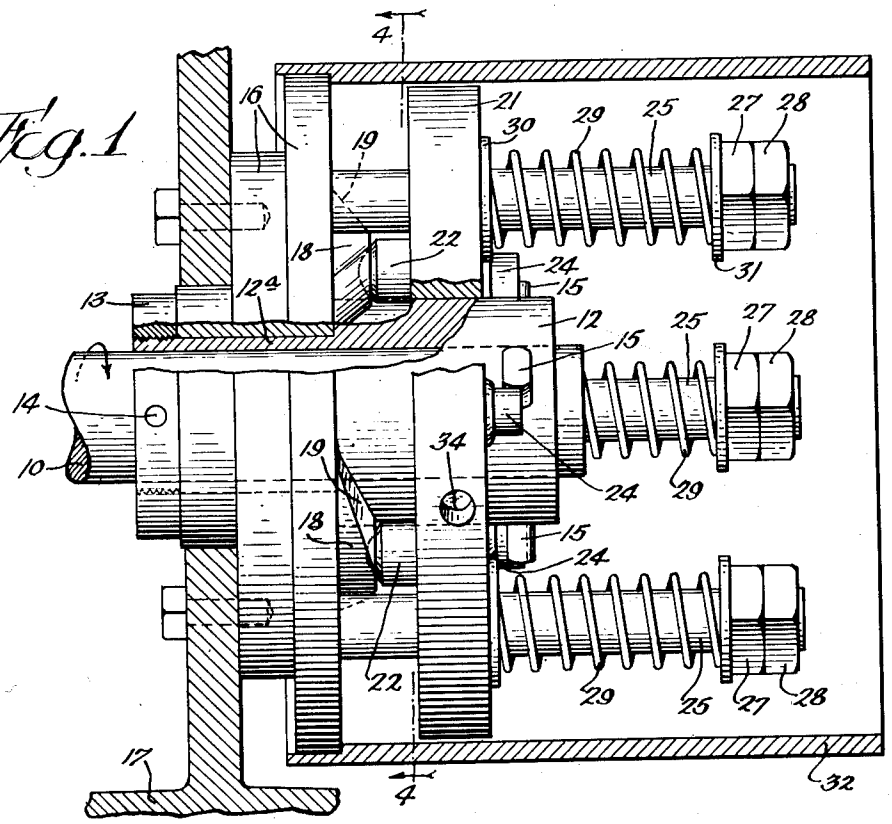
Sept. 27, 1932. A. H. RANCKE 1,879,486

RELEASE DEVICE FOR DRIVE MECHANISM FOR BAKE OVENS

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Fig. 1



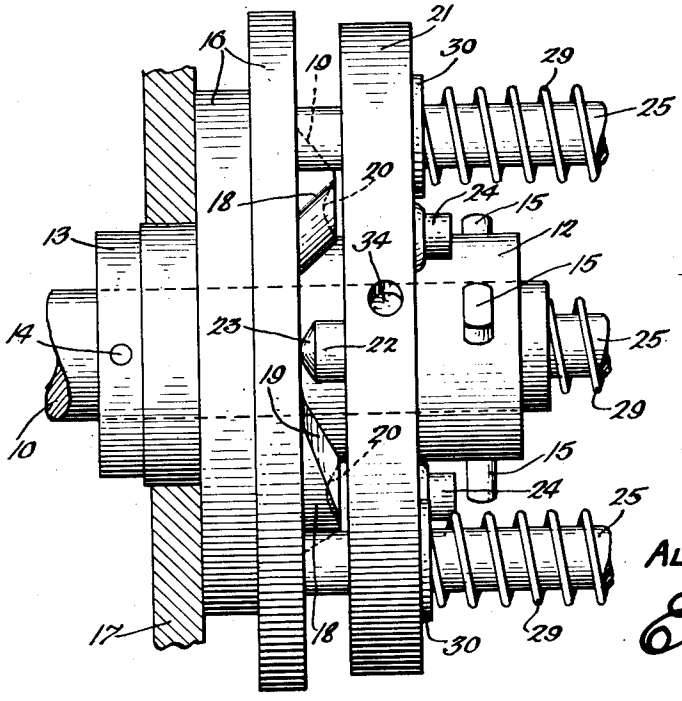


Fig. 2

Inventor
ALBERT H. RANCKE
E. K. Lundy
Atty.

Sept. 27, 1932. A. H. RANCKE 1,879,486

RELEASE DEVICE FOR DRIVE MECHANISM FOR BAKE OVENS

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Fig. 3

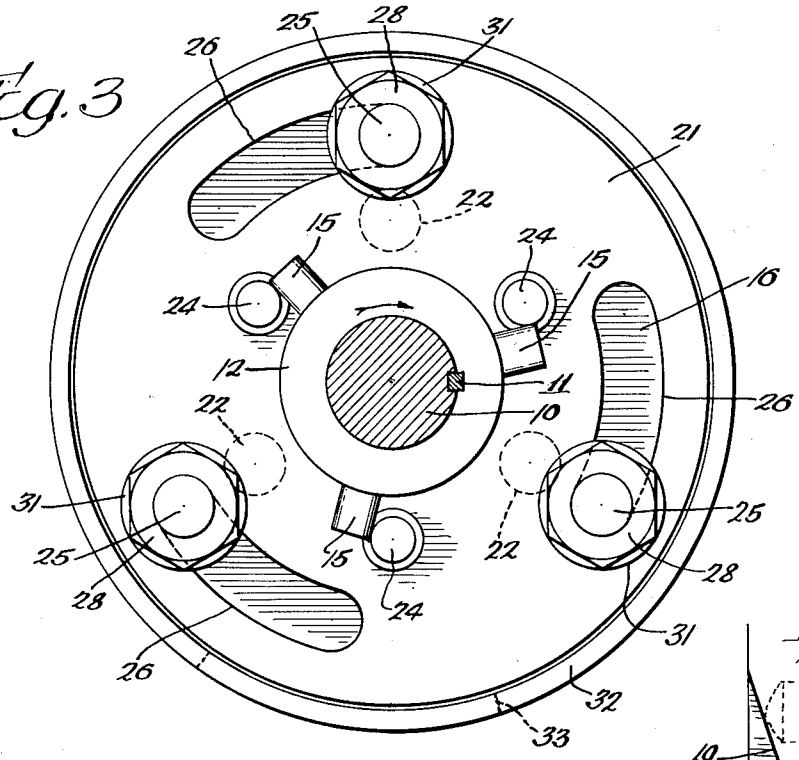


Fig. 5

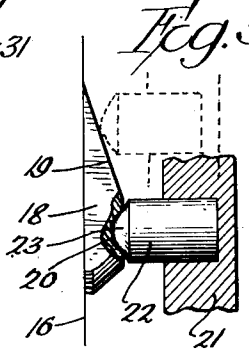
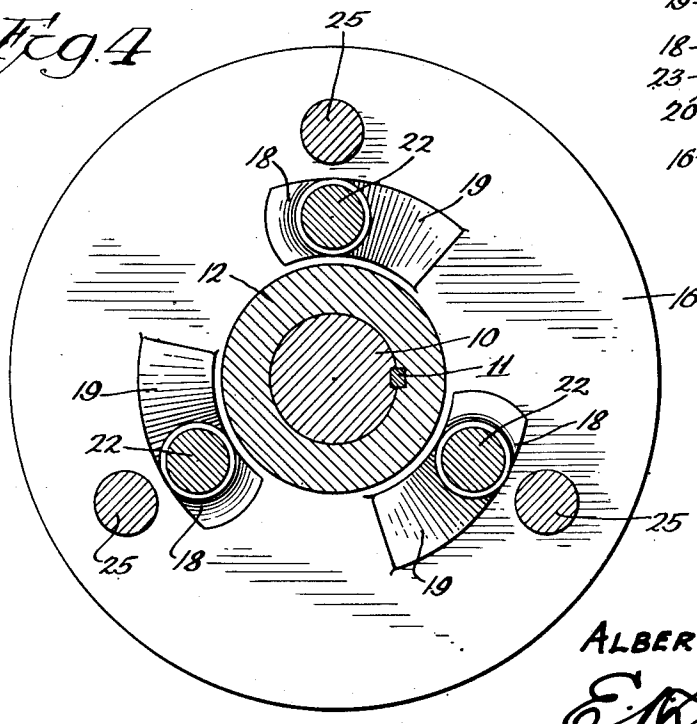


Fig. 4



Inventor
ALBERT H. RANCKE
E. K. Rundy Atty.

Sept. 27, 1932. A. H. RANCKE 1,879,486

RELEASE DEVICE FOR DRIVE MECHANISM FOR BAKE OVENS

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Fig. 6

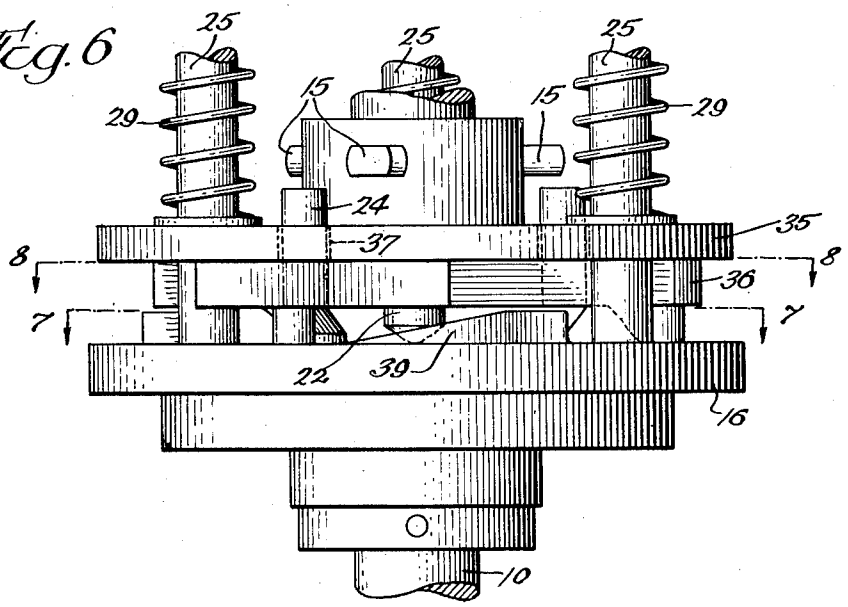


Fig. 9

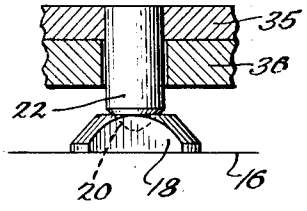
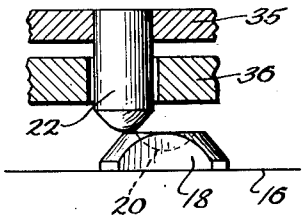


Fig. 10



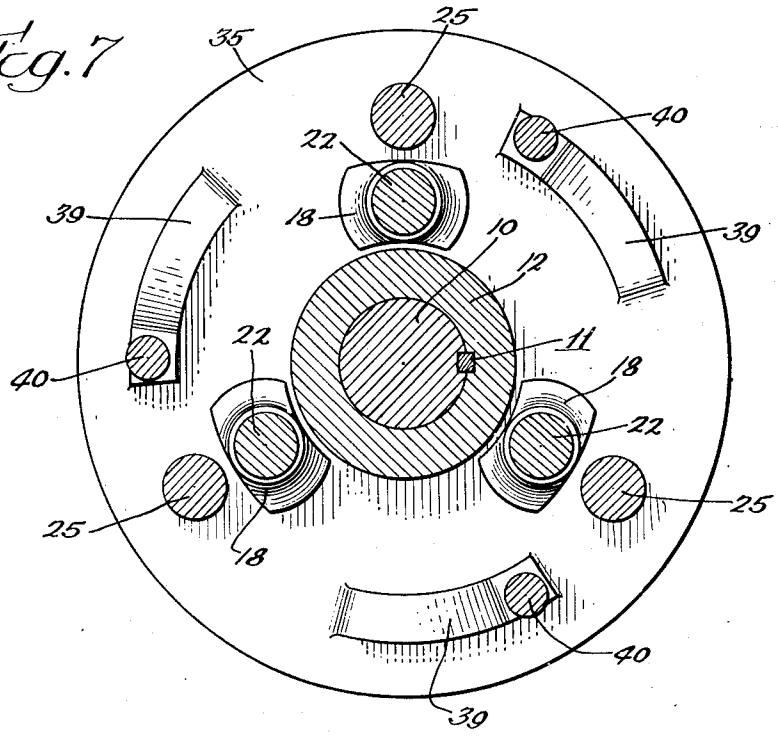
Inventor:
ALBERT H. RANCKE
E. K. Lundy
Atty.

Sept. 27, 1932. A. H. RANCKE 1,879,486

RELEASE DEVICE FOR DRIVE MECHANISM FOR BAKE OVENS

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Fig. 7



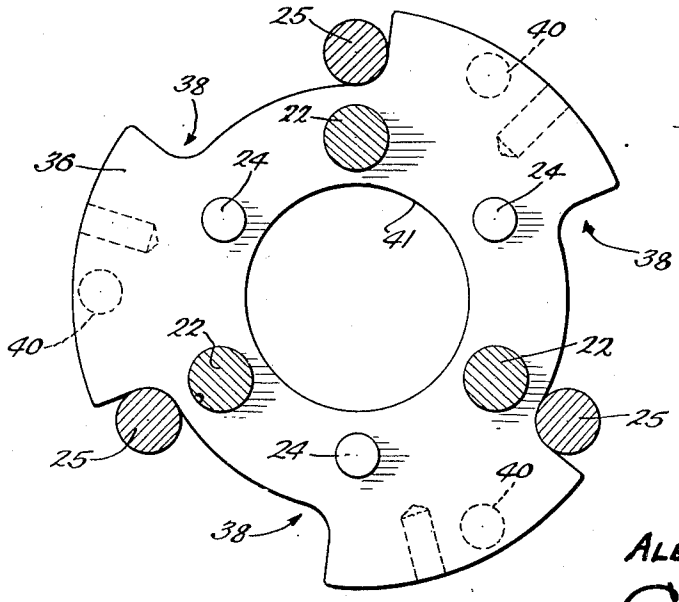


Fig. 8

Inventor
ALBERT H. RANCKE
E. N. Lundy
Atty.

Patented Sept. 27, 1932 1,879,486

UNITED STATES PATENT OFFICE

ALBERT H. RANCKE, OF HINSDALE, ILLINOIS, ASSIGNOR TO THE PETERSEN OVEN COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

RELEASE DEVICE FOR DRIVE MECHANISM FOR BAKE OVENS

Application filed October 4, 1930. Serial No. 486,341.

My invention relates to a safety device in the form of a "throw-off" that is adapted to disengage a driven member from its operative connection with a drive member in the event of accident or stoppage of parts connected with either member. More particularly my invention relates to the "throw-off" for use in connection with bake-ovens.

In ovens of the traveler type the moving hearth is usually in the form of shelves or plates that hang from a link belt conveyor and move in a circuitous path through the oven during the baking operation. The traveler or conveyor is often driven by means of an electric motor which, on account of its high speed, is geared down by means of a gear-reduction apparatus, and the power and motion for actuating the traveler, which moves at a much slower speed, is transmitted from the gear-reduction apparatus by means of chains and sprockets, or the like. It sometimes occurs that one of the shelves or carriers of the hearth or a chain and sprocket become jambed which would, under ordinary conditions, throw a heavy burden upon the motor and frequently will "blow out" the circuit when an electric motor is used.

It is to overcome the inherent objection to the present constructions that I have designed a "throw-off" that is interposed between the motor or power shaft and the gear reduction device, and said throw-off is constructed in such manner that when an over-load occurs it will automatically disconnect the driving mechanism from the driven mechanism. The throw-off is also constructed so that it may be readily reset by an ordinary operator or mechanic without the use of special tools.

My invention has numerous objects in view among which are the provision of a device of this character that is novel and compact in construction, dependable in operation, simple in the formation and assembly of its parts, economical to produce, and which will not readily get out of order. I prefer to carry out my invention and to accomplish the numerous objects thereof in substantially the manner hereinafter fully described and as more particularly pointed out in the claims. The accompanying drawings are to be understood as being more or less schematic for the purpose of illustrating a typical or preferred form in which my invention may be made and in these drawings similar reference characters have been employed to designate like parts wherever they appear throughout the several views.

Reference will now be made to the accompanying drawings that form a part of this specification, in which:—

Figure 1 is a view, partly in broken-away section, showing the details of my device in side elevation and under normal operating conditions.

Figure 2 is a view similar to Figure 1 showing the positions of the parts after the same have been disconnected to release the drive shaft.

Figure 3 is an end view of my device looking at the right side of Figure 1.

Figure 4 is a transverse section taken on line 4—4 of Figure 1 and looking in the direction of the arrows.

Figure 5 is a detail view of a pair of the coacting clutch members.

Figure 6 is a view similar to Figure 2 of a modified form.

Figure 7 is a section thereof on line 7—7, Fig. 6.

Figure 8 is a section on line 8—8, Fig. 6,

Figures 9 and 10 are detail views of the clutch members.

In the drawings 10 represents a rotatable drive shaft, which for convenience may be the drive spindle of an electric motor of the desired horse power to actuate the traveler of the bake-oven, and upon the end of this shaft I mount an extension or head that is preferably in the form of a bushing that is keyed to the shaft by the key-pin 11. The bushing or head has its outer end enlarged in diameter to provide the head 12 while the remaining portion 12^a of the bushing or extension is of less diameter and has its portion opposite the head provided with screw threads upon which a collar or stop 13 is screwed and is secured in position by a set-screw 14.

The cylindrical side portions of the head 12 are provided with radially disposed projections 15, the purpose of which will later

be described in detail herein. A disk-like plate 16 having an axial bore is mounted upon the reduced portion of the bushing back of its head and is free to rotate upon said bushing. The face of the plate 16 next the collar 13 is provided with stepped portions, providing a plurality of shoulders and the pulley 17 for connecting the structure with the gear-reduction apparatus is bolted upon one of these step portions in the manner shown in Figure 1. The opposite face of the plate 16 is provided with a plurality of embossments 18 in the form of lateral lugs that are arranged concentrically around the central opening in plate 16, and each lug is provided with a wedge or cam-shaped face 19 that inclines upwardly away from the adjacent surface of said plate to provide the members that cooperate with other members to form the clutch. At the upper or outer portions of the embossments or lugs there are depressions or sockets 20 that form one set of counterpart clutch elements that are adapted to coact, under normal conditions, with clutch parts to be later described herein.

Spaced from the plate 16, and from the embossments or lugs 18 just mentioned, is another or second plate 21 that is yieldably urged towards plate 16 and is provided with a plurality of concentrically arranged studs or clutch members 22. These studs or clutch members 22 have their outer ends rounded slightly as at 23 in order to seat in the sockets 20 of the embossments or lugs on the opposite plate. On account of the plate 21 being yieldably urged towards plate 16 the clutch elements (the studs 22 and sockets 20) are interengaged when the structure is normally operating. When, however, there is a drag or stoppage of the traveler or other driven parts, the pulley will stop and the studs 22 will unseat from their respective sockets and move along the inclined faces 19 thus carrying the plate 21 towards plate 16.

The plate 21 has a bore slightly greater than the diameter of the head 12 of the bushing and it is positioned adjacent the radial projections 15 of the bushing. The face of plate 21 nearest the radial projections 15 is provided with a plurality of lateral projections 24 the sides of which are normally engaged with the projections 15 on the head of the bushing and when the shaft is rotated the interengagement of these projections 15 and 24 causes the plate 21 to rotate and thereby rotate the pulley 17 mounted upon the plate 16 towards which the first mentioned plate is yieldably urged.

In order to yieldably urge plate 21 towards plate 16 so that the clutch members 22 and 20 may be normally engaged in assembly with each other, I provide a plurality of posts 25 that are secured to and extend laterally from plate 16 intermediate the cam embossments 18 and these posts pass through segmental or arc-shaped slots 26 in the yieldably mounted plate 21. The outer ends of these posts are screw-threaded to receive the adjusting-nuts 27 and lock-nuts 28, and relatively heavy coiled expansion-springs 29 surround the intermediate portions of the posts 25 and have their ends bearing against washers 30 and 31 that respectively engage the plate 21 and adjusting-nuts 27. The arc-shaped slots 26 are of sufficient width to permit free relative movement between the posts 25 and plate 21, and the washers 30 are large enough in diameter to bridge said slots 26 and permit plate 21 to move rotationally independently of the posts during the "throw-off" action. The tensions of the springs 29 may be readily adjusted by loosening the lock nuts 28 and then turning the adjusting nuts 27 in the proper direction to increase or decrease the distance between said nuts and the plate 21, after which the lock-nuts are tightened against the adjusting nuts in the usual manner. A shield or safety guard 32 in the form of a wide cylinder is suitably secured to the disk 16 and extends therefrom beyond the ends of the posts 25 in the manner shown in Figure 1, and said shield is provided with a transverse slot 33 shown in dotted line in Figure 3 through which a spike or tool may be inserted to engage a hole 34 made in the edge of plate 21 for the purpose of resetting the parts whenever necessary.

When a drag or stoppage occurs in the mechanism actuated by this apparatus the tendency of the pulley and disk 16 will be to stop or stand still while the tendency of the motor shaft 10 and its bushing will be to continue rotation, thus causing the projections 15 to press tighter against the coacting projections 24. This causes the studs 22 of the clutch portion to ride out of their sockets 20 and move down the inclined or wedged faces 19, due to the springs urging the plate 21 towards plate 16. This retracts or moves the projections 24 out of the path of the projections 15 and will permit the shaft and its head to continue rotation and the projections 15 will move past the projections 24 in the manner shown in Figure 2 without contacting the same.

In the structure hereinbefore described, when the studs or clutch members 22 are moving out of the sockets of the opposing clutch members 20, the plate 21 that carries the projections or pins 24 must necessarily move away from plate 16 a slight distance until the ends of parts 22 clear the sockets 20. This movement will cause the projections or pins 24 to move farther along in engagement with the radial projections or pins 15 on the head or end of the drive shaft, and when the studs ride down from the highest edges of the wedge faces 19 there will be a further or reverse movement of the lateral pins 24 against the radial pins 15, until such time as the ends of one set of pins move out of the

path of the other set. This, under certain conditions might create too much friction or might too long delay the disengagement of the respective sets of pins. The disengagement of the clutch members is caused by a relative rotative movement between plates 16 and 21 due to a drag or stoppage of parts actuated by the mechanism.

In order to increase the speed of disengagement and to reduce friction I may modify the structure in the manner shown in Figures 6 to 10 wherein it will be seen I have provided two plates in place of the single plate 21. In said figures, I have shown the drive or motor shaft 10 as being disposed upon a vertical axis instead of horizontally as in the other figures. In the structure shown in Figures 6 to 10 the plate 35 corresponds in outline and dimensions with the plate 21 of the other form and it has upon its face nearest the stepped plate 16 the laterally projecting clutch studs 22 that normally engage with sockets 20 in the embossments on the plate 16. These embossments do not have the wedge shaped inclined surfaces 19 leading from them to the plate 16 such as shown in detail in Figure 5, but said embossments are of frustoconical shape. An intermediate plate 36, of less diameter than its companion plate 35, is utilized to carry the lateral pins 24 that normally engage the radial pins 15, and said lateral pins pass through openings 37 in the plate 35. The plate 36 has circumferential recesses 38 formed in its edge in order to accommodate the posts 25 whenever there is a relative movement between the plates 35 and 36 and the plate 16. The recesses 38 correspond generally in outline to the arcuate slots 26 formed in plate 21.

The tension springs 29 urge plates 35 and 36 towards the plate 16 in the same manner as in the previously described structure. The plate 16 is provided with inclined embossments 39 that take the place of the cam surfaces in the other structure and the plate 36 is provided with projections or pins 40 that extend towards and engage the cam projections 39 on the adjacent face of plate 16. The plate 36 is provided with a central opening 41 corresponding in diameter to the central opening in the plate 35 so that both of said plates may surround the enlargement or head 12 on the end of the drive shaft and permit said plates to move independently thereof.

When a drag comes upon the structure, the plate 35 will be forced away from the other plates in the manner shown in Figure 10 due to the clutch members becoming separated. The plates 16 and 36 remain in the same spacing shown but there has been a relative rotational movement of these parts which causes projections 40 to begin to slide down the cam surfaces 39, immediately starting the withdrawal of the lateral pins 24 from the radial pins 15. By the time the clutch members have entirely disengaged each other, the pins 15 and 24 have been separated thus stopping movement of the driven mechanism. It will be seen this operation is quicker than the operation of the parts disclosed in Figures 1 to 5, and, while this modified structure comprises more parts it may be found more adaptable to certain conditions. Therefore, it will be understood that I do not limit myself to the structure shown in the preferred form as either of the disclosed types of structure may be employed.

What I claim is:—

1. A throw-off device comprising a rotatable drive member, a rotatable driven member coaxially arranged with respect thereto, and means operatively connecting said members, said means consisting of axially separated plates, yielding means for urging one of said plates towards the other plate, coacting studs and sockets on the respective plates that are maintained normally engaged by said yielding means, and normally coacting elements on said drive member and said yielding plate and adapted to be disengaged upon the movement of the yieldable plate towards the other plate due to disengagement of the studs and sockets.

2. A throw-off device comprising a rotatable drive shaft, a rotatable member coaxially arranged with respect thereto, and means for operatively connecting said member and shaft said means consisting of a plate mounted on said shaft, a second plate spaced from the first plate, means for yieldably urging the second plate towards the other plate, coacting studs and sockets on the respective plates that are maintained normally engaged by said yielding means, and elements on said shaft and the movable plate that are disengaged by the movement of the second plate towards the first plate due to disengagement of the studs and sockets.

3. A throw-off device comprising a rotatable drive shaft, a plate mounted thereon, a second plate spaced from the first plate, means for yieldably urging the second plate towards the first plate, counterpart interengaging elements on adjacent portions of the respective plates and normally maintained in engagement by said yielding means, and normally engaged elements on said shaft and second plate that are adapted to be disengaged by the movement of the second plate towards the first plate.

4. A throw-off device comprising a rotatable drive shaft, a plate mounted on said shaft, a yieldably mounted second plate adjacent the first plate, a plurality of studs on one of said plates, a plurality of cam elements on the other plate having sockets in which said studs normally seat, and normally engaged members on said shaft and yieldable plate whereby said plate is driven by said shaft,

said members being adapted to be disengaged upon the yielding movement of the second plate which unseats the studs from their respective sockets.

5. A throw-off device comprising a rotatable drive shaft, a rotatable plate carried thereby, a second plate spaced from the first plate, posts on one plate extending through the other plate, springs on said posts for urging said plates yieldably towards each other, normally engaged clutch members on adjacent faces of said plates, radial projections on said shaft, and lateral projections on said second plate that normally engage said radial projections whereby to cause said plates to rotate with said shaft, said projections adapted to be disengaged upon the disengagement of the clutch members which causes a relative movement of said plates.

6. A throw-off device comprising a rotatable drive shaft, a pair of side by side plates carried thereon and capable of relative movement towards and from each other, means for urging said plates towards each other, devices for normally separating said plates and consisting of studs and sockets on adjacent faces of the respective plates, radial projections on said shaft, and lateral projections on one of said plates that normally engage said radial projections to cause said plates to normally rotate with said shaft.

7. A throw-off device comprising a rotatable shaft, a pulley loose on said shaft, clutch members connected to said pulley, a plate spaced from said pulley and having concentrically disposed openings, counterpart clutch members on the face of said plate nearest said first mentioned clutch members, posts connected to said pulley and extending through said openings, springs on said posts for urging the plate towards said pulley, and normally engaged elements on said shaft and plate that are adapted to be disengaged when said clutch members are released by a relative movement of the plate towards the pulley.

8. A throw-off device comprising a rotatable shaft, a plate carried thereby and capable of independent movement relative thereto, a second plate spaced from the first plate and having concentric arcuate slots, coactable clutch members carried by the respective plates, lateral posts projecting from the first plate through said arcuate slots, stops on said posts, coiled expansion springs on said posts between said stops and said second plate for urging the latter towards the other plate, whereby said second plate is capable of independent rotational movement relative to the other plate, and normally engaged elements on said shaft and said second plate that become disengaged when said second plate is independently rotated.

9. A throw-off device comprising a rotatable drive-shaft, a rotatable member carried thereby and capable of independent rotative movement, a driven structure carried by said member, means for yieldably urging said structure towards said member, coacting clutch elements on adjacent portions of said member and driven structure, said elements normally maintained in engagement by the urge of said driven structure towards said member and separated by independent rotative movement of said member and driven structure with respect to each other, and normally engaged abutments on said shaft and driven structure that disengage each other upon the separation of the clutch elements.

10. A throw-off device comprising a rotatable drive-shaft, a rotatable member carried thereby and capable of independent rotative movement, a rotatable driven structure carried by said member, means for yieldably urging said structure towards said member, coacting clutch elements on adjacent portions of said member and driven structure, said clutch elements being normally maintained in engagement by the urge of said driven structure towards said member and are separated by a relative rotational movement between said member and driven structure, and normally engaged abutments on said shaft and driven structure that disengage each other upon the separation of the clutch elements.

11. A device of the kind described comprising a rotatable drive-shaft having abutments thereon, in combination with a driven structure carried thereby, said driven structure consisting of a plate loose on said shaft, having clutch elements on one face, and means normally connecting said drive-shaft and driven structure consisting of a pair of companion plates spaced therefrom and loose on said shaft, clutch elements on said companion plates that normally engage the clutch elements on said driven structure plate, yieldable devices for urging said companion plates towards the other plate, and abutments on one of said plates that engage the shaft abutments and are adapted to be retracted when the clutch elements are disengaged.

12. A device of the kind described comprising a drive-shaft, a driven member loose thereon, a second member loose on said shaft and spaced from the driven member, yielding means urging said members towards each other, devices operatively connecting one of said members to said shaft and including retractable elements, and coactable clutch elements interposed between said first and second members that are separated by relative rotational movement of one of said members independent of the other.

13. A device of the kind described comprising a drive-shaft, a driven member loose thereon, a second member loose on said shaft and spaced from the driven member, yielding means urging said members towards each other, devices operatively connecting one of

said members to said shaft and including retractable elements, one of said members having sockets on its face nearest the other member, and studs on said other member removably engaged in said sockets, said studs adapted to be unseated from said sockets by a relative rotational movement of one of said members independent of the other.

14. A device of the kind described comprising a drive-shaft, a driven member loose thereon, a second member loose on said shaft and spaced from the driven member, yielding means urging said members towards each other, devices operatively connecting one of said members to said shaft and including retractable elements, said first member having sockets in its face nearest the second member, cams on said first member adjacent said sockets, and projections on the second member extending towards the other member for coaction with said sockets and cams, whereby relative rotation of one of said members will release said projections from said sockets and move said projections down said cams to cause said members to approach each other thereby disconnecting the drive and driven parts of the device.

Signed at Chicago, Cook County, Illinois, the 11 day of September, 1930.

ALBERT H. RANCKE.