACTUATING MECHANISM

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Fig. 1



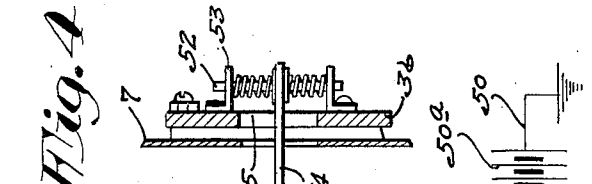
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March 14, 1933. C. J. ULRICH 1,901,541

DOORLOCK ACTUATING MECHANISM

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Fig. 4



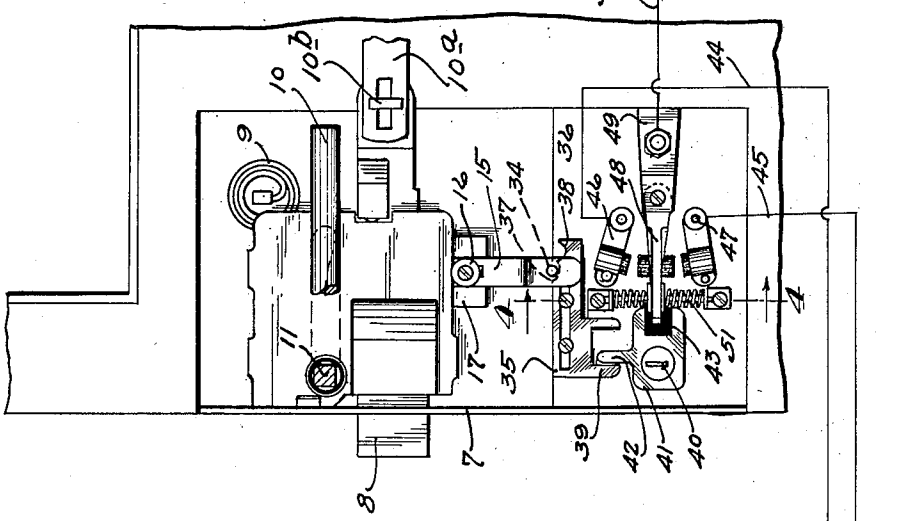


Fig. 2

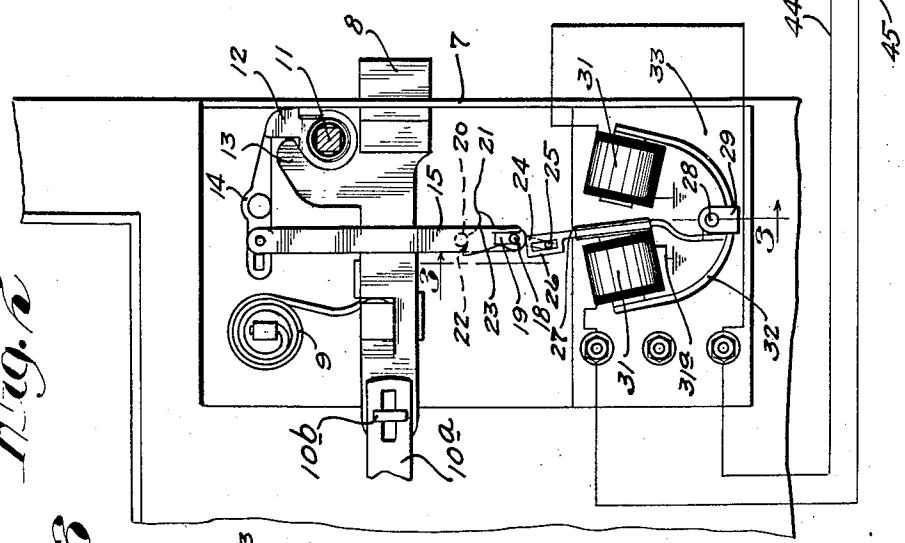
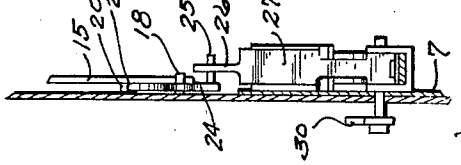


Fig. 3



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Patented Mar. 14, 1933 1,901,541

UNITED STATES PATENT OFFICE

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DOORLOCK ACTUATING MECHANISM

Application filed August 1, 1929. Serial No. 382,640.

My present invention is in the nature of an improvement on or refinement of the door lock actuating mechanism disclosed and broadly claimed in my co-pending application, S. N. 330,810, filed January 9, 1929 and under title above indicated. The present mechanism, like that of my prior application, is especially designed and particularly adapted for application to automobile doors, but is capable of a wider range of application.

Generally stated, the invention consists of the novel devices, combinations of devices and arrangement of parts hereinafter described and defined in the claims.

The accompanying drawings illustrate partly in full elevation and partly in diagram, a preferred manner of applying the actuating mechanism to an automobile having a closed body with a plurality of doors.

Referring to the drawings, wherein like characters indicate like parts throughout the several views:—

Fig. 1 is a diagrammatic view in elevation showing two doors, to wit; one front and one rear door of an automobile having a closed body and which is assumed to have four doors, two of which are not shown;

Fig. 2 is a view partly in elevation and partly in diagram and with some parts removed and some parts broken away, showing the locks and lock-actuating mechanism for the two doors illustrated in Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 2; and

Fig. 4 is a section taken on the line 4—4 of Fig. 2.

The front door is indicated by the numeral 5 and the rear door by the numeral 6. These doors are assumed to be connected to the automobile body by the customary hinges 5^a and 6^a, respectively. The door locks may be of any suitable construction but, as shown, are of standard construction except as slightly modified for the application of the present invention. The locks proper for the several doors are preferably of the same construction. Said locks are mounted in the customary metallic lock casings 7 properly set into the respective doors and provided with sliding lock bolts 8 which, when projected, will engage the customary lock detents in the door jambs, not shown. Preferably, these lock bolts have the customary beveled outer ends for automatically latching the doors, and they are spring pressed outward by suitable springs 9. The bolts are arranged to be retracted from the outer side of the door by suitable outside handles 10, shown partly in full and partly broken away in Fig. 2. These handles which may be of any suitable form are secured to the outer ends of angular shanks 11 that extend into the locks and are arranged to oscillate short bolt-retracting arms or lugs 12 that are engageable with lugs 13 on the respective bolts.

Pivotally mounted in the lock casings 7 are lock detents in the form of pivoted dogs 14, the free ends of which are adapted to be set as shown in Fig. 2 to lock the bolt-retracting lugs 12 in inoperative positions. The short ends of the dogs 14 are connected to the upper ends of operating links 15. The lower portion of the link 15 of what may be called the "last exit" door and which would usually be the front right-hand door of the automobile, is shown as provided with a roller 16 that works between guide flanges 17 on the interior of the lock casing to hold the lower end of said link for substantially vertical movements.

The lower ends of the links 15 of all of the door locks except that of the front right-hand door are connected for vertical movements by studs 18 that project inward from the backs of the lock casing and are passed through slots 19 in the lower ends of said links, and the said links above their slots 19 are provided with cam-actuated studs or projections 20. Mounted to oscillate on the studs 18 are rocker cams 21 that are provided with upper cam ledges 22 and lower cam ledges 23. Also the cams 21 are provided with short depending arms 24 that have laterally projecting studs 25. The studs 25 work in the slotted upper end extension 26 of an armature 27, the lower end of which armature is secured to a short shaft 28, as shown, journaled in a bearing bracket 29 secured in the respective lock case. The shafts 28 project at the inner side of the locks and are provided

with hand pieces 30 by means of which under certain conditions, the armature can be oscillated mechanically.

For oscillating the armature 27 electrically, there is provided a pair of opposing electro-magnets 31 that are preferably but not necessarily wound so that their adjacent or opposing poles will have the same polarity, to wit: either both positive or both negative when said electro-magnets are energized. As a highly important feature, the cores of these two magnets 31 are connected to the opposite extremities of a bent or substantially U-shaped core extension bar 32 which, as shown, is anchored to the fixed bracket 29. The armature 27 is thus mounted to oscillate between the opposing poles of the two electro-magnets but as will hereinafter appear, said magnets will never both be energized at the same time.

At the inner sides of the doors there are customary end side handles, not shown, but which would be connected to operate upon links 10*a* attached by slot and pin connections 10*b* to the inner ends of the lock bolts 8. By operating these end side handles through the links 10*a*, the lock bolts can be retracted at any time from within the car body.

Here it may be noted that the electro-magnets 31, supporting bracket 29 and certain other parts are directly mounted on a panel 33 of insulating material, such as vulcanized wood fiber which is rigidly secured in a respective lock case.

For convenience and definiteness, the lock for the front right-hand door may be treated as the primary lock and the locks of the other doors as the secondary locks. Referring again to what we have now designated as the primary lock, it will be noted that the lower end of its link 15 is provided with a laterally offset pin or lug 34 that rides on an actuating cam 35 slidably mounted on a panel 36 of insulating material such as vulcanized wood fiber secured in the case of the primary lock. Here it should also be noted that this cam member 35 near one end has upper and lower cam ledges 37 and 38 for direct connection on the stud 34. Also cam member 35 has depending spaced lugs 39. The numeral 40 indicates the tumbler of an ordinary key-actuated tumbler lock, the casing of which is not shown but which would be suitably secured within the casing 7 of the primary lock proper. Such a tumbler, of course, is adapted to be oscillated only when the proper key is used and, of course, it must be accessible for application of the key from the outer side of the door, assumed to be the front right-hand door. This tumbler 40 is secured to and is arranged to oscillate an actuating plate or member 41 which has an upstanding tappet-acting lug 42 and a notch filled with an insulating block 43.

The term "tumbler" applied to the oscillatory member 40 is used in a liberal sense to include any lock member that directly or indirectly is arranged to be moved by a key applied to the lock from the outer side of the door.

For alternately energizing the electro-magnets 31, a divided electric circuit 44—45 is extended from spaced switch contacts 46 and 47 mounted on the insulating panel 36. The leads 44 and 45 are connected, respectively, to the right and left-hand electro-magnets 31 and both of said magnets are grounded through leads 31^a. The contacts 46 and 47 co-operate with a third and movable contact 48 that is pivotally connected to a metallic bracket 49 secured on the panel board 36, but connected to the ground through a battery 50^a by means of a lead 50, which may be assumed to be the customary automobile battery, but which might be of any other suitable source of current. The free end of the movable contact 48 is seated in a notch formed in the insulating block 43 of the tumbler actuated rocker or member 41. Said contact 48 is normally yieldingly held in an intermediate position by light opposing springs 51 suitably anchored to the panel board 36 and suitably connected to said movable contact 48. As shown, the opposing springs 51 surround a retaining bolt 52 and react against lugs 53 on panel board 36.

As shown, the contact 48 which constitutes the movable member of a two-way switch is provided with a laterally projecting finger or hand-piece 54 that works through coincident slots 55 in the back panel board 36 and in the inside plate of the lock casing 7. Preferably, the leads 44, 45 and 50 instead of being continuous are arranged to be closed only when the respective doors are closed and to be broken when said doors are opened and as shown, this is accomplished by interposed pairs of contacts 44^a, 45^a and 50^b, respectively, in said leads with the said contacts arranged to be pressed at the hinged edges of the doors and arranged to be brought into contact only when the said doors are closed.

Operation

The operation of the lock and lock-actuating mechanism above described is substantially as follows: In the position of the parts shown in Fig. 2, the link 15 of the primary lock is raised by the cam member 35 and the links 15 of the other door locks are raised by the cam-acting rocker 21 and hence the lock dogs 14 are positioned to lock the bolt-retracting lugs 12 against bolt-releasing movement so that at such time no one of the doors can be opened by a manipulation of its outside handle 10. At such time, therefore, no door can be unlocked from the outside of the car except by the proper key inserted into the tumbler 40 of the primary lock. When the proper key is inserted into the tumbler it may be oscillated in a counter-

clockwise direction in respect to Fig. 2, thereby causing tappet lug 42 to move cam member 45 toward the left far enough to carry the upper ledge 37 out from under pin 34 and pinning ledge 38 under said pin so that link 15 will then drop by gravity and move lock dog 14 of primary lock into position to release bolt-retracting lug 12 so that the bolt of primary door may be then retracted and that door opened by a manipulation of its outside handle 10.

The above described oscillation of the tumbler 40 and its flange or plate 41 in addition to releasing the bolt of the primary lock, performs another highly important function, to wit: by electro-magnetic action, it causes the lock bolts of all of the other or secondary door locks to be released approximately simultaneously with the release of the lock bolt and primary bolt. This secondary releasing action discussed in detail is as follows:

The above noted oscillation of the tumbler 40 in a counter-clockwise direction, will move contact 48 into engagement with contact 46, thereby closing the circuit through lead 34 and right-hand magnet 31.

It will be assumed that the right-hand magnet 31 is so wound that when energized, its pole exposed for action on armature 27 will be positive in which event the negative pole of said magnet will be extended to armature 27 and to the inner pole of the core of left-hand magnet 31. Under this electrical energization, right-hand magnet 31 attracts armature 27 and the energized pole of left-hand magnet 31 repels said armature, thereby causing the armature to oscillate toward the right or toward the right-hand magnet. The above noted movement of the armature 27 toward the right, of course, takes place simultaneously in all of the secondary locks and such movements of the armatures causes the rocker cams 21 to so oscillate as to carry their upper ledges 22 out from under pins 20 and lower ledges 23 under said pins, thus permitting the links 15 to drop and move the corresponding retaining dogs 14 into positions to release the bolt-retracting lugs 15 of the several secondary locks so that the doors of these secondary locks may be then readily opened by manipulation of their outside handles 10.

Movement of the cam member 35 of the primary lock from its left-hand lock-releasing position just above described back into its lock-setting position shown in Fig. 2 is accomplished by giving tumbler 40 and flange 41 an oscillatory movement in a clockwise direction in respect to Fig. 2. When switch member 48 is moved into engagement with one of the contacts 46 or 47 to close the actuating circuits to the several secondary locks, the circuits will remain closed only during the short interval that said switch member is held in its moved position in the one instance by the key applied from the outside of the door, or in the other instance, by hand pressure on the handle or finger-piece 54. Obviously, as soon as pressure is removed from the key or from the side finger-piece 54, the springs 51 will instantly restore said switch member 48 to its normal circuit opening position. The short interval of closing of circuits is sufficient to energize one magnet 31 or the other and to cause either the locking or releasing of the outside handles of the secondary locks.

By the above noted oscillatory movements of flange 41 and contact 48, cam member 45 is mechanically and positively moved into position to raise co-operating link 15 and set lock dog 14 in position to lock lug 12 and outside handle against lock-bolt-releasing movement and the lock dogs of all of the secondary locks are simultaneously set in their corresponding locking positions by an electro-magnetic action caused by engagement of contact 48 with contact 47. This closes the circuit from battery through wire 45 and left-hand magnet 31 so that the armatures 27 of all of the secondary locks are thrown back to the positions shown in Fig. 2 and in which positions the cams 21 are moved and caused to raise the corresponding links and set the co-operating lock dogs 14 to intercept lock-bolt-releasing movements of lugs 12. Here it will be noted, however, that the setting of the lock dogs, as described, does not prevent the lock bolts from being forced back into inoperative positions by a camming action produced against the beveled ends thereof.

From this, it follows that the operator from his seat, by depressing contact 48 as just described, can set the actuating mechanism to all of the locks including the primary lock in locking condition without the use of his key providing the doors are all closed at the time of depression of said contact 48. If the operator should, by depression of contact 48 set the actuating mechanism of the several locks in locking conditions and should then, before leaving the car, change his mind, he could set all of the actuating mechanism back in releasing position simply by pressing the contact 48 upward into engagement with contact 46.

Under both directions of oscillation of flange 41 and tumbler 40, the operations of the setting and releasing cam 35 is purely mechanical while the setting and releasing of the actuating mechanisms of secondary locks is electro-magnetic. If for any reason, the electro-magnetic actuating devices should become inoperative in any secondary lock, the armature 27 thereof, by pressing on finger or hand-piece 30 from the inside of the car, can be mechanically forced from the position shown in Fig. 2 toward the right

and into a releasing position which will release the bolt-retracting lug 12 for manipulation by the outside handle.

The major operations of the invention hereinafter described may be summarized as follows:

All doors are locked against opening from the outside simultaneously from one control point.

All doors are unlocked simultaneously from one central point so they may be opened from the outside.

All locks may be opened from the inside at all times.

All but one of the door locks are operated electrically, the door lock containing the control being operated mechanically.

Control may be operated from the inside of the car without a key, but can be operated from the outside only by means of a key.

Electrically operated locking levers may be operated manually on the inside of the car without interfering with the electric operation.

Locking and unlocking of the exit door is done mechanically by the operation of the control switch, and in unison with the other locks.

From what has been said, it will be understood that the device described is capable of various modifications all within the scope of the invention as herein disclosed and broadly claimed.

What I claim is:

1. A plurality of door locks having outside and inside operating handles, lock dogs operative when set to hold said outside handles against lock releasing movements, key-controlled means operative manually from the outer side of one of said locks to mechanically retract the lock dog of that lock, and electrically actuated means controlled by said key-actuated lock to automatically retract the lock dogs of the other of said locks substantially simultaneously with the lock dog with the key-actuated lock.

2. A plurality of door locks having outside and inside operating handles, lock dogs operative when set to hold said outside handles against lock releasing movements, key-controlled means operative manually from the outer side of one of said locks to mechanically retract the lock dog of that lock, and electrically actuated means controlled by said key-actuated lock to automatically retract the lock dogs of the other of said locks substantially simultaneously with the lock dog with the key-actuated lock, the bolt-actuating members of said locks being of the self-locking type under door-closing movements.

3. The combination with a plurality of door locks, one of which serves as a primary lock and the others of which serve as secondary locks, of means including a common controller operative from the inner side of the door-enclosed structure, and operative to secure the lock-actuating mechanisms in the several locks against lock-releasing movement, and key-actuated mechanism operative from the exterior of the door-enclosed structure to release the lock-releasing mechanisms of the several locks for door-opening movements.

4. A plurality of door locks having retractable lock bolts, outside operating handles having lock-bolt-retracting tappets, lock dogs for securing said outside handles and tappets against bolt-retracting movements, one of said locks having mechanical key-actuated means for moving said dog to a retracted position and having also an electrical key-actuated switch, the other locks including opposed electro-magnets, an armature arranged to be alternately oscillated by said magnets, a mechanical armature actuated connection for moving said lock dog to and from operative positions, and a divided circuit connecting said electro-magnets to said key-actuated switch substantially as described.

5. In a lock, the combination with a retractable lock bolt, of an operating handle having a lock bolt-retracting tappet, a lock dog for securing said handle and tappet against bolt-retracting movement, a link connected to said dog, a cam operative on said link to set said dog from operative to inoperative position and conversely, an armature connected to said cam for imparting the above indicated movements thereto, opposing magnets operative on said armature, and a divided circuit including a reversible switch and said electro-magnets.

6. The structure defined in claim 5 in further combination with another lock mechanism operating as a primary lock, said primary lock mechanism including a lock bolt, tappet, handle, lock dog and dog-actuating link corresponding to the same elements in the other lock, said primary lock further including a cam operative on said link to move the corresponding lock dog from operative to inoperative position and conversely, and a key-actuated member operative from the outer side of the primary lock to move the dog-actuating cam of said primary lock and to operate the reversing switch thereof substantially as described.

7. A plurality of door locks having outside and inside operating handles, lock dogs operative when set to hold said outside handles against lock releasing movements, key-controlled means operative from the outer side of one of said locks to retract said lock dogs and render the several locks operative by manipulation of their outside handles, one of said locks acting as a primary locking mechanism and the other locks acting as secondary locking mechanisms and the release of the

lock dogs of the secondary lock mechanisms following automatically from the key manipulation of the primary lock mechanism, the said primary acting lock mechanism having a mechanical key-actuated dog-setting or releasing device, the actuating connections between the primary and secondary lock mechanisms being electro-magnetic and including in the primary lock mechanism a key-actuated circuit-reversing switch in the secondary lock mechanisms, opposing magnets, an armature subject thereto, and an armature-actuated dog-setting and releasing element.

8. A plurality of door locks having outside and inside operating handles, lock dogs operative when set to hold said outside handles against lock-releasing movements, key-controlled means operative from the outside of one of said locks to render the several handles operative to perform their unlocking functions, lock controlling means arranged to cause one of said locks to act as a primary locking mechanism and the other locks to act as secondary locking mechanism, and means arranged to cause release of the lock dogs of the secondary locking mechanisms, automatically from key manipulations of the primary lock mechanism.

9. In combination with the normal locking mechanisms of a plurality of closures, a source of electrical energy, means for electrically locking and unlocking the normal locking mechanisms, a master lock, means associated with said master lock for temporarily connecting the first mentioned means to the source of electrical energy when the master lock is actuated, and means actuated by said master lock for mechanically releasing the electric locking mechanism.

10. In combination with the normal locking mechanisms of a plurality of closures, a source of electric energy, means for electrically locking and unlocking the normal locking mechanisms, a master lock, means associated with said master lock for temporarily connecting the first mentioned means to the source of electrical energy when the master lock is actuated, and means actuated by said master lock for mechanically releasing the electric locking mechanism on one of said normal locking mechanisms.

11. Door locking means for simultaneously locking and unlocking several doors, comprising in combination with manual door latching mechanisms, means adapted to be interposed in said mechanisms to prevent the external release thereof, a source of electrical energy, locking and unlocking solenoids cooperating with said means to shift the same into operative and disengaged positions, a master lock, means associated therewith adapted to momentarily complete the circuit from said source of electrical energy to said locking and unlocking solenoids, and means actuated by said master lock for mechanically releasing the locking mechanism.

12. Door locking means for simultaneously locking and unlocking several doors, comprising in combination with manual door latching mechanisms, means adapted to be interposed in said mechanisms to prevent the external release thereof, a source of electrical energy, locking and unlocking solenoids, cooperating with said means to shift the same into operative and disengaged positions, a master lock associated with one of said normal locking mechanisms, means associated therewith adapted to momentarily complete the circuit from said source of electrical energy to said locking and unlocking solenoids, and means actuated by said master lock for mechanically releasing the locking mechanism.

In testimony whereof I affix my signature.

CARL J. ULRICH.

CERTIFICATE OF CORRECTION.

Patent No. 1,901,541. March 14, 1933.

CARL J. ULRICH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, strike out lines 14 to 28 inclusive, comprising claim 8; and lines 29, 40, 52, and 68, for the claim numbers "9, 10, 11, and 12," respectively, read 8, 9, 10, and 11; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of November, A. D. 1933.

F. M. Hopkins

(Seal) Acting Commissioner of Patents.