No. 802,437. PATENTED OCT. 24, 1905.

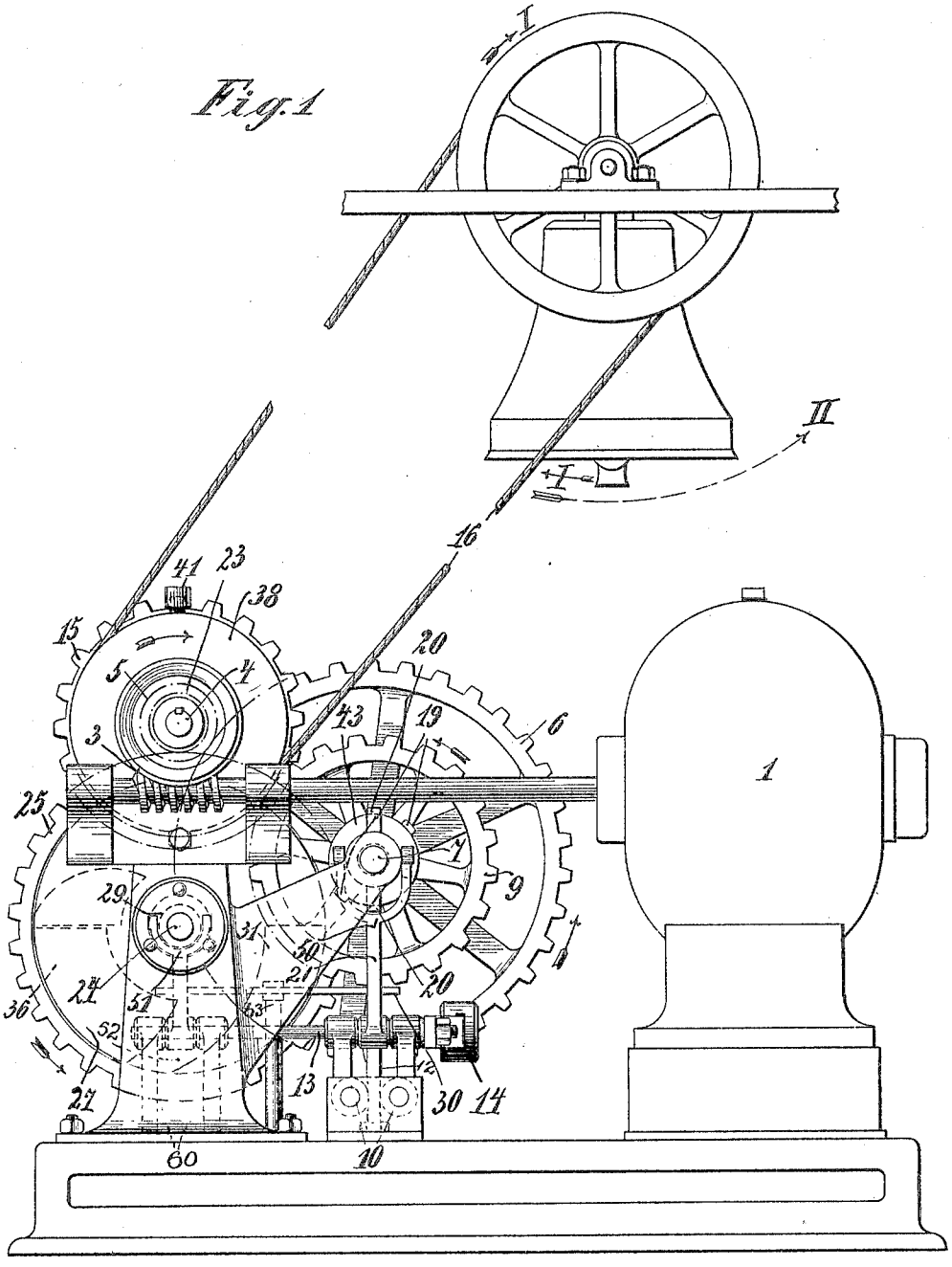
F. WEULE.

BELL RINGING APPARATUS.

APPLICATION FILED APR. 2, 1903.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS—SHEET 2.

Fig. 3

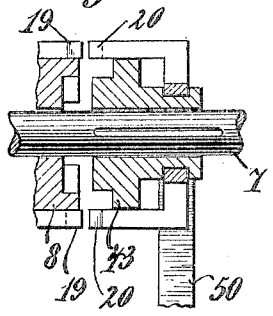


Fig. 4

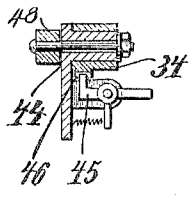


Fig. 5

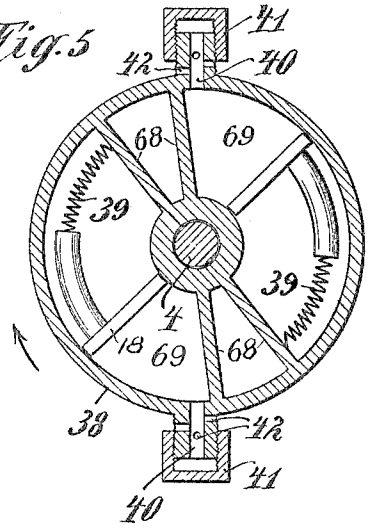
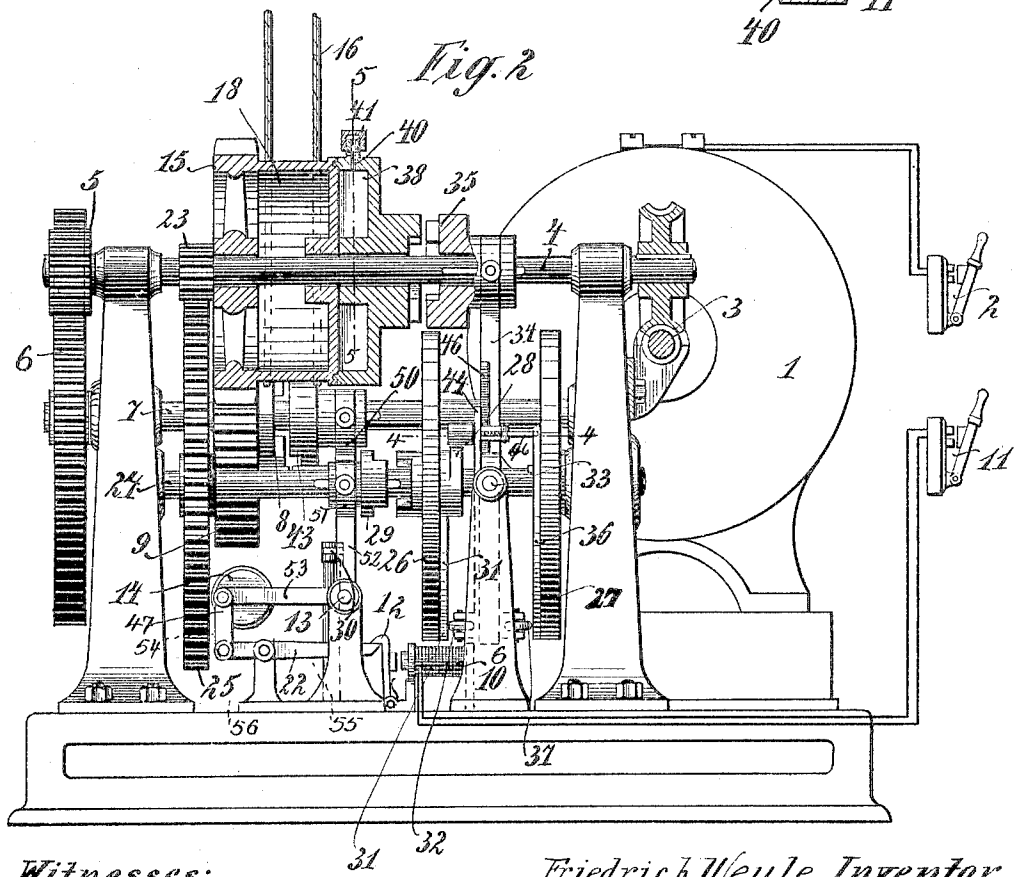


Fig. 2



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UNITED STATES PATENT OFFICE.

FRIEDRICH WEULE, OF BOCKENEM, GERMANY.

BELL-RINGING APPARATUS.

No. 802,437. Specification of Letters Patent. Patented Oct. 24, 1905.

Application filed April 2, 1903. Serial No. 150,712.

To all whom it may concern:

Be it known that I, FRIEDRICH WEULE, a citizen of Germany, residing at Bockenem-on-the-Harz, Germany, have invented an Improvement in Bell-Ringing Apparatus, of which the following is a specification.

My invention relates to means for automatically ringing church or alarm bells; and more particularly it consists in an arrangement and combination of mechanism designed to be operated by an electric motor.

One of the advantages of my invention resides in the fact that the ringing of the bell may be controlled from any convenient point, which may be at a considerable distance from the bell itself, since all that is necessary to start or stop the ringing of the bell is the manipulation of electric switches.

Means are provided, as will hereinafter more particularly appear, to derive the oscillatory movement required for the ringing of the bell from the continuous rotation in one direction of the motor, and provision is made to cushion the impulses delivered to the bell by the motor, such provision comprising what I term a "compressed-air coupling."

The various novel features and combinations of my invention will now be more specifically described, reference being had to the accompanying two sheets of drawings, in which the same numerals are used throughout the different views to indicate like parts, and will be finally pointed out and specifically stated in the annexed claims.

In the drawings, Figure 1 represents in side elevation a bell connected to my improved electrically-driven mechanism for ringing the same. Fig. 2 is an end elevation and partial section of said mechanism. Fig. 3 is a detail sectional view of one of the clutches. Fig. 4 is a detail sectional view of the automatic means for preventing the amplitude of the swinging movements of the bell from materially increasing, taken on the line 4 4, Fig. 2. Fig. 5 is a section through the compressed-air coupling, taken on the line 5 5, Fig. 2.

In the figures, 1 represents an electric motor the armature-shaft of which is operatively connected to a shaft 4 by means of a worm 3 and worm-wheel or other suitable gearing. The shaft 4 carries loosely the drum 18, on which is wound the rope leading to the bell, as shown in Fig. 1, said drum having formed integral therewith or attached thereto a gear 15.

In Fig. 2 I have shown diagrammatically a circuit and switch 2, by means of which the motor can be started or stopped from any convenient point. The shaft 4 also carries the compressed-air coupling 38, which has a yielding connection with the drum 18, as will be hereinafter described, the sliding clutch member 35, the pinion 23, and the gear 5, said last three elements being keyed to said shaft 4. Gear 5 meshes with a gear 6, fast on a shaft 7, on which is loosely mounted a gear 9, meshing with gear 15 of the rope-drum 18. Gear 9 has a clutch 8 connected therewith, and keyed to shaft 7 is a sliding clutch-sleeve 43, adapted to engage the clutch 8. Said clutch 8 carries a cam or cams 19, with which operate cams 20, formed on the yoke 50, which actuates said sleeve 43. The yoke 50 is pivoted by its shank 21, Fig. 1, to a rod 13, supported on the frame, from which rod an arm 53, carrying a weight 14, projects.

The weight 14 is normally maintained in an elevated position by means of a lever 22, one end of which is connected thereto by a link 47 and the other end of which is normally prevented from rising by a catch 12, formed on the armature of an electromagnet 10, the circuit of which is controlled by a switch 11, located adjacent to the motor-switch 2.

The pinion 23 meshes with a gear 25, fast on a shaft 24, which carries two cam-disks 26 and 27, the latter being fast to the shaft and the former being adapted to be clutched thereto by a sliding clutch-sleeve 29. This clutch is operated by a yoke 51, similar to the yoke 50 of the clutch 43, the shank of which is loosely pivoted on the rod 13.

The sleeve 29 is operated, through its yoke 51, to engage the cam-disk 26 by a lever 30, pivoted on a post 63, the opposite ends of said lever lying directly behind the vertical arms of the shanks 21 and 52 of the yokes 50 and 51, respectively. When, therefore, the weight 14 is released to move the sleeve 43 (by means of the yoke 50, shank 21, rod 13, and arm 53) into engagement with the clutch 8 on the gear 9, the sleeve 29 is moved in the opposite direction by means of the yoke 51 and shank 52, with which lever 30 contacts to engage with the clutch on the cam-disk 26. The electromagnet 10 only comes into use when the ringing is started, the operation of the mechanism so far described being as follows:

Closing the switch 2 starts the motor and closing switch 11 releases the weight 14, and

clutch 43 thereupon engages clutch 8. The drum 18 is therefore rotated by the motor through shaft 4, gears 5 and 6, shaft 7, clutches 43 and 8, gear 9, and gear 15, and the bell is "pulled." The cams 19 and 20 come into contact after approximately a half-revolution of gear 9, and sleeve 43 is thereby cammed back out of engagement with clutch 8. This raises weight 14 again, and the switch 11 having been opened immediately after the drum is started said weight is again maintained in its elevated position by the catch 12, a suitable spring, as 54, (see Fig. 2,) being provided to hold said catch away from its magnet. When the clutch-sleeve 43 was slid into engagement with the clutch 8 of gear 9, clutch-sleeve 29 was also slid into engagement with the clutch-hub of cam-disk 26 by the action of the lever 30. Shaft 4, through pinion 23 and gear 25, drives shaft 24, and consequently cam-disks 26 and 27. Cam 31 on the disk 26 acts on roller 32 of lever 34, pivoted at 33 (see Fig. 2) to slide clutch 35 into engagement with compressed-air coupling 38. The drum 18, which has been returned by the weight of the bell, is accordingly now again rotated in the same direction as that in which it was first rotated by gear 9. Cam 36 on disk 27 acts on roller 37 to throw lever 34 and clutch 35 in the opposite direction, and then the weight of the bell returns the drum again. The continued rotation of shaft 24 brings cam 31 round again, and the clutch 35 is thrown in again, and this cycle of operations is repeated as long as the motor continues to run.

There remains to be described the structure of the compressed-air coupling and the means to prevent the amplitude of the oscillations of the drum 18 from materially increasing.

The coupling consists of a cup-shaped casing 38, (see Figs. 2 and 5,) mounted loosely on shaft 4 adjacent to the closed end of the drum 18 and having a circular flange engaging a groove in said drum, making a substantially air-tight joint therewith. The end of said drum is provided with two radial ribs 18, and the casing 38 is provided with two pairs of radial ribs 68, each pair occupying a position intermediate of the ribs 18. Between each rib 18 and one rib 68 of each pair is arranged a coil-spring 39, the space between the other ribs 68 and the ribs 18 forming closed air-chambers 69. When, therefore, an impulse is delivered to the casing 38, the first effect is to compress the air in chambers 69, and therefore no objectionable jerk is delivered to the drum and bell. When the clutch 35 is drawn out of engagement, the springs 39 act to return the casing 38 to its original position relatively to the drum 18. To provide an adjustment for this coupling, so that the air-cushioning effect may be regulated, each chamber 69 is provided with a lug having a longitudinal aperture 40 and lateral passages 42, which latter may be more or less closed by a cap 41, screw-threaded onto the aforesaid lugs. As repeated impulses of equal force will cause the oscillations of the bell to gradually increase, I have provided automatic means to prevent this, comprising a bracket 44, mounted to slide longitudinally in the lever 34, which bracket carries the rollers 32 and 37. This bracket has a lateral projection, preferably in the form of an antifriction-roller 48, (see Fig. 4,) which when the amplitude of the oscillations of the bell, and consequently also of shaft 24 and cam-disk 26, increases beyond a certain point is acted upon by a cam 28, carried by or attached to said cam-disk 26, the bracket 44 being thereby raised and the rollers 32 and 37 being carried in radially of the cam-disks 26 and 27, cam 31 of the former disk being cut away on its inner edge, as shown in dotted lines in Fig. 1. The roller 32 is therefore not acted on as soon or even not at all, and consequently the impulse given to the drum 18 through clutch 35 and coupling 38 has less or no effect. To maintain the bracket 44 when it has been raised by cam 28, it is provided with a spring-pawl 45, arranged to engage with ratchet-teeth 46, formed on lever 34. Cam 36 on disk 27 is so shaped at one end, as shown in dotted lines in Fig. 1, that as it comes around it will strike the free end of the pawl 45, release the same from the ratchet-teeth 46, and permit the bracket 44 to fall to its former position relatively to lever 34.

Having thus described an embodiment of my invention and without limiting myself to the precise mechanism or arrangement shown, what I claim is—

1. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of automatic means to alternately clutch and unclutch said drum and motor, whereby the drum is oscillated and the bell rung, substantially as set forth.

2. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of an electrically-controlled clutch arranged to connect said motor and drum to start the latter, and a second clutch operated by the oscillations of the rope-drum to alternately connect and disconnect said motor and drum, substantially as set forth.

3. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of a clutch to positively connect said motor and drum to start the latter, a second clutch to yieldingly connect said motor and drum to maintain the oscillations of the latter, and means actuated by the oscillations of the drum to alternately engage and disengage said second clutch, substantially as set forth.

4. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of means to positively connect said drum and motor to pull the bell, said means

being constructed to automatically disengage, means actuated by the return swing of the bell to yieldingly connect said drum and motor, means actuated by the subsequent forward swings of the bell to disconnect said drum and motor, and means to prevent said yielding connection when the ringing is to be stopped or when the oscillations of the bell exceed a certain amount, substantially as set forth.

5. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of means to alternately clutch and unclutch said motor to said drum, whereby the latter is oscillated, said means comprising two cam-disks connected by gearing to said rope-drum, a lever connected to the movable member of said clutch at one end and adapted to be alternately acted upon by said cam-disks at its other end, and electrically-controlled means to disconnect one of said disks from the drum whereby said clutch may be rendered inoperative and the ringing stopped, substantially as set forth.

6. In an electric bell-ringing mechanism, the combination with a rope-drum and electric motor of electrically-controlled means to connect said motor through a reduction-gearing to said drum to start the latter, automatic means to disconnect said motor from said drum after the latter has made a partial rotation, means actuated by the oscillations of said drum to alternately connect and disconnect said motor to said drum, whereby oscillations of the drum are maintained and the bell is kept ringing, substantially as set forth.

7. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor of means to positively connect said motor and drum to start the latter, automatic means to disconnect said motor from said drum after the latter has made a partial forward rotation, means actuated by the subsequent backward rotation of said drum, caused by the weight of the bell, to yieldingly connect said motor and drum, whereby a second forward impulse is delivered to the drum, means actuated by said second forward rotation of the drum to again disconnect said motor and drum, said alternate yielding connection and disconnection continuing until the motor is stopped, and automatic means to prevent the amplitude of the oscillations of the drum from increasing, substantially as set forth.

8. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor of electrically-controlled means to positively connect said motor to said drum to start the latter, automatic means to disconnect the same, whereupon said drum is rotated in the opposite direction by the bell, means actuated by said backward rotation of the drum to connect said motor to said drum by a yielding clutch-coupling, whereby a second forward rotation is imparted to the drum, means actuated by said second forward rotation of the drum to disconnect said yielding clutch-coupling, said two last-mentioned operations continuing alternately until the motor is stopped, substantially as set forth.

9. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor of means to oscillate the former from the latter, said means comprising a yielding clutch constructed and arranged to transmit the rotation of the motor to the drum, and automatic means to alternately connect and disconnect said clutch, whereby said drum is oscillated, substantially as set forth.

10. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of means to alternately connect and disconnect said motor to and from said drum, whereby the latter is oscillated, and automatic means to prevent the amplitude of the oscillations from increasing beyond a predetermined amount, substantially as set forth.

11. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor of a yielding clutch-coupling between said motor and drum and means to alternately engage and disengage said clutch-coupling; whereby the rope-drum is oscillated without any sudden jerk, substantially as set forth.

12. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of automatic means to alternately connect and disconnect said motor to said drum comprising a clutch member keyed to said shaft, a coöperating clutch member loose on said shaft, and formed integral with a chamber having radial arms, radial arms on said drum arranged to lie between the radial arms in said chamber whereby the shock is cushioned when said clutch members are engaged.

13. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor of coöperating clutch members to connect said motor and drum to give the latter a rotary impulse in one direction, one of said clutch members being constructed and arranged to move angularly relatively to said rope-drum means on said member and coöperating means on said drum forming air-cushion chambers, whereby the rotary impulse of said motor on said drum is cushioned, springs to return said member to its normal angular relation to said drum, and means to alternately engage and disengage said clutch members, whereby said rope-drum is oscillated and the bell is rung, substantially as set forth.

14. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor of a clutch to connect said motor to said drum, one member of said clutch comprising a casing frictionally engaging said drum, alternate ribs upon said drum and within said casing adapted to compress

air between them and thereby cushion the impulse delivered to the drum by said clutch, springs arranged to act on said ribs to return said casing to its normal angular position relatively to said drum, adjustable means to control the escape of the air between said ribs whereby the cushioning effect can be regulated, and means to alternately engage and disengage said clutch, whereby said drum is oscillated and the bell is rung, substantially as set forth.

15. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of a clutch to alternately connect and disconnect said drum and motor, whereby the drum is oscillated, a lever connected to the movable member of said clutch at one end and carrying on its other end a longitudinally-slidable bracket providedwith opposed rollers,a spring-pawl on said bracket and ratchet-teeth on said lever whereby said bracket is connected to said lever, a pair of disks connected by gearing to said drum and carrying cams arranged to alternately act upon said rollers respectively to swing said lever and engage and disengage said clutch, a supplementary cam carried by one of said disks and arranged, when the amplitude of the oscillations of the drum and consequently of said disk reaches a certain amount, to slide said bracket toward the pivot of said lever and thereby prevent said rollers from being actuated by said first-mentioned cams, the other of said disks carrying a cam arranged to disengage said pawl from said ratchet-teeth and permit said bracket to return to its normal position, substantially as set forth.

16. In an electric bell-ringing mechanism, the combination with a rope-drum and an electric motor, of a clutch arranged to positively connect said motor and drum to start the latter, cams on said clutch to disengage the same after the drum has made a partial forward rotation, electrically-controlled means to engage said clutch, said means being arranged to normally hold said clutch disengaged, a shaft geared to said drum and carrying two cam-disks, one fast and one loose thereon, a clutch to engage said loose disk with said shaft, connections between said clutches whereby they are both engaged simultaneously, electrically-controlled means to disengage said last-mentioned clutch, a compressed-air coupling operatively connected with said drum, a clutch to connect said coupling with the motor, a lever arranged to be operated alternately by said cam-disks to engage and disengage said last-mentioned clutch, and means to prevent the operation of said last-mentioned lever by said cam-disks whenever the amplitude of the oscillations of said drum exceeds a predetermined amount, substantially as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRIEDRICH WEULE.

Witnesses:

JULIUS SECKEL,

BERTHA REIMANN.