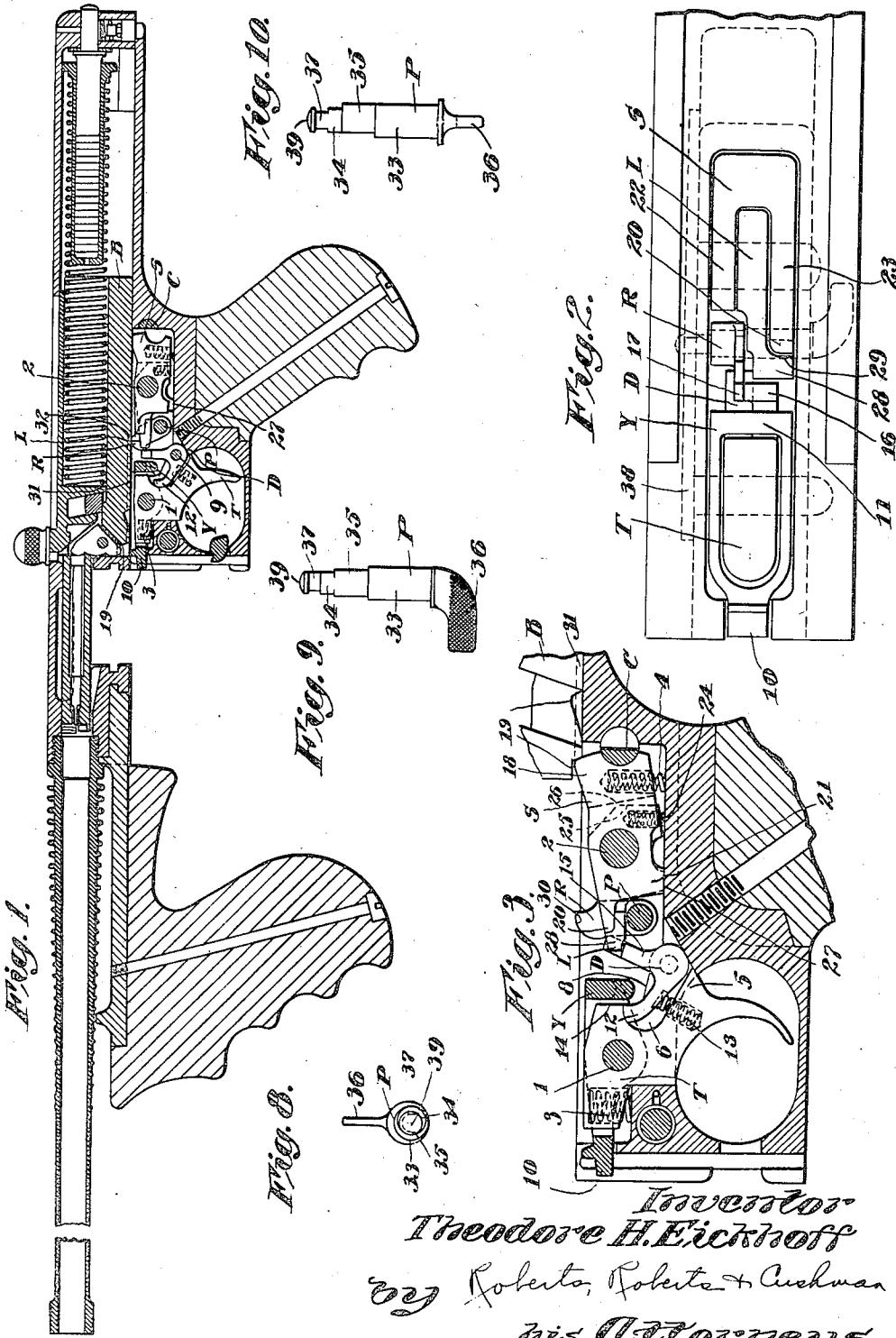


T. H. EICKHOFF,
FIRE CONTROL FOR AUTOMATIC GUNS,
APPLICATION FILED DEC. 31, 1920.

1,437,889.

Patented Dec. 5, 1922.

2 SHEETS—SHEET 1.

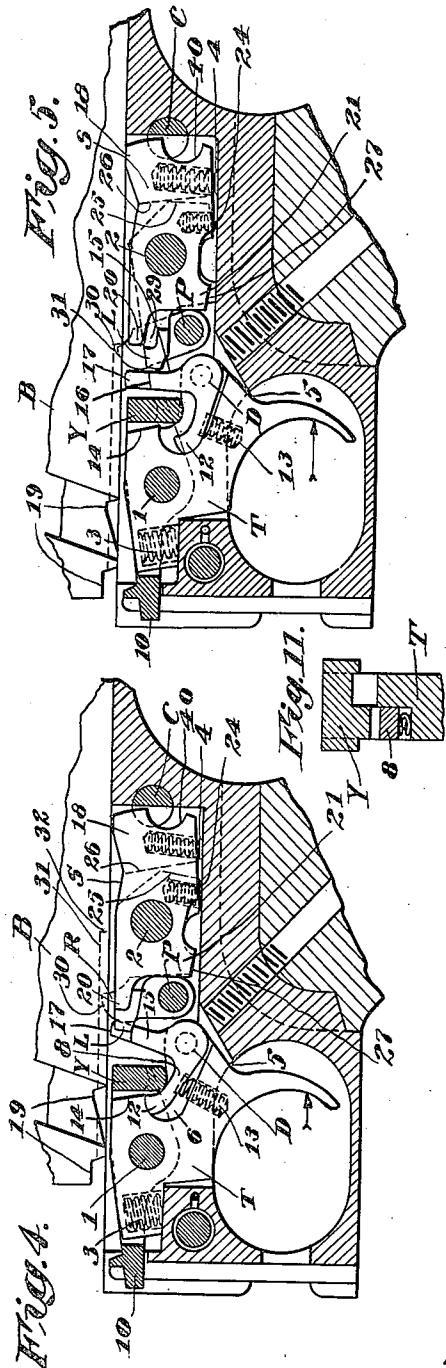


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UNITED STATES PATENT OFFICE.

THEODORE H. EICKHOFF, OF CLEVELAND, OHIO, ASSIGNOR TO AUTO-ORDNANCE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FIRE CONTROL FOR AUTOMATIC GUNS.

Application filed December 31, 1920. Serial No. 434,399.

To all whom it may concern:

Be it known that I, THEODORE H. EICKHOFF, citizen of the United States of America, and resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Fire Controls for Automatic Guns, of which the following is a specification.

This invention relates to guns of the automatic type wherein the recoil of the breech closure is made use of in feeding cartridges to the firing chamber. In particular this invention has reference to firing mechanism for controlling the breech closure operation in such a gun.

The principal object of the invention is to provide a gun having improved fire control mechanism by which semi-automatic fire may be effected. Another object is to provide for full automatic firing by a simple adjustment. Another object is positively to free the sear from the trigger at each shot so that a second shot can not be fired without another actuation of the trigger. Another object is to utilize the movement of the breech closure to disconnect the sear from the trigger. Another object is automatically to hold the breech closure open after the last cartridge from the magazine has been fired whether the fire control is set for semi-automatic or full automatic firing. Other objects are to provide a gun which is constant and reliable in action and generally to improve guns of the automatic type.

These objects are attained in an embodiment having the trigger, sear and disconnector and trip of the full automatic gun for transmitting the trigger movement to the sear for continuous fire, as shown in the patent to Payne, 1,349,345, August 10, 1920. To these elements are added a mechanism which, when in position, breaks the contact between the disconnector and the sear with each reciprocation of the bolt, thereby requiring an independent pull on the trigger for every discharge. The gun then becomes a single fire or semi-automatic gun.

This mechanism is so mounted as to be readily removed from operation to permit the gun to be used as a continuous fire gun of the full automatic type. The particular form of this mechanism, which is adopted for illustration of the invention, has a mem-

ber or rocker mounted on a pivot rotatable in the receiver, the connection between the rocker and the pivot being eccentric so that the rocker may be moved bodily in the receiver, into or out of the path of the bolt. When in the path of the bolt it coacts therewith, toward the end of the forward or closing movement of the bolt, to move the disconnector out of contact with the sear. However, as soon as the rearward movement of the bolt is begun, the rocker is released, and this permits the disconnector, pressed by its spring against the rocker, to return to its original position while the forward end of the sear is still uplifted by the bolt contact on the rear end of the sear. To prevent such reengagement of the disconnector and the sear, the trigger still being under pressure—the sear is made in two parts, the sear lever and the sear proper, each part being independently spring pressed. The sear lever is the part which is operated by the disconnector, while the sear proper is the part which engages the bolt to hold it from forward movement. The sear lever engages the lower surface of the sear and is free to drop out of contact from the sear. Consequently, when its engagement with the disconnector is broken, the sear lever moves under the action of its spring away from the sear.

Release of the disconnector, then, by the rocker does not affect the sear, for the sear lever does not remain in position to be reengaged by the disconnector. The sear lever not being in contact with the sear, the sear is free to move into the bolt notch, when the latter is presented and so hold the bolt from forward movement. To again operate the sear for releasing the bolt, it becomes necessary to relax the trigger so that the trigger can carry the disconnector downward and so reengage the sear lever. The gun therefore acts as a single fire gun.

When the rocker is withdrawn from the path of the bolt, it is not operated by the latter. It does not then interfere with the continued engagement of the disconnector and the sear lever, and therefore the sear remains depressed through the contact of the sear lever, as long as the trigger is under pressure. The bolt therefore continues to reciprocate while the trigger is pulled, and results in a continuous rapid fire gun, or a gun of the full automatic type.

The additional mechanism adopted, then, consists entirely of a rocker for operation by the bolt, a pivot on which it is mounted, and a sear lever. It is to be understood however, that this is but a preferred embodiment, and that the invention here claimed is capable of other forms. It is also evident that the invention is not restricted to the associated mechanism described, but is capable of use in other relations.

A detailed disclosure of the illustration chosen of the invention follows in the description and accompanying drawings, in which:—

Figure 1 is a longitudinal section of an assembled gun showing the mechanism with the bolt in forward position, the rocker in operative position, and the trigger released.

Figure 2 is a top view of the control mechanism in the relative positions shown in Fig. 1;

Figure 3 is a section similar to Fig. 1 of the bolt control mechanism, with the exception that the bolt is retracted; and the safety catch is in operative position;

Figure 4 is a section similar to Fig. 3 with the bolt in midway position, the rocker in operative position, and the trigger retracted;

Figure 5 is a section similar to Fig. 3, except that the bolt is in closed position and the trigger retracted;

Figure 6 is a section similar to Fig. 3, except that the trigger is still retracted;

Figure 7 is a section similar to Fig. 5, with the exception that the rocker is in inoperative position;

Figure 8 is an end view of the pivot;

Figure 9 is an elevation of the pivot;

Figure 10 is a view of the pivot at right angles to Fig. 9; and

Figure 11 is a transverse section on line 11—11 of Fig. 7 through the yoke disconnector and trigger.

As before indicated the firing mechanism consists of a trigger T, a disconnector D, a trip or yoke Y, sear S, and the added elements, sear lever L, rocker R, and pivot P. These elements are mounted in the gun frame for controlling the bolt B. The trigger and the yoke are pivoted on a pin 1, while the sear is pivoted on another pin 2, both pins being secured to a plate 38 and removably mounted in the gun frame as in the aforesaid patent to Payne.

The trigger T, which is held in forward position by the spring 3, carries the disconnector D in a side recess on an extension 5. The disconnector D is pivoted on this extension by a pin 9 integral with the disconnector (Fig. 1). The yoke Y has a forward end 10 and rear bar 11 (Fig. 2). Raising the end 10 of the yoke by contact with the magazine follower throws the bar downward, and the trigger is disconnected

from the sear through the medium of the disconnector.

The disconnector is of L shape, one arm 12 lying in the trigger recess. A compression spring 13 urges the disconnector in a clockwise direction; and to limit this movement the trigger is provided with a projection 14 which engages the end of the arm 12. The other arm 15 of the disconnector has an end surface 16 (Fig. 2) and extending upwardly from the surface at one side is a lug 17.

The sear S has the compression spring 4 urging the bolt-engaging end 18 upward about the pivot 2 into one of the notches 19 on the bolt, when the bolt is in retracted position. The sear is U-shaped in plan having the two sides 22 and 23 through which the pivot passes (Fig. 2). The forward end 20 of the side 23 of the sear, being on the opposite side of the pivot is urged downward by the spring 4. A stop 21 formed on the sear engages the frame for limiting this movement about the pivot.

Pivoted on the same pin 2 and lying between the sides 22 and 23 of the sear, is the sear lever L. A compression spring 24 urges the rear end of this lever upward, this movement being limited with respect to the sear by a surface 25, arranged to contact with a surface 26 on the sear, and with respect to the frame by a stop 27. The forward end 28 of the lever projects to one side as shown in Fig. 2 and extends farther forward than the sear end 20. In this is formed a depression 29 which contacts the lower surface of the forward end 20 of the sear. This end 28 of the lever lies in position for its lower surface to be engaged by the end surface 16 of the arm 15 of the disconnector when the latter is turned to its limiting position by the disconnector spring 13. The sear end does not extend sufficiently forward to come into contact with the disconnector.

For controlling the contact between the sear lever and the disconnector the rocker R is provided. This is mounted for oscillation on the pivot P, its movement in one direction being limited by the lug 17 on the disconnector arm 15. Its movement is limited in the other direction by the side 22 of the sear; when in this position a protruding nose 30 extends into the path of the bolt B. A clearance groove 31 is provided in the bolt so that the latter rides over the nose 30. This groove ends with an abutment 32 so positioned that it strikes the nose 30 and moves the rocker when the bolt is in fully closed position.

The pivot P upon which the rocker is mounted, is provided with the concentric bearings 33 and 34 fitting in openings in the frame, and a portion 35 upon which the rocker oscillates. The portion 35 is eccentrically placed with reference to the axis 130

of the pivot so that a bodily movement, upward or downward, is given the rocker when the pivot is turned.

5 A handle 36 extends from the pivot on the exterior of the frame for so turning the pivot and indicating its position. The other end 37 engages the plate 38 which carries the pins 1 and 2, and this end has a head 39 for preventing removal of the pivot unless the pivot is rotated to a position wherein the head 39 may pass through a slot in the plate 38.

15 A safety catch C is provided for engaging a groove 40 formed in the sear. The catch is rotatably mounted and can be turned to engage the groove when the sear is in upward position holding the bolt (Fig. 3). Engagement of this catch prevents any release of the bolt.

20 When the bolt is in retracted position (Fig. 3) and the sear is in engagement with it, the forward end of the sear, in conjunction with the sear lever spring, holds the forward end of the sear lever depressed.

25 The trigger T being in forward position, the disconnector is below the end 28 of the sear lever due to the action of its spring 13. A pull on the trigger lifts the disconnector as shown in Figs. 4 and 7 and thereby raises the forward end of the sear lever L and the sear S to release the bolt. As shown in Fig. 7 with only the elements, trigger, sear, and disconnector in use, a continued pull on the trigger holds the sear depressed so that the bolt is free to reciprocate. With the rocker not in use, the gun acts as a full automatic gun.

30 Prevention of a return forward movement is secured when the rocker is in position to be operated by the bolt as shown in Fig. 5. The rocker strikes the disconnector removing it from beneath the sear lever. The sear however, is not free to move on account of its contact with the bolt. Therefore if the sear lever were not made separate from the sear, the end would still remain in raised position. Being made separate, the sear lever moves downwardly, blocking the path of the disconnector. Rearward movement of the bolt 35 releases the rocker, and this release permits the disconnector to spring back; but the sear lever being no longer in raised position the disconnector merely strikes the forward end of the sear lever, as shown in Fig. 6. When the bolt has retracted, so that a notch in it is in position for engagement by the sear, the forward end of the sear lever being depressed out of contact with the sear, permits the sear to project into the notch. The

40 bolt is now locked, even though the trigger is still retracted. To again release the bolt, it is necessary to relax the trigger. The trigger spring then rotates the trigger to normal position turning its extension downward, and so carrying the arm of the dis-

45 connector downward below the sear lever end. The disconnector is now free to slip beneath the sear lever, and on the next pressure of the trigger, the sear lever is lifted and the rear end of the sear depressed. The bolt, then, is released for the next discharge. The gun, therefore, when the rocker is in operation, acts as a semi-automatic gun.

50 The yoke Y engages the disconnector (but not the trigger) to swing the disconnector into inoperative position when the magazine is emptied and the magazine follower engages the forward end of the yoke. This results in the bolt being held retracted after the last shot has been fired.

80 I claim:

1. A fire control for a gun having in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a trigger for operating said sear, means responsive to movement of the bolt for disconnecting said trigger from said sear, and means for maintaining said trigger disconnected until the latter is released.

85 2. A fire control for a gun having in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a trigger, a disconnector operative for associating the trigger and the sear, means for moving the disconnector into inoperative position after the trigger has been actuated, and additional means for holding the disconnector in inoperative position until the trigger is released.

90 3. A fire control for a gun having in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a trigger, a disconnector operative for associating the trigger and the sear, means responsive to movement of the bolt for moving the disconnector into inoperative position after the trigger has been actuated and additional means for holding the disconnector in inoperative position until the trigger is released.

100 4. Fire control mechanism for guns comprising a sear, a member associated with said sear and movable therewith to retracted position, a trigger, a disconnector associated with the trigger and operable through said member to retract the sear when the trigger is actuated, said member being mounted to return to normal position independently of the sear thereby to retain said disconnector inoperative until said trigger is released.

105 5. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a trigger mounted for retraction, restraining means for the bolt associated with the trigger and removed by retraction of the trigger, and means operable at will for disconnecting the trigger from the restraining means upon movement of the bolt while the trigger is retracted.

110 6. A fire control for a gun having, in com-

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bination, a bolt movable into and out of firing position, a trigger, controlling means for the bolt operable by the trigger, and manually operable means, projectable into the path of the bolt, for disconnecting the trigger from the controlling means when the former is retracted. 5

7. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a trigger mounted for retraction, restraining means for the bolt associated with the trigger and removed by retraction of the trigger, and a member projectable at will into the path of the bolt for disconnecting the restraining means and the trigger thereby to permit the operation of the restraining means upon movement of the bolt, while the trigger is retracted. 10

8. A fire control for a gun having in combination, a bolt movable into and out of firing position, a trigger, controlling means for the bolt operable by the trigger, independently operable means, projectable into the path of the bolt, for disconnecting the controlling means and the trigger, and an eccentric mounting for said means for projecting said means. 15

9. A fire control for a gun having, in combination, a bolt, having an abutment thereon, movable into and out of firing position, a trigger mounted for retraction, restraining means for the bolt associated with the trigger and removed by retraction of the trigger, a member projectable into the path of the abutment for causing the operation of the restraining means upon movement of the bolt while the trigger is retracted, and a pivot having an eccentric connection with the member and operable at will for projecting the member. 20

10. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a trigger mounted for retraction, restraining means for the bolt, a disconnector operatively associating the restraining means and the trigger for removing said restraining means from the bolt upon retraction of the trigger, and means operable at will for rendering the disconnector inoperative upon movement of the bolt while the trigger is retracted. 25

11. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a sear for restraining the bolt, a trigger mounted for retraction and operatively associated with the sear for removing the sear from restraining position by the retraction of the trigger, and means operable at will for dissociating the sear and the trigger upon movement of the bolt while the trigger is retracted. 30

12. A fire control for a gun having in combination, a bolt movable into and out of firing position, a sear for restraining the bolt, a trigger mounted for retraction, a disconnector operatively associating the sear with the trigger for removing of the sear from restraining position upon retraction of the trigger, and means operable at will for rendering the disconnector inoperative upon movement of the bolt while the trigger is retracted. 35

13. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a member associated with the sear for removing it from contact, a trigger, a disconnector operative for associating the trigger and the member, and means responsive to movement of said bolt for rendering the disconnector inoperative. 40

14. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a member associated with the sear and operable for removing it from contact, a trigger mounted for retraction, a disconnector operative for associating the trigger and the member upon retraction of the trigger, and means operable at will for rendering the disconnector inoperative while the trigger is retracted, said member being movable independently of the sear into position to hold the disconnector out of association with the sear until the trigger is released. 45

15. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a sear lever engageable with the sear for removing it from contact, a disconnector projectable for engagement with the sear lever, a trigger upon which the disconnector is movably mounted, and a member operable by said bolt for contacting the disconnector to move the latter upon the trigger whereby engagement of the disconnector and the sear lever is prevented. 50

16. A fire control for a gun having in combination a bolt movable into and out of firing position, a sear for contact with the bolt, a trigger, a disconnector operative for associating said trigger and said sear, and a member projectable at will into the path of said bolt for moving said disconnector into inoperative position. 55

17. A fire control for a gun having in combination a bolt movable into and out of firing position, a sear for contact with the bolt, a trigger, means associated with said trigger for operating said sear, and a member eccentrically mounted for projection manually into the path of said bolt for rendering said means inoperative. 60

18. A fire control for a gun having, in combination, a bolt movable into and out of firing position, a sear for contact with the bolt, a trigger, a disconnector operative for associating the trigger and the sear, a member projectable into the path of the bolt for dissociating said disconnector from said bolt. 65

sear, and an eccentric mounting for said member.

19. A fire control for a gun having, in combination, a bolt movable into and out of 5 firing position, a sear for contact with the bolt, a trigger, a disconnector pivoted to said trigger for operating said sear, a member projectable into the path of the bolt to be moved thereby to rock said disconnector out 10 of operative connection with said sear when the trigger is in retracted position, and an eccentric mounting for said member.

20. A fire control for a gun having, in combination, a bolt movable into and out of 15 firing position, a sear for contact with the bolt, a pivot for said sear, a member mounted on said pivot and arranged to engage said sear for removing it from contact, and means for actuating said member.

21. A fire control for a gun having, in combination, a bolt movable into and out of 20 firing position, a sear for contact with the bolt, a pivot for said sear, a member mounted on said pivot and associated with the sear 25 for removing it from contact, a trigger, and a disconnector operative for associating the trigger and the member.

22. A fire control for a gun having, in

combination, a bolt movable into and out of 30 firing position, a sear for contact with the bolt, a pivot for said sear, a member mounted on said pivot and associated with the sear 35 for removing it from contact, a trigger, a disconnector operative for associating the trigger and the member, and means responsive to movement of the bolt for rendering the disconnector inoperative.

23. Fire control mechanism for guns comprising a trigger, a sear, a disconnector interposed between the trigger and the sear, 40 the disconnector having an operative position in which the sear may be actuated by the trigger and an inoperative position in which the trigger is inoperative to actuate 45 the sear, and means for holding the disconnector in inoperative position until the trigger is released, said means including a member automatically movable, independently of the trigger, sear and disconnector, into the path of the disconnector after the sear is 50 actuated and before it returns to normal position.

Signed by me at Boston, Mass., this 10th day of December, 1920.

THEODORE H. EICKHOFF.