May 9, 1939. H. E. VAN DORN 2,157,364

DOOR OPERATING MEANS FOR ELECTRIC COUPLERS

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Fig. 1.

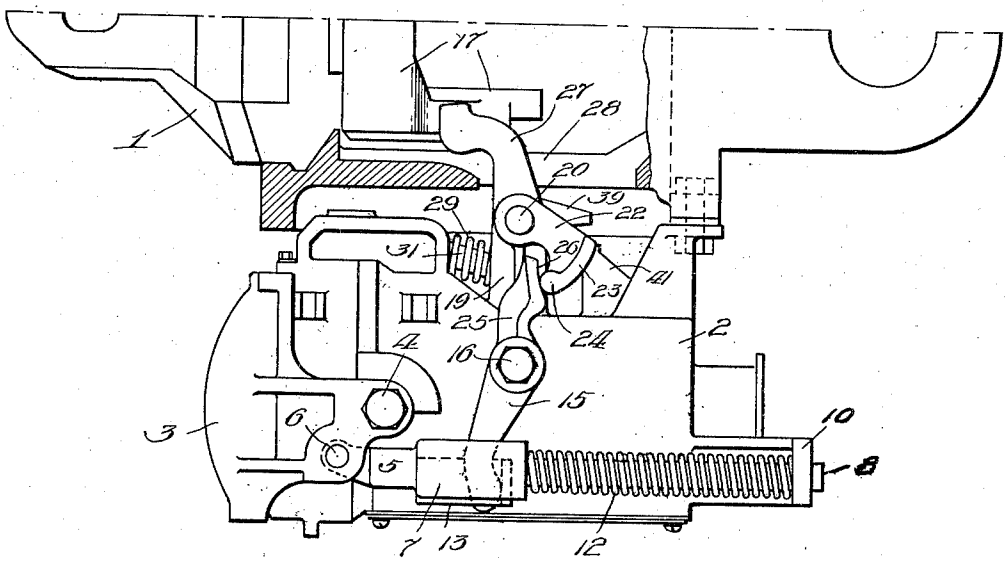
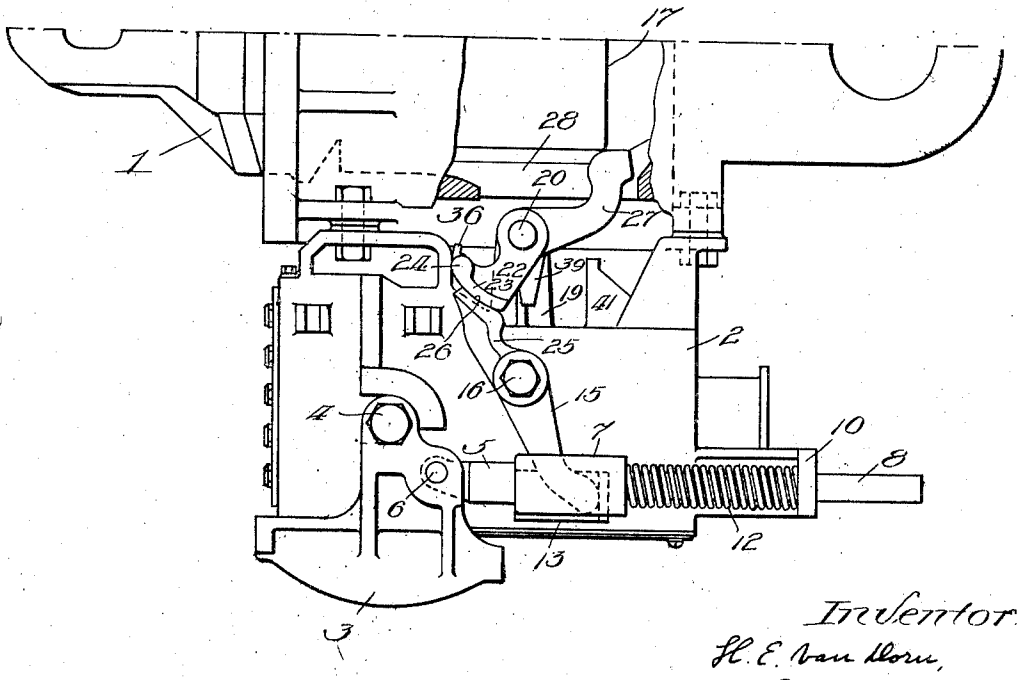


Fig. 2.



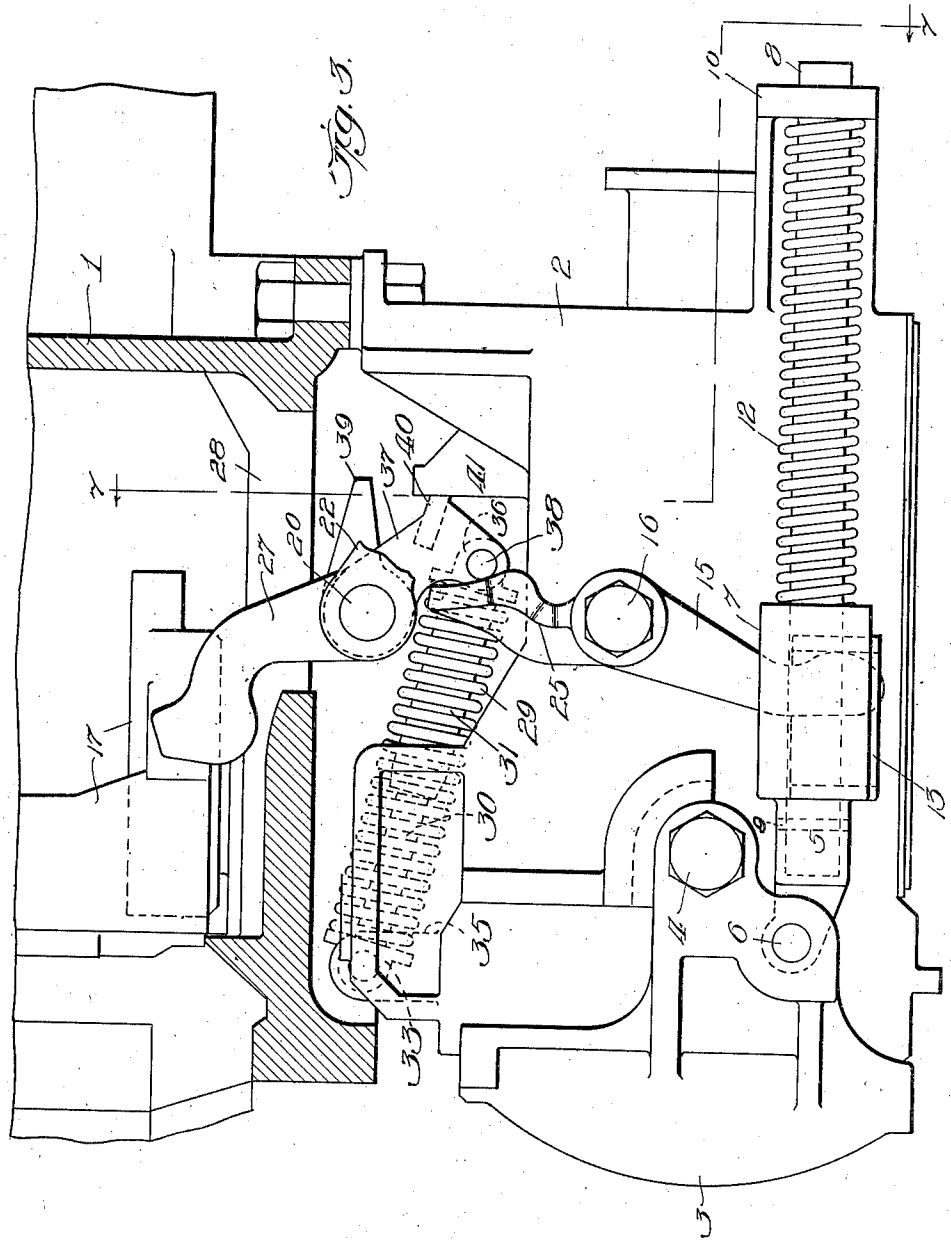
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DOOR OPERATING MEANS FOR ELECTRIC COUPLERS

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Fig. 3.



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DOOR OPERATING MEANS FOR ELECTRIC COUPLERS

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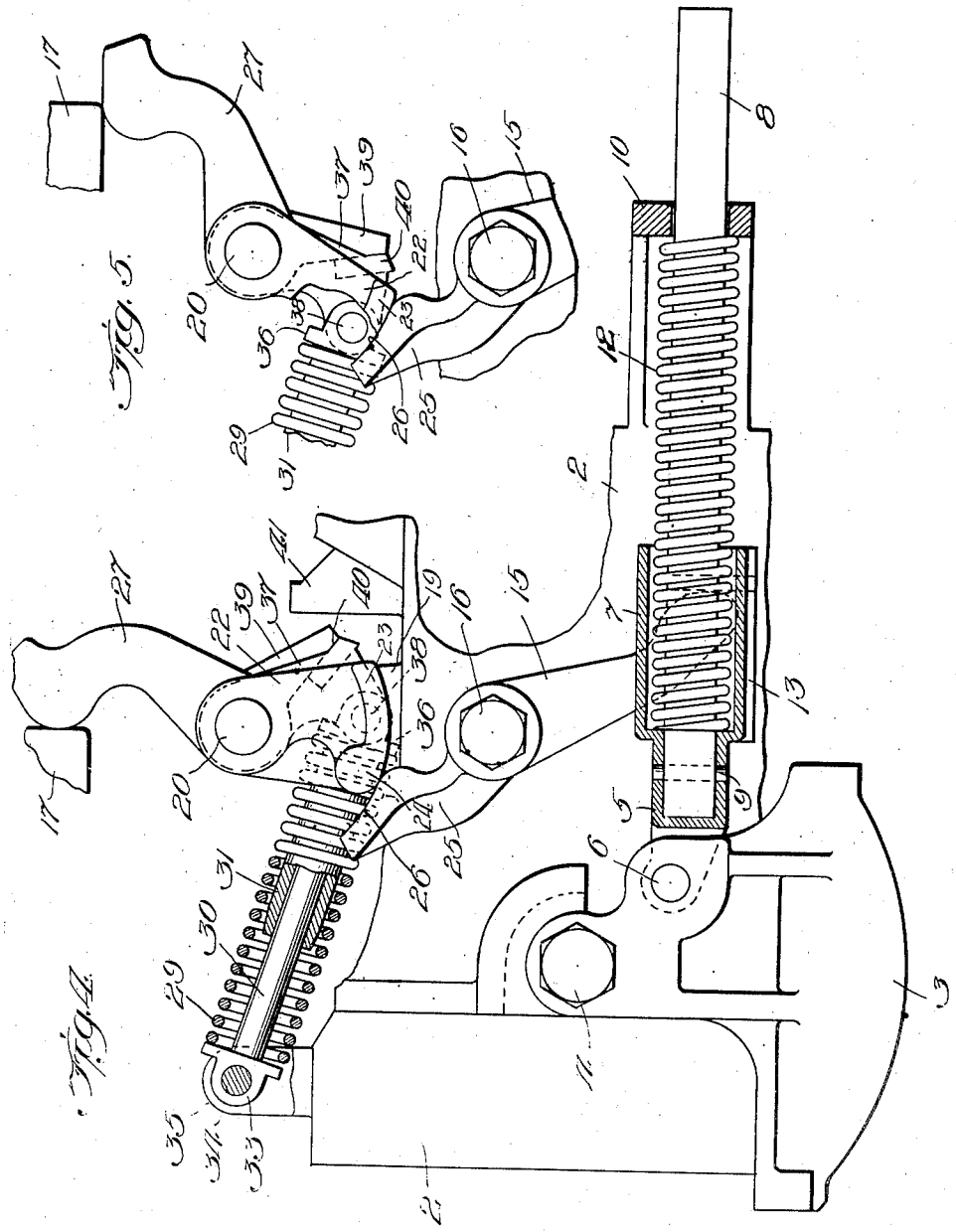


Fig. 5.

Fig. 4.

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DOOR OPERATING MEANS FOR ELECTRIC COUPLERS

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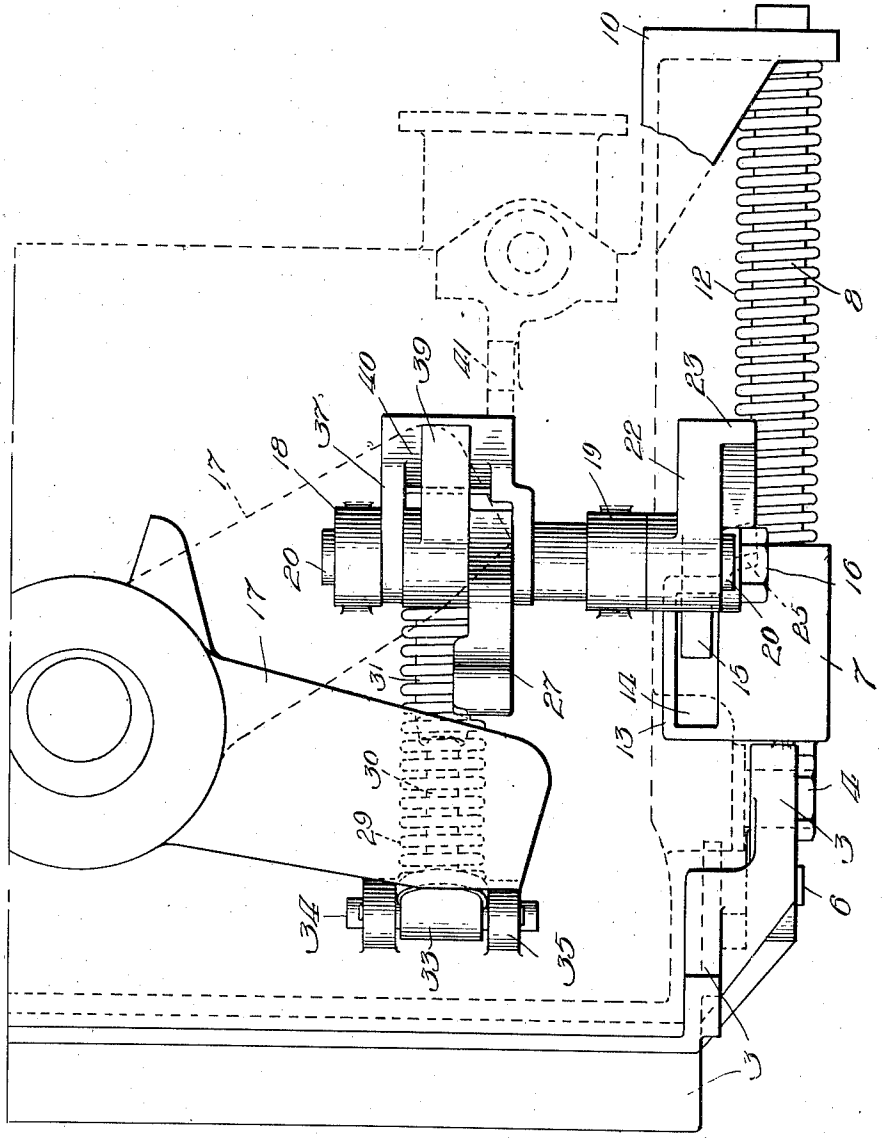


Fig. 6.

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DOOR OPERATING MEANS FOR ELECTRIC COUPLERS

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Fig. 6.

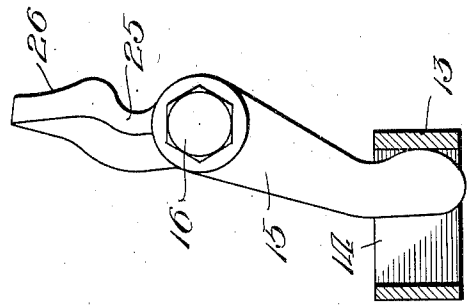
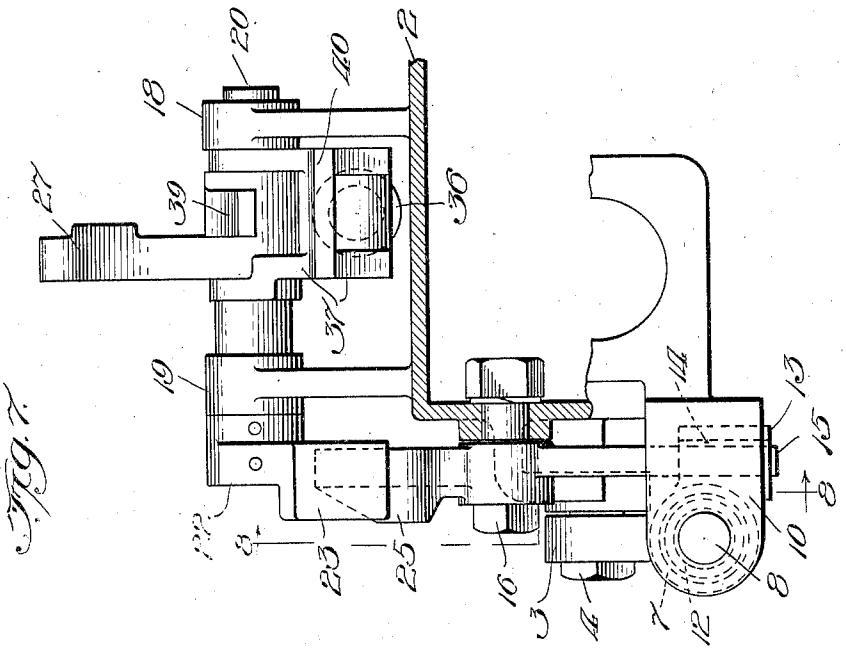


Fig. 7.



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Patented May 9, 1939

2,157,364

UNITED STATES PATENT OFFICE

2,157,364

DOOR OPERATING MEANS FOR ELECTRIC COUPLERS

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Application July 19, 1937, Serial No. 154,404

9 Claims. (Cl. 173—332)

In electric railway systems it is a common practice to attach to the usual car couplers electric couplers for establishing proper electrical connections between conductors or circuits throughout a train of cars. In the simpler forms of electric couplers the contacts normally project slightly beyond the coupler faces so that the contacts on two meeting cars abut against each other when the cars are mechanically coupled together; the contacts being spring-pressed so as to be yieldable in the lengthwise direction. With couplers of this type it is required that the contacts be covered by a suitable door or other closure except during the times that their couplers are not operatively connected to complementary couplers on other cars. It is desirable that these doors or other closures operate automatically so as to cause them to close immediately upon the uncoupling of cars and to open, during the act of coupling the cars together, but far enough in advance of the completion of the act of coupling, to insure that the doors or closures on two meeting electric couplers will not interfere with each other or with the coupling operation.

The object of the present invention is to produce a simple and novel operating means for the door of an electric coupler, which will permit the coupler to be rigidly secured in a predetermined position upon a car coupler and the coupler door thereafter to be operated automatically, without requiring any change in the construction of the car coupler or its operating means.

The type of car coupler in general use is one in which there is a movable locking dog which may be pushed back by a part on a complementary car coupler and thereafter returned to its locking position to complete the process of coupling. In accordance with my invention, I so construct the door operating mechanism for the electric coupler that when the electric coupler is mounted on the car coupler an element of the operating mechanism projects into the path of the locking dog in the car coupler and is driven thereby in the door-opening direction when the locking dog is moved toward its unlocking position. The return, or closing movement of the door is brought about by the action of a spring; so that the doors on two meeting electric couplers are automatically opened in the act of coupling the cars and automatically close when the cars separate from each other. Since the operating mechanism for the door of the electric coupler is acted on directly by the locking dog of the car coupler, it is evident that no change of any kind need be made in the usual or desired operating mechanism for the locking dog. Consequently, no change, whatever, need be made in a car coupler to adapt it to my new type of operating mechanism, than to cut a slot through the wall of a coupler head to permit the entrance of an element of the door operating mechanism into the interior of the coupler, so as to be positioned in the path of the locking dog.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a view, partly in side elevation, and partly in vertical section, of an electric coupler having operating mechanism arranged in accordance with the present invention and so much of a tight-lock car coupler, supporting the same, as is needed to explain the operation; Fig. 2 is a view similar to Fig. 1, the door of the electric coupler being open instead of closed as in the latter figure; Fig. 3 is a view on a larger scale, similar to Fig. 1, showing more detail, and having a portion of the operating mechanism broken away to expose parts that would be otherwise concealed; Fig. 4 is a view more or less similar to Fig. 3, showing the coupler door open, only a fragment of the locking dog of the car coupler being shown, and more parts being shown in section than is the case in Fig. 3; Fig. 5 is a view similar to Fig. 3, showing a lesser portion of the mechanism with the parts in the positions which they occupy after the locking dog has traveled on past the position in which the door is completely opened; Fig. 6 is a plan view of the door operating mechanism, on the same scale as Figs. 3 to 5, only fragments of the electric coupler casing and door and a fragment of the locking dog of the car coupler being shown; Fig. 7 is a section taken approximately on line 7—7 of Fig. 3, the car coupler being omitted and only a fragment of the electric coupler housing being shown; and Fig. 8 is a section on line 8—8 of Fig. 7, showing only the lever which acts on the coupler door, and the slotted part into which one end of the lever extends and which is connected directly to the door.

In the drawings I have illustrated a car coupler 1 of the so-called tight-lock type and an electric coupler 2 underlying the head of the car coupler and rigidly fastened thereto by bolts or the like. The present invention is not concerned

with the couplers themselves which are old and well known. Thus, substantially the same car and electric couplers are illustrated in my prior Patent No. 1,819,214, dated August 18, 1931. In said patent the door of the electric coupler is operated by means associated with the device by which the locking dog of the car coupler is shifted manually. In the construction shown in the aforesaid patent, some of the elements by which the door is controlled are necessarily small and some of the joints or connections are such that it is difficult to insure perfect coordination between all of the parts by simply bolting the car and electric couplers together. In accordance with the preesnt invention, the operating mechanism for the door comprises a few rugged members so associated with each other and with the locking dog of the car coupler that plenty of leeway is provided to compensate for variations in castings and in the machining of different couplers, to insure perfect operation of the door on an electric coupler whenever it is rigidly bolted to any car coupler of the type for which it is adapted.

Referring to the drawings, it will be seen that the door 3 of the electric coupler is hinged to the casing of the electric coupler, at 4, so as to be capable of swinging about a horizontal axis in rear thereof from a vertical closed position in front of the electric coupler, as shown in Fig. 1, to open position in which it underlies the front end of the electric coupler, as shown in Fig. 2. The door is normally held in its closed position by a spring. In the arrangement shown, a stem 5 is hingedly connected to the door, as at 6, at a point below and somewhat forwardly of the hinge pin 4 when the door is in its closed position. This stem terminates in a sleeve-like part 7 open at the rear end. The stem itself is tubular, as best shown in Fig. 4, the internal diameter being considerably less than that of the part 7. A long rod 8 extends at one end through the sleeve 7 and into the tubular stem and is fixed to the latter by a pin 9. The rear end of the rod extends through a hole in a flange or ear 10 forming a part of a bracket extending rearwardly from the rear end of the casing of the electric coupler. Surrounding the rod is a compression spring 12, one end of which extends into the sleeve portion 7 of the stem and the other end of which abuts against the ear or flange 10. In assembling the parts, the spring is placed under an initial compression so that when not restrained from doing so, it holds the coupler door closed.

On the side of the part 7 toward the electric coupler housing is a yoke or loop 13 between which and the part 7 is a slot 14 extending longitudinally of the coupler. On the side of the coupler housing is mounted a lever 15 swinging in a vertical plane about an axis parallel to the hinge axis of the door. In the arrangement shown, a headed journal pin 16 extends through the lever at a point remote from both ends of the latter and is fixed to the wall of the coupler housing in such position that the lower end of the lever extends into the slot 14. The parts are so proportioned that when a lever 15 is swung in one direction, it engages with the portion of the loop or yoke 13 at the lower end of the slot 14 and thus forces the sleeve 7 back against the resistance of the spring and opens the door.

The lever 15 is driven in the door-opening direction by means actuated directly by the horizontally swinging locking dog 17 of the car coupler; this locking dog, as in the aforesaid patent, swinging in the horizontal plane from front to rear when shifting from a locking into an unlocking position. In the arrangement shown, two posts or pedestals 18 and 19 rise from the top of the electric coupler housing underneath the car coupler; these mmebers being spaced apart transversely of the coupler and serving rotatably to support a transverse shaft 20. On the outer end of the shaft 20 is a rugged radial arm 22 having at its free end a long, wide curved flange 23; the face of the flange farthest from the axis of the shaft 20 being preferably a fragment of the surface of a cylinder whose axis coincides with that of the shaft. The forward edge of the flange 23 is thickened and rounded, as indicated at 24. The upper end of the lever 15 has a wide flange 25 extending along the rear edge. The parts are so proportioned that the flanges 23 and 25 are in engagement with each other. Normally, when the lever 15 is approximately upright, as shown in Fig. 1, the nose 24 on the flange of the lever 22 engages with a part 26 of the rear face of the flange 25 that is complementary in shape to the working face of the flange 23, being a cylindrical surface of the same radius as the latter. Upon turning the shaft 20 in the clockwise direction, with the parts in position shown in Fig. 1, the nose 24 on the lever 22 forces the upper end of the lever 15 toward the left, or forward, and rides up along the cylindrical face 26 as that face swings forward and downwardly. Thus, the door is forced into its open position. By the time that the door is fully open, the main cylindrical working face of the flange 23 begins to ride upon the surface 26; but, since the surfaces that are now in engagement with each other are cylindrical surfaces of the same radii, further movement of the lever 22 in the clockwise direction has no effect on the lever 15 or the door. In other words, after the door has opened, the shaft 20 and the lever or arm 22 may continue to turn in the clockwise direction without any other consequence than to lock the door in its open position.

The turning movements of the shaft 20 in the clockwise direction, as viewed in Fig. 1, are caused by movements of the locking dog 17 of the car coupler. To this end, the shaft 20 is provided with a radial arm 27 that extends upwardly therefrom through a longitudinal slot 28 in the bottom wall of the car coupler head, directly behind the free end of the locking dog. When the locking dog is swung back, either through impact with a part of another car coupler in the act of making a coupling, or through manual or other operation, the dog strikes the upper end of the lever 27 and moves it rearwardly. The parts are so proportioned that the locking dog need swing rearwardly through only a small angle in order to throw the door of the electric coupler wide open, as will be evident by comparing the positions of the parts in Figs. 3 and 4. In other words, the doors of the electric couplers on two meeting cars are swung out of the way while the electric couplers are still so far apart that the doors cannot interfere with each other. Then, as the cars come closer together, the locking dog of the car coupler continues to be driven back from the position illustrated in Fig. 4 to that in Fig. 5. The parts are so proportioned that when the locking dog is in or near its unlocking position the highest point in the arm 27 lies in the plane of the under face of the dog, as shown in Fig. 5. Therefore, the locking dog can swing still farther back just as though the arm 27 were not present. It will

thus be seen that it is unnecessary to depend upon extremely accurate dimensions or adjustments in order that each desired result may be secured at exactly the right time, since the door of the coupler may normally be opened so quickly that comparatively wide variations in the dimensions and conditions of various car couplers would not prevent the doors from opening quickly enough; movements of the locking dogs are not limited in any way by the presence of the operating mechanism for the coupler doors, so that under a wide range of conditions the locking dogs of the couplers will be properly moved back as far as need be, in the act of coupling.

It is necessary that the arm 22 be shifted into an idle position whenever cars are uncoupled, so as to permit the coupler door to close. To accomplish this I provide a spring that tends constantly to hold the shaft 20 in what may be termed its normal idle position. However, it is not desirable that this spring should offer resistance to the opening of the door, and I therefore make provision for permitting the shaft 20 to turn independently of this spring while turning from the position illustrated in Fig. 3 to approximately that illustrated in Fig. 4 or, while the door is being opened.

The spring 29 for turning the shaft 20 in one direction surrounds a rod 30 telescoped and slidable in a tube 31. On the outer end of the rod 30 is a head 33 against which one end of the spring bears, and this head is journaled on a pin 34 that extends through the same and through a pair of ears 35 rising from the top of the electric coupler housing near the front end. At the rear end of the tubular member 31 of the telescoped assembly, is a head 36 similar to the head 33 and serving as an abutment for the rear end of the spring 29. The head 36 lies between the arms of a U-shaped casting 37 straddling the arm 27 and journaled on the shaft 20 which extends through the free ends thereof; the head 36 being swiveled to this casting by a pin 38 extending through the same and through the two arms of the latter. The arm 27 has a rearwardly projecting tail piece 39 at the base end thereof; this tail piece being long enough to engage with the cross bar 40 of the casting 37. This cross bar, in the normal idle positions of parts, engages with the front edge of an upward projection 41 rising from the top of the housing of the electric coupler, as shown in Fig. 3. At this time the shaft 20 may be turned through a substantial angle back and forth from the extreme forward position illustrated in Fig. 3. When the locking dog is swung rearwardly, the shaft 20 and its arm 27 are turned backward until or just before the door is opened, thereby meeting only the resistance of the door spring 12. However, about the time that the door is fully open the lug or tail 39 on the arm 27 strikes the cross bar 40 on the U-shaped casting 37 and causes this casting to swing in unison with the shaft. In Fig. 4 the locking dog has moved back a little past the point to which the door is fully open and the casting 37 has been swung forward until the cross bar is clear of the stop 41, so that the spring 29 has been compressed somewhat. In Fig. 5 the shaft has been turned to carry the arm 27 to its rearward limit, and the spring 29 is under maximum compression. When the locking dog swings forward after the car couplers have been completely engaged with each other, the spring 29 again expands, permitting the shaft 20 to turn in the counter-clockwise direction, as viewed in the drawings, until the cross bar 40 strikes the stop 41, as shown in Fig. 3. At the time the cross bar 40 strikes the stop 41, the lever 15 is no longer locked by the arm 22 against turning in the direction to permit the door to close, and consequently, the spring 12 begins to close the door and, through the lever 15, to turn the shaft 20 in the counter-clockwise direction. If, at this time, two cars are in coupled relation, the doors cannot close; but, as soon as the cars draw apart, the doors swing upwardly and close the front ends of their respective electric couplers.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. In combination, a car coupler of the type that has a locking dog movable between a locking position and an unlocking position and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler provided with a door mounted on the under side of the car coupler, and door-operating mechanism mounted on the electric coupler and including a member projecting upwardly into the path of said dog and adapted to be engaged by the same and driven in the direction to cause the door to open when the dog is moved to unlock the car coupler.

2. In combination, a car coupler head of the type that contains a horizontally-swinging locking dog that must be moved rearwardly to bring it into its unlocking position and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler mounted underneath the coupler head and having a door, and door-operating mechanism mounted on the electric coupler and including a member mounted to swing in a vertical plane and extending up into the head behind said dog in position to be moved into door-opening position by the dog when the latter travels toward its unlocking position.

3. In combination, a car coupler of the type that has a locking dog movable between locking and unlocking positions and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler provided with a door mounted on the under side of the car coupler, a spring tending constantly to close said door, means including a rocker member to open said door against the resistance of the spring, and a second rocker member mounted on the electric coupler in position to engage with the first rocker member and first move it into its door-opening position and then ride upon the same while holding it in the door-opening position, an element of said second rocker member projecting upwardly into the path of the said locking dog to cause the second rocker member to be actuated by the dog when the latter is moved to unlock the car coupler.

4. In combination, a car coupler of the type that has a locking dog movable between locking and unlocking positions and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler provided with a door mounted on the under side of the car coupler, a spring tending constantly to

close said door, means including a rocker member to open said door against the resistance of the spring, a second rocker member mounted on the electric coupler in position to engage with the first rocker member and first move it into the door-opening position and then ride upon the same while holding it in the door-opening position, an element of said second rocker member projecting upwardly into the path of the said locking dog to cause the second rocker member to be actuated by the dog when the latter is moved to unlock the car coupler, the parts being so proportioned that said locking dog at an intermediate point in a stroke thereof ceases to cause further movement of said second rocker member and simply rides upon the latter, and a spring acting on the second rocker member and tending constantly to hold it against being moved by the locking dog.

5. In combination, a car coupler of the type that has a locking dog movable between a locking position and an unlocking position and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler provided with a door mounted on the under side of the car coupler, and door-operating mechanism including a member mounted on the electric coupler and projecting upwardly into the path of said dog and adapted to be engaged by the same and driven in the direction to cause the door to open when the dog is moved toward its unlocking position.

6. In combination, a car coupler head of the type that contains a swinging locking dog serving to engage a member on a companion coupler to hold the two couplers together, said head having an opening in the bottom, an electric coupler mounted underneath the coupler head and having a door, and door-operating mechanism including a movable member mounted on and extending up from the electric coupler through said opening and into the path of movement of said dog and adapted to be engaged by the same and driven in the direction to open when the dog is moved toward its unlocking position.

7. In combination, a car coupler head that has an opening in the bottom and contains a horizontally-swinging locking dog that must be moved rearwardly to bring it into its unlocking position and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler mounted underneath the coupler head and having a door, and door-operating mechanism including a member mounted on the electric coupler to swing in a vertical plane and extending up through said opening behind and in the path of said dog so as to be moved into door-opening position by the dog when the latter travels toward its unlocking position.

8. In combination, a car coupler head that has an opening in the bottom and contains a locking dog movable between locking and unlocking positions and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler mounted on the under side of the car coupler and provided with a door, a spring tending constantly to close said door, means including a rocker member mounted on the electric coupler to open said door against the resistance of the spring, a second rocker member mounted on the electric coupler in position to engage with the first rocker member and first move it into its door-opening position and then ride upon the same while holding it in the door-opening position, an element of said second rocker member projecting upwardly through said opening in the coupler head into the path of the said locking dog to cause the second rocker member to be actuated by the dog when the latter is moved to unlock the car coupler, and spring means cooperating with said second rocker member to return it to its starting point when said dog moves into its starting point when said dog moves into its locking position.

9. In combination, a car coupler of the type that has a locking dog movable between locking and unlocking positions and serving to engage a member on a companion coupler to hold the two couplers together, an electric coupler provided with a door mounted on the under side of the car coupler, a spring tending constantly to close said door, means including a rocker member to open said door against the resistance of the spring, a second rocker member mounted on the electric coupler in position to engage with the first rocker member and first move it into the door-opening position and then ride upon the same while holding it in the door-opening position, an element of said second rocker member projecting upwardly into the path of the said locking dog to cause the second rocker member to be actuated by the dog when the latter is moved to unlock the car coupler, the parts being so proportioned that said locking dog at an intermediate point in its stroke, from a locking position to an unlocking position ceases to cause further movement of said second rocker member and simply rides upon the latter, and a spring device cooperating with the second rocker member so as to leave it free to move independently thereof while the locking dog travels between its locking position and said intermediate point and stressed during the movement of the dog from said intermediate point to the unlocking position.

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