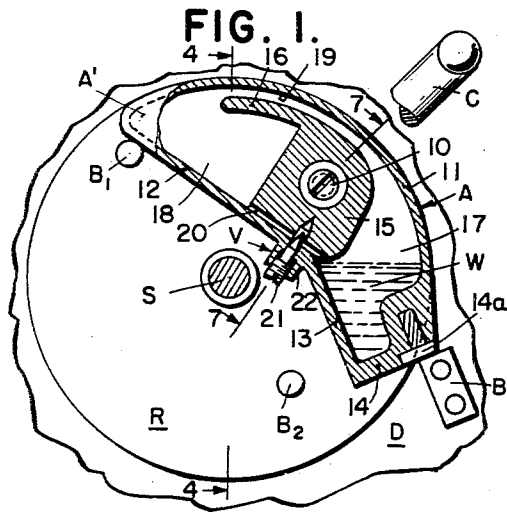
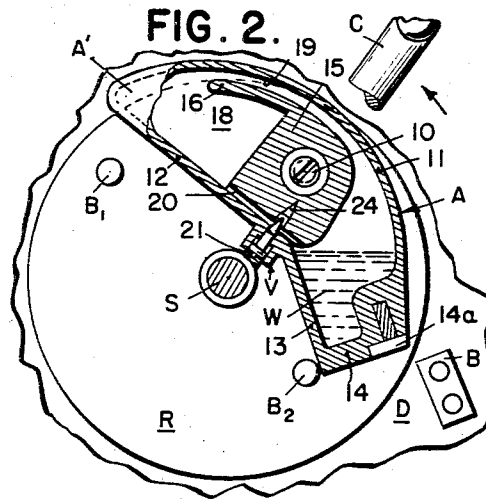
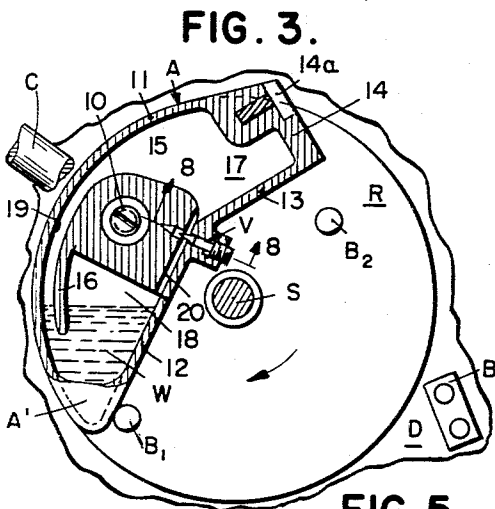
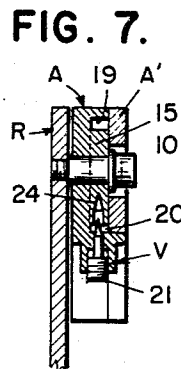
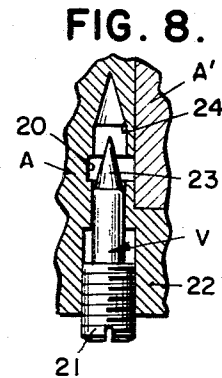
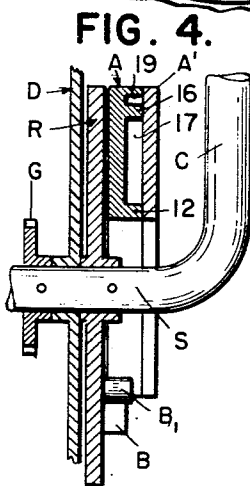
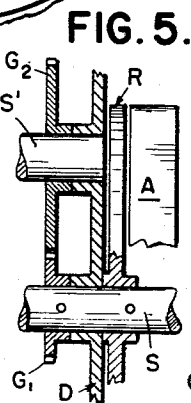
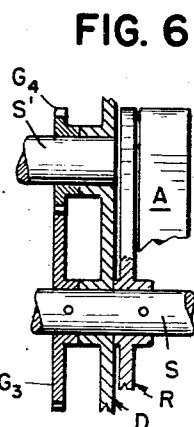


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ROTATION CONTROL UNIT

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ROTATION CONTROL UNIT

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This invention relates in general to and has for an object the provision of a new rotation control unit, but more particularly to a simple economical and efficient mechanism for arresting and limiting movement of a rotatable element to a selected fractional part of a single revolution or one or more revolutions or fractional portions thereof, together with means operative upon a slight reverse movement for releasing and permitting removal in the first direction to an extent limited by the arresting means.

Another object is to provide a mechanism of the character mentioned which includes a rotatable member and a rotation arresting unit pivotally borne by the rotatable member and adapted to be overbalanced under the influence of gravity in opposite directions as the rotatable member revolves in opposite directions.

A further object is to provide a rotatable arresting unit which bears a shiftable weight so mounted that as the arresting unit moves in an opposite direction beyond dead center position relative to its axis of rotation, said member will correspondingly tilt on its axis of oscillation and cause its weight to shift to an extent that a portion of said unit will project into a position of interference with a fixed stop which is otherwise not in the path of the arrestor. Also, after the arrestor is released from engagement with said stop by reverse rotation of the arrestor the weight thereon will readily shift in an opposite direction to an extent limited by a stop on the rotatable member, thereby retracting the projecting portion of the arrestor from said fixed stop in readiness for an ensuing forward movement of the rotatable member.

A further object is to form the arrestor with two spaced chambers connected by a shallow passage and to provide therein a quantity of shiftable material, either fluid or granular, sufficient to but partly fill only one of said chambers, and thus to provide the hereinbefore mentioned shiftable weight. We have ascertained that mercury is well adapted for the weight element because of its fluidity and specific gravity, thereby providing maximum weight with minimum volume. Moreover, mercury will flow in shallow passages where said or other granular elements would tend to pack and clog the passage.

A still further object is to provide a valve-like control device for varying the effective area of the passage between the two chambers of the arrestor so as to increase or decrease the period of time required for the weight element of the arrestor in accordance with requirements of various uses for the unit and variable speeds of the rotatable member or driven member whose operation the arrestor controls.

Other objects may appear as the description progresses.

We have shown in the accompanying drawings a preferred form of the invention, subject to modification, within the scope of the appended claims without departing from the spirit of the invention. In said drawings:

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Fig. 1 is a face view of our rotation arrestor [in section] mounted on a rotatable member and stopped against further rotation in a clockwise direction;

Fig. 2 is a view of the same elements when slightly rotated reversely to release the unit for repeated forward movement;

Fig. 3 is a view of the same elements as while being rotated in a forward direction but while the arrestor is overbalanced leftwardly and limited by a stop on the supporting rotatable member;

Fig. 4 is a sectional view on line 4—4 of Fig. 1 showing a 1 to 1 connection between the manually operable arrestor and a driven shaft;

Fig. 5 is a sectional view of the unit showing a 1 to 2 connection between the arrestor and a driven shaft;

Fig. 6 is a sectional view of the same showing a 2 to 1 connection between the driving and driven shafts;

Fig. 7 is a cross sectional view of the arrestor on line 7—7 of Fig. 1; and

Fig. 8 is a fragmentary sectional view on line 8—8 of Fig. 3.

When manually operable the unit of our invention preferably includes a driving shaft S integral with [as shown] or having a crank C attached thereto, a rotatable member R secured to and rotatable with crank C as in Fig. 4 or with separable driving and driven shafts S and S' respectively, as in Figs. 5 and 6, a rotatable arrestor A oscillatably mounted on and bodily rotatable with member R, a stop B fixed to a suitable case or base D and secondary stops B₁ and B₂ borne by the rotatable member R, together with certain gears for in some cases connecting the driving and driven shafts to vary the driving ratio to meet different conditions of use.

In its simplest form our arresting unit, as shown in Fig. 4, is directly connected with driven shaft S' on which shaft a gear G may be carried for transmitting motion to any desired unit for any desired purpose.

As shown in Fig. 5, shaft S is connected with shaft S' by pinion G₁ fixed to shaft S and driving a larger gear G₂ fixed to shaft S', thereby affording a 1 to 2 [or greater] ratio between said shafts.

In Fig. 6 shaft S carries a large gear G₃ meshed with a smaller gear G₄ on shaft S', thereby providing a driving ratio of 2 or more, or less to 1.

In all events the ratio between shafts S and S' may vary from less than one to one or more than one to one determined in integers or fractions, and under control of the arrestor unit A will thus cause the stoppage of rotation of the driven shaft S' at any desired point short or in excess of one revolution, as determined by the hook-up of shafts S and S'. Member A is oscillatably mounted on a fulcrum screw 10 secured to member R and is of substantially segmental form with an outer arcuate wall 11 and inner chordal wall sections 12 and 13 disposed at oblique angles, a right hand end wall 14 and a central block 15 having an arcuate wing 16. The left end of member A is closed by joining walls 11 and 12 and in the form shown member A has two chambers 17 and 18 which are connected adjacent wall 11 by a channel 19. Also said chambers are connected through block 15 adjacent wall section 12 by a narrower channel 20.

A quantity of heavy material, preferably mercury, as at W, is placed in the member A and sealed against leakage, as by adhesively or otherwise affixing a cover plate A' to the body of member A, and only enough of the element W is used to partly fill an internal chamber 17 or 18. Obviously, as the arrestor is tilted to the right as shown in Figs. 1 and 2 the element W will slowly flow from chamber 18 through channel 20 to chamber 17 and when tilted to the left as shown in Fig. 3 the

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element slowly flows through channel 20 from chamber 17 to channel 18.

When arrestor is upside down on member R the outer channel 19 will be downmost and following its position shown in Fig. 2 further rotation forwardly will cause the element W to flow from chamber 17 through channel 19 as the right hand end of the weighted chamber 17 begins the ascent of its orbit. The flow of the element W through channel 19 is necessarily much faster than through channel 20—in fact before chamber 17 has reached the position shown in Fig. 3 chamber 17 will have been completely evacuated of its contents and all of the element W will rest in the chamber 18.

Thus, as rotation forwardly of members R and A proceeds, the arrestor A will be overbalanced toward the left and will rest against stop pin B₁ until after a metal striker 14a borne by end 14 of member A engages the fixed stop B and member A cannot be further rotated forwardly until and unless it is retracted sufficiently to release it from stop B. When so retracted and released by a slight turn of crank C the weight in chamber 17 will swing the arrestor downwardly on its fulcrum to an extent limited by a second stop in B₂ but sufficiently to clear the stop B in the beginning of another operation.

In order to regulate flow of the element W through channel 20 we may provide a valve-like closure V borne by the bottom of arrestor A and extensible across channel 20 so as to vary the effective area of channel 20 and correspondingly vary the period of delay between succeeding possible revolutions forwardly of member R. Said device V is best shown in Fig. 8 and includes a screw 21 adjustable in a lug 22 at the bottom of arrestor A and having a needle-like closure 23 extensible through channel 20 into a socket 24 to a variable extent which because of the conical form of portion 23 will vary the effective area of said channel and the rate of flow of element W therethrough.

Of course the rotation and arrestment of the driven shaft S', regardless of its driving ratio, is affected proportionately to shaft S, and by computing proper driving ratios for shaft S' to meet varying demands of use, shaft S may be regulated in its forward rotation to any fractional part of one or more revolutions or any number of complete revolutions in a cycle of operations.

However, due to the effect of centrifugal force on arrestor A the rapid rotation of crank C on shaft S will not defeat the purpose of the invention because regardless of the speed of shaft S the arrestor will be sufficiently overbalanced to assure its stoppage by stop B. The time required to transfer element W from chamber 18 to chamber 17 depends upon the effective area of channel 20 only following slight retractive rotation of crank C, but because of the greater cross sectional area of channel 19 the element W is rapidly transferred from chamber 17 to chamber 18, if not completely before arrestor A has again been stopped by stop B, at least sufficiently to overbalance and extend striker 14a outwardly for engagement with stop B.

We claim:

1. A rotation control unit comprising: a rotatable member, a support therefor, a revolution arrestor oscillatably mounted on and rotatable with said rotatable member and arranged to shiftably support a weight element between two extremes of movement, a stationary stop on said support adjacent the orbit of said arrestor adapted to be engaged by an extremity of said arrestor when said extremity is overbalanced and thereby thrust outwardly beyond the normal orbit of said extremity, and means for rotatably moving said rotatable member and said arrestor to a position of release from said stop due to the overbalanced condition of the arrestor, and permit further forward rotation of said member.

2. A rotation control unit comprising: a rotatable member, a support therefor, a revolution arrestor oscil-

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latably mounted on and rotatable with said rotatable member and arranged to shiftably support a weight element between two extremes of movement, a stationary stop on said support adjacent the orbit of said arrestor adapted to be engaged by an extremity of said arrestor when said extremity is overbalanced and thereby thrust outwardly beyond the normal orbit of said extremity, and means for rotatably moving said rotatable member and said arrestor to a position of release from said stop due to the overbalanced condition of the arrestor, and permit further forward rotation of said member, such further forward rotation of the arrestor serving to overbalance the arrestor in an opposite direction and shift said weight element to an opposite extremity of said arrestor, preparatory to another operational cycle.

3. A rotation control unit comprising: a rotatable member, a support therefor, a revolution arrestor oscillatably mounted thereon at a point eccentric to the axis of said rotatable member, said arrestor having chambers on opposite sides of its fulcrum and channels connecting said chambers, a weight element borne by said arrestor and shiftable through said channels between said chambers so that during a portion of each revolution about the axis of said rotatable member said arrestor will be overbalanced in opposite directions and said weight element shifted from one chamber to another and return whereby to extend and retract a portion of said arrestor relative to a stationary stop mounted within the orbit of such extended portion, and means for rotating said member so said arrestor will disengage said stop and by reason of the then shifted weight permit further forward rotation of said rotatable member until again arrested by said stop.

4. A rotation control unit, as characterized in claim 3 including means on said rotatable member for limiting the inward thrust of said arrestor as the arrestor is swung on its axis of oscillation when overbalanced by said weight element.

5. A rotation control unit as characterized in claim 3 in which mercury is employed for said weight element.

6. A rotation control unit as characterized in claim 3 in which said weight element is of granular material.

7. A rotation control unit comprising: a rotatable member, a gravity actuated arrestor oscillatably mounted on and rotatable with said rotatable member, a relatively fixed stop member adapted to be engaged by a portion of and for stopping rotation of said arrestor at a given point in the orbit of said arrestor until the force of gravity is effective for releasing the same upon slight reverse rotation of the arrestor, said arrestor carrying a shiftable weight element movable from one end to the other of said arrestor and which when shifted to opposite positions overbalances the arrestor to occasion its engagement with said stop member and its release therefrom, said arrestor including means for restricting movement of said weight element from one position to another position.

8. A rotation control unit as characterized in claim 3 in which mercury is employed for said weight element, and means in one of said channels for varying the effective area thereof so as to correspondingly vary the period of time required to shift said element from one to another of said chambers.

9. A rotation control unit comprising: a rotatable member, a support therefor, a revolution arrestor oscillatably mounted thereon at a point eccentric to the axis of said rotatable member, said arrestor having chambers on opposite sides of its fulcrum and channels connecting said chambers, a weight element borne by said arrestor and shiftable through said channels between said chambers so that during a portion of each revolution about the axis of said rotatable member said arrestor will be overbalanced in opposite directions and said weight element shifted from one chamber to another and return whereby to extend and retract a portion of said arrestor relative to a stationary stop mounted within the orbit of such

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extended portion, and means for rotating said member so said arrestor will disengage said stop and by reason of the then shifted weight permit further forward rotation of said rotatable member until again arrested by said stop, one of said channels being of less cross sectional area than the other for restricting the shifting of said weight element from a first chamber to a second chamber while rotation of the arrestor is stopped.

10. A rotation control unit comprising: a rotatable member, a support therefor, a revolution arrestor oscillatably mounted thereon at a point eccentric to the axis of said rotatable member, said arrestor having chambers on opposite sides of its fulcrum and channels connecting said chambers, a weight element borne by said arrestor and shiftable through said channels between said chambers so that during a portion of each revolution about the axis of said rotatable member said arrestor will be overbalanced in opposite directions and said weight element shifted from one chamber to another and return whereby to extend and retract a portion of said arrestor relative to a stationary stop mounted within the orbit of such extended portion, and means for rotating said member so said arrestor will disengage said stop and by reason of the then shifted weight permit further forward rotation of said rotatable member until again arrested by said stop, one of said channels being of less cross sectional area than the other for restricting the shifting of said weight element from a first chamber to a second chamber while rotation of the arrestor is stopped, the greater area of said other channel serving to effect rapid return of said element to the first chamber, preparatory to a new operational cycle.

11. In an arrestor for limiting movement of a rotatable member by engagement with a fixed stop, the combination of: a housing adapted to be pivotally mounted on said member and having a portion engageable with said stop; a weight element located completely within and movable in said housing between first and second positions; and means on said housing for restricting movement of said weight element between said positions.

12. In an arrestor for limiting movement of a rotatable member by engagement with a fixed stop, the combination of: a housing adapted to be pivotally mounted on said member and having a portion engageable with said stop; a weight element movable in said housing between first and second positions; and adjustable means on said housing for restricting movement of said weight element between said positions.

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13. In an arrestor for limiting movement of a rotatable member by engagement with a fixed stop, the combination of: a body adapted to be pivotally mounted on said member having a portion engageable with said stop; a weight element located completely within and movable in said body between first and second positions; and means on said body for limiting said movement of said weight element at said first and second positions.

14. In an arrestor for limiting movement of a rotatable member by engagement with a fixed stop, the combination of: a body adapted to be pivotally mounted on said member having a portion engageable with said stop; a weight element located completely within and movable in said body between first and second positions; and means on said body for restricting the movement of said weight element between said first and second positions.

15. In an arrestor for limiting movement of a rotatable member by engagement with a fixed stop, the combination of: a housing adapted to be pivotally mounted on said member and having a portion engageable with said stop, said housing including first and second chambers at opposite sides of its pivotal mounting; channel means in said housing between said chambers; and a fluid weight element movable between said first and second chambers through said channel means.

16. In an arrestor for limiting movement of a rotatable member by engagement with a fixed stop, the combination of: a housing adapted to be pivotally mounted on said member and having a portion engageable with said stop, said housing including first and second chambers at opposite sides of its pivotal mounting; channel means in said housing between said chambers; a fluid weight element movable between said first and second chambers through said channel means; and a restriction in one of said channel means for retarding flow of said weight element through said one channel means.

References Cited in the file of this patent

UNITED STATES PATENTS

867,168	Stull	Sept. 24, 1907
995,091	Porter	June 13, 1911
1,044,212	Maize	Nov. 12, 1912
2,274,282	Stinson	Feb. 24, 1942
2,301,678	Brongersma	Nov. 10, 1942