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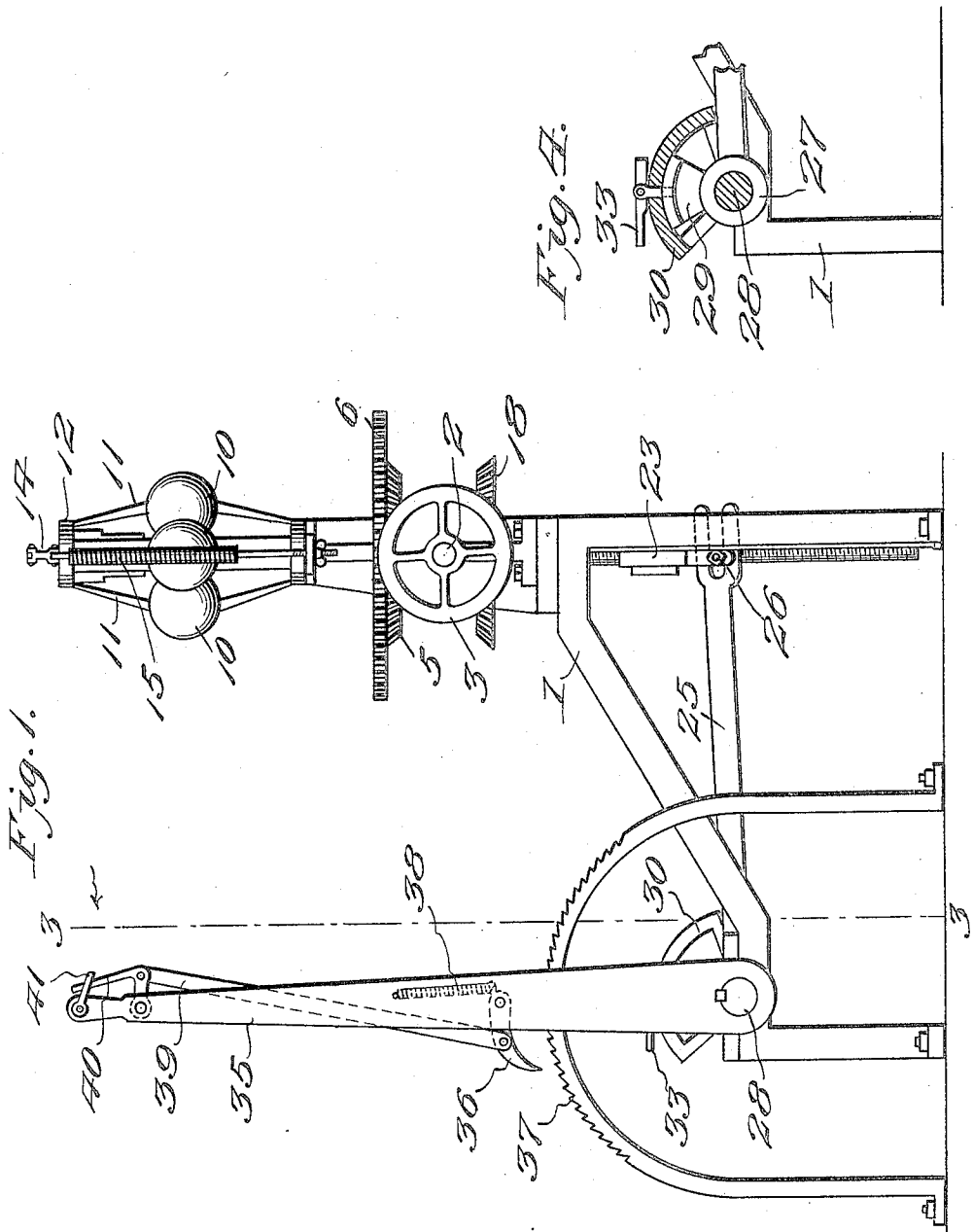
PATENTED APR. 17, 1906.

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SPEED REGULATOR.

APPLICATION FILED SEPT. 16, 1905.

2 SHEETS—SHEET 1.



Witnesses

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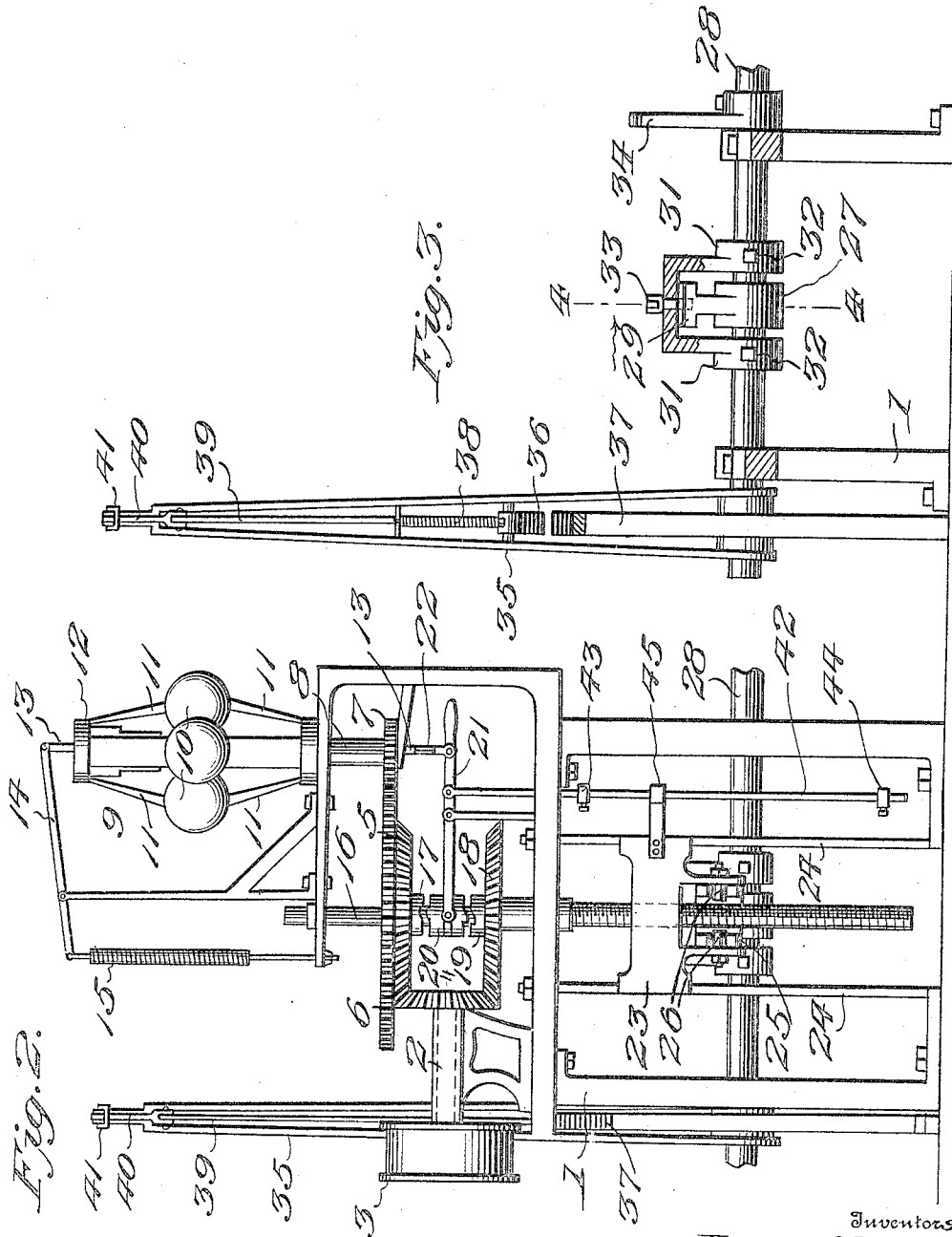
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UNITED STATES PATENT OFFICE.

JAMES OLER, CHRISTIAN A. FUGAL, AND JUNIUS J. HAYES, OF PLEASANT GROVE, UTAH.

SPEED-REGULATOR.

No. 818,281.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed September 16, 1905. Serial No. 278,729.

To all whom it may concern:

Be it known that we, JAMES OLER, CHRISTIAN A. FUGAL, and JUNIUS J. HAYES, citizens of the United States of America, residing at Pleasant Grove, in the county of Utah and State of Utah, have invented new and useful Improvements in Speed-Regulators for Water-Wheels, of which the following is a specification.

This invention relates to a governor or variable-speed regulator for water-wheels, and has for its object the production of simple and effective mechanism for regulating the supply of water to the wheel to control the speed of motion thereof and also the production of a speed-regulating mechanism of this character whereby the water-gate may be automatically controlled or adjusted by hand as desired.

With the above and other objects in view the invention consists of the novel construction and combination of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevational view of a water-wheel speed-regulator constructed in accordance with our invention. Fig. 2 is a front elevation of the same. Fig. 3 is a transverse section on the line 3 3 of Fig. 1, and Fig. 4 is a transverse section through the gate-operating shaft and the rocker-arm coupling on the line 4 4 of Fig. 3.

Referring now more particularly to the drawings, the numeral 1 designates the frame of the apparatus, which may be of any form, size, and construction to support the operating parts. Journaled in this frame is a horizontal drive-shaft 2, provided at its outer end with a pulley 3, adapted to be connected in practice with the shaft of the water-wheel, and having at its inner end a beveled driving-gear 4, meshing with a horizontally-disposed gear 5, to which is fixed a similarly-disposed spur-gear 6, meshing with a pinion 7 on the lower end of the shaft 8 of a centrifugal governor 9 of that type, provided with balls or weights 10, carried by inwardly and outwardly movable arms 11. At the upper end of the governor is a cap or head 12, operatively connected with the arms to move therewith and to which is fixed the governor-stem 13, which is pivotally attached at its upper end to a lever 14, controlled by a spring

15, which exerts a determined resistance to the downward movement of said stem. The construction of the governor is such that when the governor-balls 10 swing outward the head 12 will be drawn downward and depress the stem 13, while upon the inward movement of said balls the stem will be raised by the action of the arms 11 and the spring-controlled lever 14.

The gears 5 and 6 are loosely mounted upon the upper end of a speed-regulating shaft 16 and provided with a clutch collar or member 17, and also loosely mounted on said shaft below said gears 5 and 6 is a beveled gear 18, which meshes with the driving-gear 4 and is provided with a clutch collar or member 19. Splined to the shaft between the two clutch-collars 17 and 19 is a clutch member 20, which is adapted to rotate with the shaft and to slide thereon, so as to be positioned between the clutch-collars or to be thrown into connection with either of them. The gears 5 and 18 are constantly driven by the driving-gear 4, but rotate loosely on the shaft 16, so that the latter normally remains stationary. The gear 5 and the gear 6, connected therewith, are adapted in practice to turn counter-clockwise, while the gear 18 turns clockwise, so that by connecting the clutch member with the clutch-collars 17 or 19 motion may be imparted to the shaft in either direction. The clutch element 20 is annularly grooved in the usual manner to receive pins or studs on the yoked inner end of a shifting-lever 21, which is pivoted at its outer end to the lower end of the governor-stem 13, which latter is provided with an adjustable coupling 22, by which the length thereof may be varied to compensate for wear and to impart a proper degree of movement to the clutch element.

The lower end of the shaft 16 is threaded for engagement with a vertically-movable nut or reciprocating actuating element 23, slidable on guides 24, and to which the inner end of a rocker-arm 25 is pivotally connected by pins or bolts 26. The outer end of said rocker-arm carries a sleeve or hub 27, which loosely engages a gate-operating shaft 28, and is provided with a coupling projection 29. This projection 29 is arranged between the side portions or arms of a segmental yoke or coupling member 30, having sleeves 31 embracing the shaft and fixed thereto by set-screws 32. The member 30 is provided with

a suitable latch device 33 to engage the member 29 and thereby lock the same to the shaft to positively couple the rocker-arm therewith. As the nut or actuating device 23 moves up or
 5 down it rocks the arm 25, thereby oscillating the shaft 28 in one direction or the other; but by releasing the latch 33 the rocker-arm will be permitted to move without imparting motion to the shaft, thus throwing the latter out
 10 of action. The shaft carries an arm 34, which may be connected by a rod or other suitable connecting element with the water-wheel gate to open said gate when the shaft turns in one direction and close it when the shaft
 15 turns in the reverse direction. We have not deemed it necessary to show the connecting-rod or element, as the connecting means may vary in construction and arrangement according to the structure of the gate and the
 20 arrangement with respect thereto of the governor mechanism. When the rocker-arm is disconnected from the shaft 28, the latter will be uninfluenced by the governor mechanism and is free to be independently operated. A
 25 lever 35 is keyed to the shaft and adapted to be operated by hand to rock the shaft for the purpose of manually adjusting the gate. This lever carries a dog 36 to engage a stationary rack 37 to lock the lever and shaft in adjusted
 30 position. The pawl is adapted to be projected by a spring 38 and is connected by a link 39 to a bell-crank handpiece 40, by which the pawl may be retracted. A bail-shaped keeper 41, pivoted to the lever, is provided
 35 to engage the handpiece to enable the pawl to be held out of locking engagement with the rack when the shaft is operatively connected with the governor mechanism.

In operation the two gears 5 and 18 are constantly driven by the drive-gear 4, and as the gear 6 turns with the gear 5 constant motion will be imparted to the governor 9. When the speed of the water-wheel exceeds the normal, the action of the governor-weights 10 in
 40 flying outward causes the depression of the stem 13, whereby the clutch element 20 will be shifted into engagement with the collar 17 to lock the gears 5 and 6 to the shaft 16 and impart motion in one direction thereto. The
 45 nut 23 will thereby be operated to rock the gate-elevating shaft in one direction through the medium of the arm 25 and to thereby close the water-gate to a greater or less extent to correspondingly cut off the supply of water
 50 to the wheel. When the speed of the water-wheel falls below the normal and the governor-balls 10 move inward, the stem 13 is forced upward and the lever 21 shifted to throw the clutch element 20 in engagement
 55 with the clutch-collar 19, thereby locking the gear 18 to the shaft 16, which latter will be turned in the reverse direction to correspondingly move the nut 23 and actuate the arm 25 to rock the shaft 28 to open the gate and
 60 admit a greater supply of water to the wheel

to increase its speed of revolution. In order to shift the clutch member 20 to a neutral position, a vertically-slidable shipper-rod 42 is provided and is pivotally connected at its upper
 70 end to the lever 21. This rod carries adjustable contact-collars 43 and 44, arranged, respectively, above and below a contact-arm or projection 45, carried by the nut 23, so that when said nut moves a certain distance
 75 in either direction to impart a desired degree of opening or closing movement to the gate the arm 45 will engage the contact 43 or contact 44 and shift the rod 42 to swing the lever 21 and move the clutch element 20 out of en-
 80 gagement with the collar 17 or collar 19, as the case may be. By this means after normal conditions have been restored the shaft 16 will be disconnected from the driving-gears and the gate maintained in the position to
 85 which it has been adjusted until the speed of the wheel again falls above or below the normal.

It will be seen that our invention provides a speed-governing mechanism which is positive and reliable in action and adapted to regulate the supply of water to the wheel in a
 90 most effective manner to maintain a constant uniform speed of motion thereof and that it also provides effective means whereby the gate may be manually controlled, if desired.

Having thus described the invention, what is claimed as new, is—

1. In a speed-regulator for water-wheels, the combination with a driving element and a gate-controlling element, the latter comprising a rock-shaft, of a governor driven by
 100 said driving element, an actuating element for rocking the gate-controlling element, gearing between the governor and actuating element for automatically moving the latter in one direction or the other, and means for disconnecting the actuating element from the gate-controlling element to permit the latter to be independently operated.

2. In a speed-regulator for water-wheels, the combination with a driving element, and a gate-controlling element, the latter comprising a rock-shaft, of a governor driven by
 110 said driving element, an actuating device for automatically operating the gate-controlling element, gearing including clutch mechanism between the governor and actuating element for moving the latter in one direction or the other, and means for shifting the clutch mechanism to neutral position when the actuating
 115 element reaches the limit of its rocking movement in either direction.

3. In a speed-regulator for water-wheels, the combination with a driving element, and a gate-controlling element, the latter comprising a rock-shaft, of a governor driven by
 120 said driving element, gearing including clutch mechanism between the driving and gate-controlling elements for rocking the latter in one direction or the other, said clutch
 30

mechanism, being automatically controlled by the governor, and means automatically operated by said gearing for shifting the clutch mechanism to neutral position and
 5 throwing the gearing out of operation when the gate-controlling element has been rocked to the prescribed extent in either direction.

4. In a speed-regulator for water-wheels, the combination with a driving element, and
 10 a gate-controlling element, the latter comprising a rock-shaft, of a governor driven by said driving element, an actuating member operatively connected with the controlling element to impart rocking movement there-
 15 to, gearing between the driving mechanism and actuating member for moving said member in one direction or the other, said gearing including clutch mechanism automatic-
 20 ally controlled by the governor, and shifting means controlled by said actuating member for restoring the clutch mechanism to normal position.

5. In a speed-regulator for water-wheels, the combination with a driving element, and
 25 a gate-controlling element, the latter comprising a rock-shaft, of a governor operated by the driving element, a sliding actuating member operatively connected with the gate-controlling element to impart a rocking move-
 30 ment thereto, gearing including clutch mechanism controlled by the governor for moving said actuating member in one direction or the other, and shifting means controlled by
 35 said actuating member for restoring the clutch mechanism to normal position when adjusted to the limits of its movements.

6. In a speed-regulator for water-wheels, the combination with a driving element, and a gate-controlling element, of a governor
 40 driven by said driving element, an actuating element movable in one direction to operate the controlling element to open the water-gate and in the other direction to close the gate, gearing between the driving and actu-
 45 ating elements including clutch mechanism controlled by the governor for moving said actuating element in one direction or the other when the speed of the wheel exceeds or falls below the normal, and shifting means
 50 movable in parallel relation to the actuating element and operated thereby at the limit of its movements to restore the clutch mechanism to normal position.

7. In a speed-regulator for water-wheels, the combination with a driving element, and
 55 a gate-controlling element, of a governor driven by said driving element, an actuating member for operating the controlling element, a screw-shaft for operating said actu-
 60 ating member, gearing including clutch mechanism controlled by the governor for connecting the driving element with the shaft to operate it in one direction or the other, and shifting mechanism controlled by the actu-
 65 ating member to restore the clutch mechanism

to normal position and disconnect the gearing from the shaft.

8. In a speed-regulator for water-wheels, the combination with a driving element, and an oscillating gate-controlling element, of a
 70 reciprocating actuating member operatively connected with said controlling element, a governor driven by the driving element, a screw-shaft for operating the actuating member, gearing including clutch mechanism con-
 75 trolled by the governor for operating said shaft in one direction or the other, a shifting device for restoring the clutch mechanism to normal position, and means carried by the actuating member for operating said shifting
 80 device at the limit of the movements of said actuating member.

9. In a device of the class described, a driving element, a rock-shaft having means for communicating motion therefrom and hav-
 85 ing a yoke fixed thereto, automatic speed-regulating mechanism embodying a reciprocating member actuated by the driving element, a rocker-arm pivotally connected with the said reciprocating element and loosely en-
 90 gaging the rock-shaft and having a coupling projection between the arms of the yoke, and means for detachably connecting said projection to the yoke.

10. In a speed-regulator for water-wheels, the combination of a driving-gear, an oscil-
 95 lating gate-controlling shaft, a sliding operating element, a screw-shaft for operating said element, a governor, gears loosely mounted on the shaft and meshing with the driving-
 100 gear, one of said gears being in operative relation with the governor, said gears having clutch elements, a clutch member splined to the shaft and movable to engage either of
 105 said clutch elements, a shifting member for adjusting said clutch member, an operative connection between the actuating member and gate-controlling element, and shifting mechanism controlled by the actuating member
 110 for restoring the clutch member to normal position.

11. In a speed-regulator for water-wheels, the combination with a driving element and a gate-controlling element, of a governor
 115 driven by said driving element, an actuating member for operating the controlling element, a screw-shaft for operating said actuating member, gearing including clutch mechanism and an actuating-lever therefor controlled by the governor for connecting the
 120 driving element to the shaft to operate it in one direction or the other, a rod connected with the lever and carrying contacts, and a coacting contact member carried by the actuating member to engage the contacts on
 125 the rod at the limits of the movement of said actuating member to restore the clutch mechanism to normal position and disconnect the gearing from the shaft.

12. In a speed-regulator for water-wheels, 130

the combination of a drive-shaft carrying a gear-wheel, a screw-shaft, oppositely-revoluble gears loosely mounted on the screw-shaft and meshing with said gear-wheel and provided with clutch members, a cooperating clutch member on the screw-shaft between the gears, a lever for operating said cooperating clutch member to connect either of said loose gears with the screw-shaft, a governor driven by one of said gears and operatively connected with the lever, a rock-shaft, a nut actuated by the screw-shaft and operatively connected to the rock-shaft, and shifting mechanism

controlled by the nut operatively connected with the clutch-lever to restore said coacting clutch member to normal position at the limits of the movement of the nut. 15

In testimony whereof we affix our signatures in presence of two witnesses.

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CHRISTIAN A. FUGAL.
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Witnesses:

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