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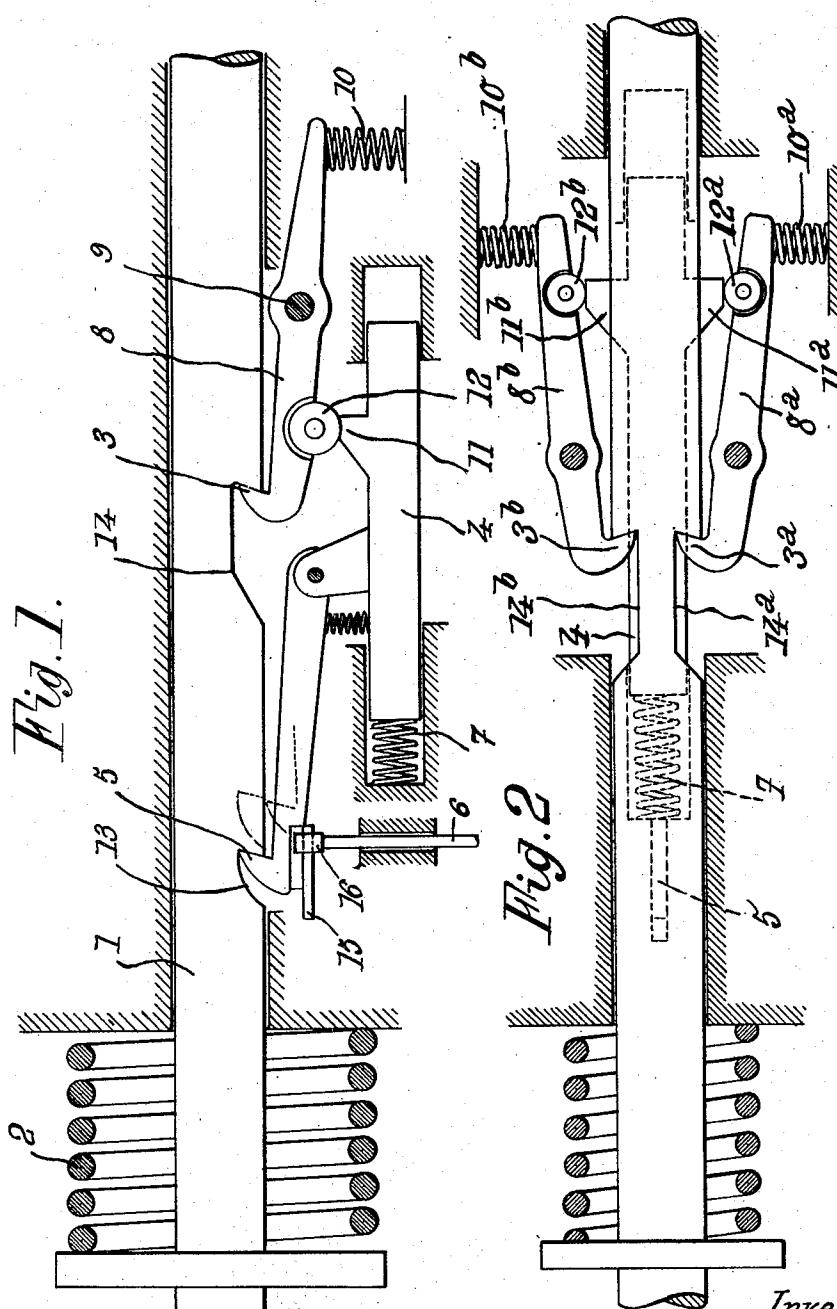
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1,993,645

TRIPPING DEVICE

Filed Dec. 21, 1933

2 Sheets-Sheet 1



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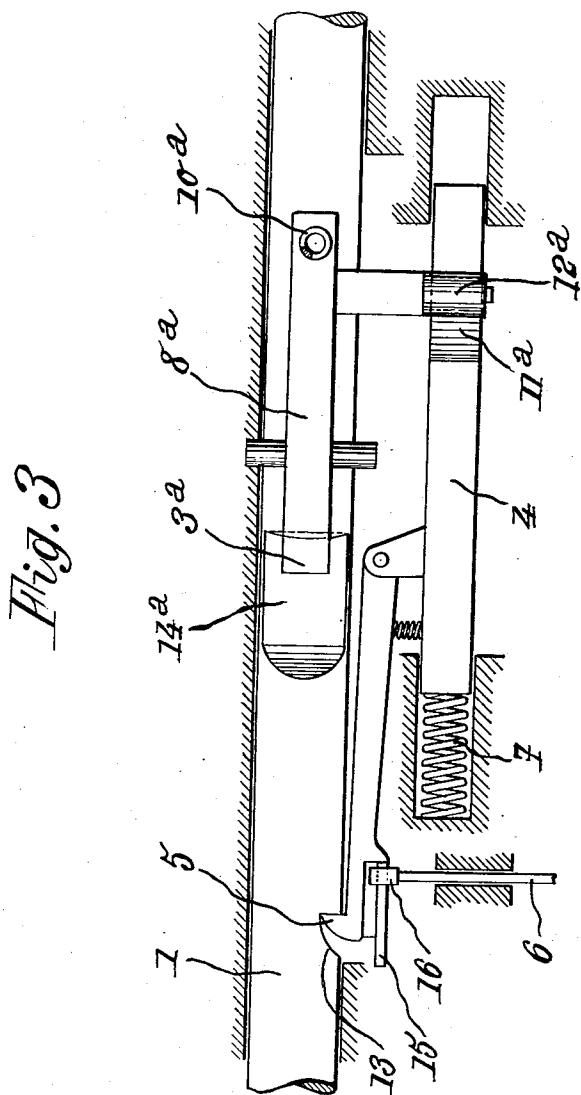
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## UNITED STATES PATENT OFFICE

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## TRIPPING DEVICE

Louis Birkigt, Bois-Colombes, France

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In Belgium November 9, 1933

7 Claims. (Cl. 185—41)

My invention relates to mechanisms for the tripping or release of movable organs subjected to the action of a high return or counter force, such as the movable part of a spring starter for 5 internal combustion engines or the equivalent, the carriage of a spring catapult, rams or tups for driving posts, and, in a general manner, all organs that are maintained by a catch in a given position against the action of an elastic system 10 exerting on said organs a considerable effort tending to move them from said position.

The object of the present invention is to provide a mechanism of the type above referred to in which the release of the organ held by the 15 catch necessitates a smaller effort than with the mechanisms utilized for similar purposes up to the present time.

To this effect, the mechanism according to the present invention is so devised that the catch is 20 actuated by an intermediate tripping element arranged in such manner that its release causes the movable organ to be released, this intermediate element being automatically brought back into its position in which it maintains the movable 25 organ against the action of the elastic means acting thereon, when said movable organ is brought back to its initial position after having been released.

Other features of my invention will appear 30 from the following detailed description thereof.

Preferred embodiments of my invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example, and in which:

35 Fig. 1 is a diagrammatical plan view of a first embodiment of my invention.

Fig. 2 is a diagrammatical plan view of another embodiment.

Fig. 3 is a side elevation of the form shown 40 in Fig. 2.

It will be assumed that the release device according to my invention is applied to a spring 45 starter for internal combustion engines, but it should be well understood that it could be used in connection with any similar structure, as above explained.

The starter proper may for instance comprise a rod 1 subjected to the action of a spring 2 that tends to push it toward the left hand side of the 50 figure. This rod is so connected with the shaft of the engine with which it is to coact that when said spring, which has been previously compressed, is released, its expansion causes rod 1 to move suddenly toward the left hand side of the 55 figure, thus starting the engine.

The starter may further comprise means (not shown in the drawings because they are not part of the invention) for bringing back the parts into their initial position, after their working, and accordingly for moving rod 1 toward the right hand side of the figure, thus compressing spring 2, until said rod is again maintained in the desired position against the action of said spring. 5

The tripping mechanism according to the present invention comprises a catch or pawl 3 intended to maintain rod 1 in the desired position against the action of spring 2 and to release it when it is desired. This catch or pawl 3 is controlled by an intermediate element 4 so arranged that its displacement in a certain direction causes the disengagement of said catch from said rod, and therefore the release of said rod. When, subsequently, said rod is moved in a backward direction so as to again engage it 20 with catch or pawl 3, this intermediate element 4 is automatically brought back into the position in which it maintains said catch engaged with said rod. 15

To this effect, as shown in the drawings, said intermediate element is itself advantageously provided with a second catch or pawl 5 directly connected with the control means 6 so that, when said means is acted upon, element 4 may be released, that is to say left free to move with 30 respect to rod 1. 25

Elastic means, consisting for instance of a spring 7 interposed between element 4 and the stationary part of the mechanism, are provided for moving said element 4 with respect to said 35 stationary part when the second catch is removed from the left notch in bar 1.

This element 4 and catch 3 are, according to my invention, so connected together that when element 4 is displaced by spring 7, it causes catch 40 3 to be disengaged from rod 1, thus releasing said rod.

To this effect, catch 3 may be carried by a lever 8 pivoted about a stationary axis 9 and subjected to the action of a spring 10 tending to pivot it in the direction in which catch 3 releases rod 1. 45

As for element 4, it is mounted in slideways substantially parallel to the direction in which rod 1 is allowed to slide.

This element 4 is provided with a cam 11 50 adapted to coact with a projection of lever 8 (for instance a roller 12). This cam is so shaped and positioned that, when element 4 is maintained in the position shown in the drawings, cam 11 maintains pawl 3 in engagement with rod 55

1. On the contrary, as soon as element 4 is released and allowed to move under the action of spring 7, cam 11 allows lever 8 to pivot under the action of spring 10, bringing catch 3 out of engagement with rod 1 which is then released.

5 In order that the intermediate element 4 should be automatically brought back into the position of Fig. 1 when rod 1 is moved backwards, said rod is provided with a notch 13 adapted to coat with the second pawl or catch 5.

10 Consequently, when said catch 5 has been disengaged and element 4 has moved under the action of spring 7, together with catch 5, pivoted to said element, it suffices to move rod 1, in a backward direction, a distance such that notch 13 comes opposite said catch (position shown in dotted lines in the drawings). Under the action of the spring acting thereon, said catch 5 penetrates into notch 13 and when rod 1 moves 15 toward the left hand side of the figure a small distance (from the position of notch 13 shown in dotted lines to its position shown in solid lines) element 4 is brought back into the position shown in the drawings thus compressing its spring 7.

15 25 It will be readily understood that, with such an arrangement, it is necessary that rod 1 should be moved in a backward direction beyond the position shown in Fig. 1, being then allowed to come back to said position under the action of spring 2.

20 30 Of course, during the whole of the backward movement of rod 1, lever 8 is maintained by spring 10 in a position such that it cannot engage with rod 1. But, during the slight displacement of said rod toward the left hand side of the figure, lever 8 is caused to pivot by the action of cam 11 on roller 12. It is therefore necessary to give notch 14, provided in rod 1, a length at least equal to the length of cam 11 35 measured in the longitudinal direction of element 4.

35 40 Of course, as the second catch 5 is to move longitudinally together with element 4, it is necessary to so connect it with controlling means 6 as to allow for said displacements.

45 50 In the example shown in the drawings, it will suffice, to this effect, to provide this catch 5 with a slideway 15, parallel to the direction of displacement, adapted to receive a sliding element 16 directly connected to control member 6, which moves in a direction at right angles to said slideway 15.

55 60 It will be readily understood that, with the arrangement above described, the release of rod 1 can be obtained without exerting a considerable effort and, as a matter of fact, with an effort corresponding to the release of element 4.

65 70 As shown in the embodiment of Fig. 2, it is advantageous to utilize two catches 3a and 3b 60 symmetrically disposed with respect to a plane passing through the axis of rod 1, so as to avoid any lateral effort on the guides of rod 1.

75 80 In this case it will be advantageous, as shown in Fig. 2, to provide a single intermediate member 4 for both pawls 3a and 3b. This element 4 will therefore be disposed in a plane at right angles to the plane of the two catches 3a and 3b. It will be provided with two cams 11a and 11b coacting with rollers 12a and 12b respectively.

85 90 While I have described what I deem to be preferred embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts 95 without departing from the principle of my in-

vention as comprehended within the scope of the appended claims.

What I claim is:

1. A device of the type described, which comprises in combination, a stationary part, an organ movably carried by said stationary part, elastic means for urging said organ in a certain direction with respect to said part, a catch movably carried by said stationary part adapted to engage said organ for maintaining it in a given position with respect to said part against the action of said elastic means, movable intermediate means for bringing said catch into and out of engagement with said movable organ, elastic means for urging said intermediate means toward a position in which said catch is brought out of engagement with said movable organ, a second catch connected with said intermediate means and adapted to engage said movable organ for maintaining said intermediate means in the position in which said intermediate means maintains said first mentioned catch in engagement with said movable organ, means for controlling said second mentioned catch so as to bring it out of engagement with said movable organ, and elastic means for urging said second mentioned catch toward said movable organ, said second catch engaging the movable organ when said organ after having been released, is moved back past its initial position, and thereby when said organ is allowed to come back to said initial position said catch moving said intermediate means to the position in which it causes said first mentioned catch to engage said organ.

2. A device of the type described, which comprises in combination, a stationary part, an organ movably carried by said stationary part, elastic means for urging said organ in a certain direction with respect to said part, a catch movably carried by said stationary part adapted to engage said organ for maintaining it in a given position with respect to said part against the action of said elastic means, a movable intermediate member for normally maintaining said catch in engagement with said movable organ, elastic means for urging said catch toward a position in which it is not engaged with said organ, elastic means for urging said intermediate member toward the position thereof in which it no longer maintains said catch in engagement with said movable organ, a second catch movably connected with said intermediate member and adapted to engage said movable organ for maintaining said intermediate member in the position in which it maintains said first mentioned catch in engagement with said movable organ, means for controlling said second mentioned catch so as to bring it out of engagement with said movable organ, and elastic means for urging said second mentioned catch toward said movable organ, said second catch being so arranged as to automatically bring back said intermediate member into the position in which said member causes said first mentioned catch to engage said movable organ when said organ, after having been released, is moved backwards past its initial position and then allowed to come back to its initial position.

3. A device according to claim 1 in which the first mentioned catch is pivotally mounted on said stationary part and the intermediate member is slidably with respect thereto in a direction substantially parallel to the direction of displacement of said movable organ, the first mentioned elastic means and the second men-

tioned elastic means acting in opposite directions.

4. A device according to claim 1 in which the first mentioned catch is pivotally mounted on said stationary part and the intermediate member is slideable with respect thereto in a direction substantially parallel to the direction of displacement of said movable organ.

5. A device according to claim 1 in which the first mentioned catch is pivotally mounted on said stationary part, the intermediate member is slideable with respect thereto in a direction substantially parallel to the direction of displacement of said movable organ, and the second catch is pivotally mounted on said intermediate member, the means for controlling said second catch consisting of a rod slideable in said stationary part at right angles to said direction of displacement and slidably connected with said second catch in a direction parallel to said direction of displacement.

6. A device according to claim 1 further comprising a third catch movably carried by said stationary part, symmetric with the first mentioned catch as to the axis of said movable organ, said third catch being adapted to coact with said intermediate member in the same manner as the first mentioned catch.

7. A device of the type described, which comprises in combination, a stationary part, an organ

movably carried by said stationary part, elastic means for urging said organ in a certain direction with respect to said part, a catch movably carried by said stationary part adapted to engage said organ for maintaining it in a given position with respect to said part against the action of said elastic means, movable intermediate means for bringing said catch into and out of engagement with said movable organ, elastic means for urging said intermediate means toward a position in which said catch is brought out of engagement with said movable organ, a notch in said movable organ, a second catch connected with said intermediate means and adapted to engage said notch, means for controlling said second mentioned catch so as to bring it out of engagement with said notch, and elastic means for urging said second mentioned catch toward said movable organ, said second catch and said notch being so arranged that the catch penetrates into the notch when said movable organ, after having been released, is moved backwards past its initial position and that, when said movable organ is allowed to come back to said initial position, it brings said intermediate means in the position in which said intermediate means maintains said first mentioned catch in engagement with said movable organ.

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