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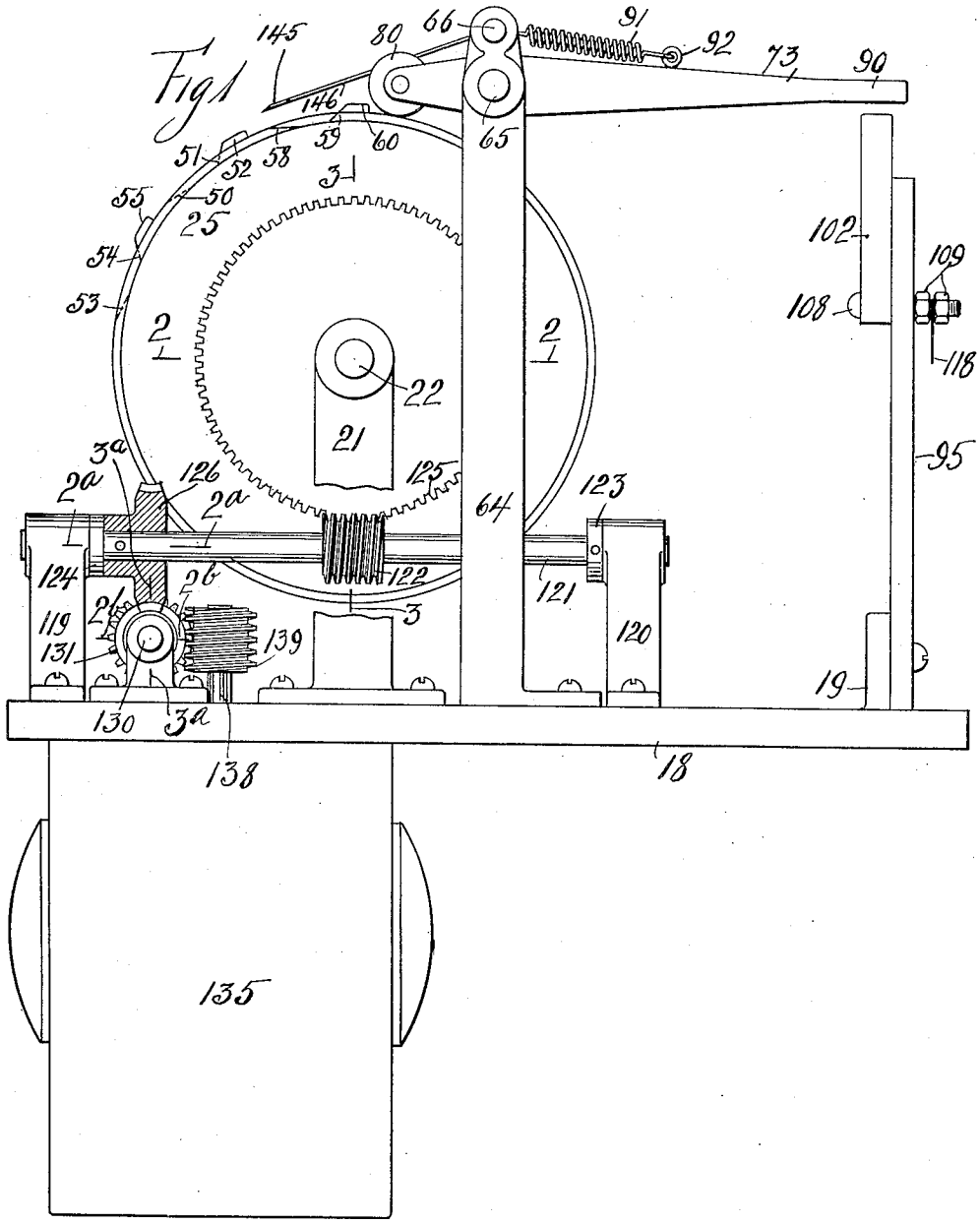
AUTOMATIC SWITCH OPERATING DEVICE FOR AEROPLANE MECHANISMS.

APPLICATION FILED APR. 9, 1918.

1,336,138. Patented Apr. 6, 1920.

3 SHEETS—SHEET 1.

Fig 1



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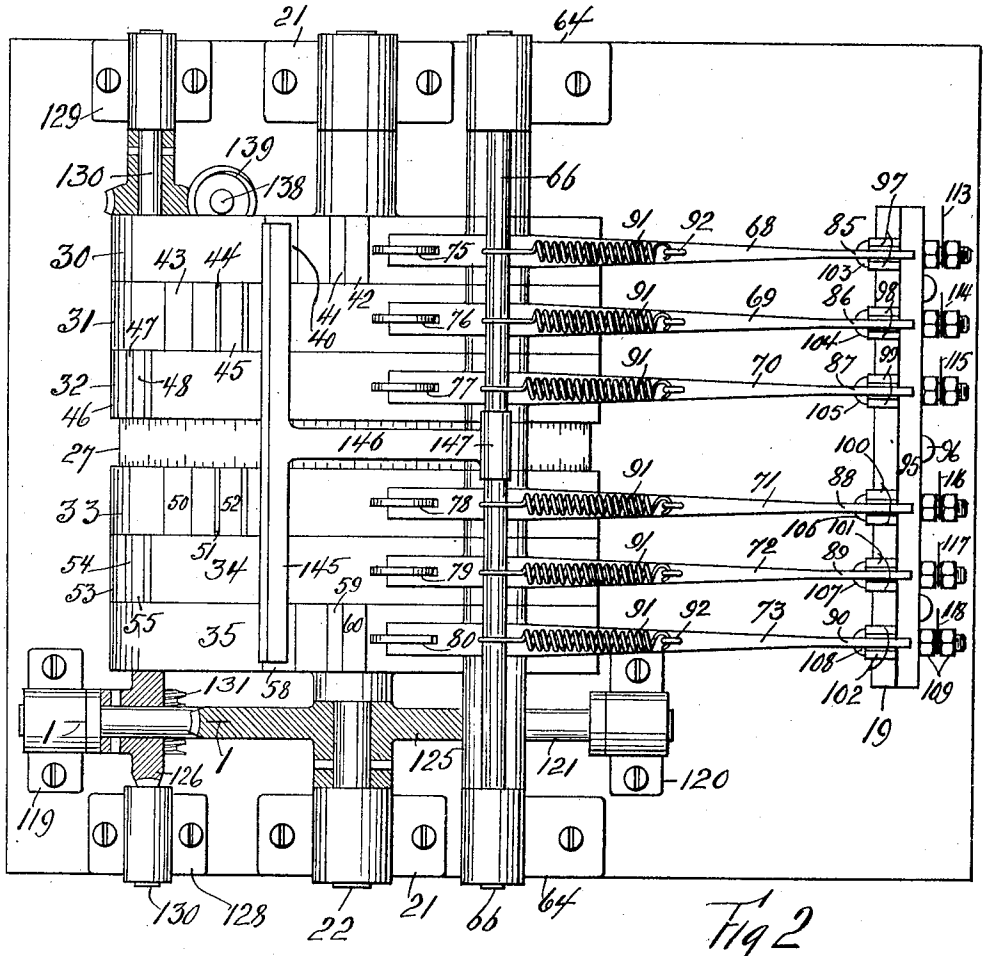


Fig 2

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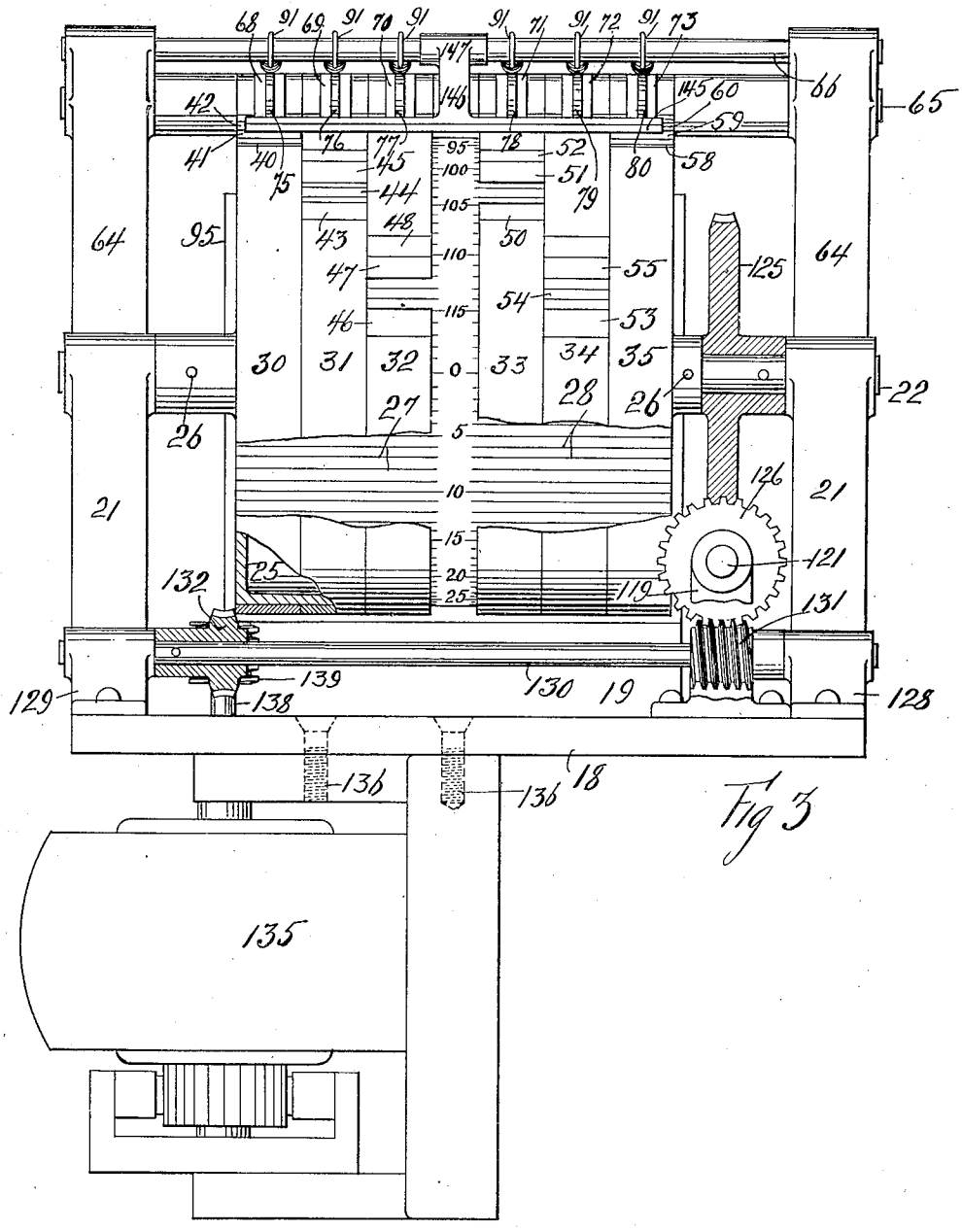


Fig 3

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UNITED STATES PATENT OFFICE.

ERNEST E. G. HEDENSTROM, OF BROOKLYN, NEW YORK, ASSIGNOR TO SPRINGFIELD MOTORS COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

AUTOMATIC SWITCH-OPERATING DEVICE FOR AEROPLANE MECHANISMS.

1,336,138. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed April 9, 1918. Serial No. 227,559.

To all whom it may concern:

Be it known that I, ERNEST E. G. HEDENSTROM, a subject of Great Britain, and resident of the borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Automatic Switch-Operating Devices for Aeroplane Mechanisms, of which the following is a specification.

This invention relates to an automatic switch operating device for controlling different mechanisms on an aeroplane.

The object of the invention is the production of a timing device by means of which a plurality of switches are operated at predetermined intervals of time and thereby a plurality of electric circuits are closed at different times. The electric circuits energize different electric appurtenances, which latter perform useful functions. This specific construction of the device is applicable to an aeroplane to be used without an operator in the machine. For instance one of the electric circuits is connected to a machine that controls a mechanism which in turn operates the elevator of the aeroplane. A second electric circuit is for a pole changer in series with a rudder actuating mechanism of the aeroplane. A third circuit controls a bomb dropping device of the aeroplane.

In the accompanying drawing Figure 1 represents a side elevation of the device with a section on the line 1, 1 of Fig. 2; Fig. 2 shows a top plan view of Fig. 1 with sections on the lines 2, 2, 2^a, 2^a and 2^b, 2^b, of said figure and Fig. 3 is a left hand end view of Fig. 1 with partial sections on the lines 3, 3 and 3^a, 3^a.

A bed plate 18 having the flange 19 has supported thereon the journal brackets 21 in which is journaled the drum shaft 22 and the latter has fastened thereto the drum 25 by means of the pins 26. On the periphery of the drum 25 is indicated a pair of scales 27 and 28. Split cam rings 30, 31, 32, 33, 34 and 35 are carried in frictional engagement with the periphery of the drum 25. The cam ring 30 has the accompanying beveled ends 40 and 41. With the end 41 is formed the cam 42.

The cam ring 31 has the accompanying beveled ends 43 and 44. With the end 44 is formed the cam 45.

The cam ring 32 has the accompanying beveled ends 46 and 47. With the end 47 is formed the cam 48.

The cam ring 33 has the accompanying beveled ends 50 and 51. With the beveled end 51 is formed the cam 52.

The cam ring 34 has the accompanying beveled ends 53 and 54. With the end 54 is formed the cam 55.

The cam ring 35 has the accompanying beveled ends 58 and 59. With the beveled end 59 is formed the cam 60.

A pair of columns 64 are supported and fastened to the base plate 18. Rods 65 and 66 are supported in the upper ends of the columns 64. Switch levers 68, 69, 70, 71, 72 and 73 are supported on the rod 65, and have respectively journaled each at one end the cam rollers 75, 76, 77, 78, 79 and 80, and at the other ends of the levers are respectively formed the switch knives 85, 86, 87, 88, 89 and 90. Springs 91 have one end each fastened to the rod 66 and the other end hooked to an eye 92 extending from each of the said levers 68 to 73 inclusive.

A switch board 95 of insulating material is fastened to the flange 19 by means of the screws 96. Switch forks, 97, 98, 99, 100, 101 and 102 are fastened to the switch board 95 by means of the screws 103, 104, 105, 106, 107 aad 108, having each a pair of nuts 109. The said switch forks respectively coact with the switch knives 85 to 90.

A wire 113 extends from the screw 103 and can be connected with an operating mechanism of an aeroplane. A wire 114 extends from the screw 104 and can be connected to an elevator mechanism of an aeroplane.

A wire 115 extends from the screw 105 and can be connected with a pole changer in series with a rudder actuating mechanism of an aeroplane.

A wire 116 extends from the screw 106 and can be connected with a bomb dropping device of an aeroplane.

A wire 117 extends from the screw 107 and can be connected to the elevator mechanism of an aeroplane.

A wire 118 extends from the screw 108 and can be connected to a pole changer that is in series with the elevator actuating mechanism of an aeroplane.

A pair of journal brackets 119 and 120 are supported upon and fastened to the bed plate 18.

A shaft 121 is journaled in the journal bracket 119 and 120 and has formed therewith the worm 122.

A worm wheel 125 is fastened to the drum shaft 22 and meshes with the worm 122. A worm wheel 126 is fastened to the shaft 121. A collar 123 is fastened to the shaft 121 adjacent to the inner face of the journal bracket 120, and a washer 124 is supported upon said shaft and bears between the inner face of the journal bracket 119 and the hub of the worm wheel 126.

A pair of journal brackets 128 and 129 are located upon and fastened to the bed plate 18. A cross shaft 130 is journaled in the journal brackets 128 and 129. A worm 131 is secured to the cross shaft 130 and meshes with the worm wheel 126. A worm wheel 132 is secured to the cross shaft 130 adjacent to the journal bracket 129.

An electric motor 135 is fastened to the bed plate 18 by means of the screws 136. The armature shaft of the motor is indicated at 138 and the latter has fastened thereto the worm 139 which meshes with the worm wheel 132. Each one of the electric circuits of the elements controlled is grounded with the drum mechanism.

An adjusting gage is shown with the blade 145 that has extending therefrom the arm 146 with the hub 147. The hub 147 is fastened to the rod 66.

To operate the invention the cam rings 31 to 35 are located in predetermined positions upon the drum 25 by means of the scales 27 and 28. The apexes of the beveled ends 40, 43, 46, 50, 53 and 58 are located at predetermined distances from the zero line of the scales 27 and 28 which accurately locate the cam rings in their proper positions. The electric motor 135 is now started causing the drum 25 with its cam rings 30 to 35 to turn. During the rotations of the drum the cams 42, 45, 48, 52, 55 and 60 contact respectively with the cam rollers 75 to 80. This in turn causes the switch knives 85 to 90 to engage with the switch forks 97 to 102.

When the electric circuits controlled by the switches having respectively the switch knives 85 to 90 are closed, the mechanisms connected therewith are caused to perform their functions at predetermined times, governed by the locations of the cam rings on the drums.

To adjust the rings the operator bears down upon the arm 146 of the adjusting gage to locate the edge of the blade upon the required division of the scale 27 and 28. Next a cam-ring is turned on the drum 25 to bring one of the beveled edges like 40 in line with the edge of the blade 145. A similar method is used to locate any of the other cam rings in their proper locations to perform their functions.

Having described my invention what I desire to secure by Letters Patent and claim is:

1. In a switch operating device the combination of a drum having a scale on its peripheral surface, a cam ring on the drum and in frictional engagement therewith, the said cam ring having beveled ends to enable one thereof to be brought in line with a division of said scale, means to rotate the drum and thereby the cam ring, a switch lever pivoted adjacent to the drum, a cam roller journaled in one end of the switch lever and said lever having a switch knife at the other end, the roller located to be actuated by the cam of the cam ring and a switch fork for the knife switch.

2. In a switch operating device the combination of a drum having a scale on its outer surface, a plurality of cam rings on the drum and in frictional engagement therewith, each cam ring having beveled ends to enable one thereof to be brought in line with a division of said scale, means to rotate the drum and thereby the said cam rings, a plurality of switch levers pivoted adjacent to the drum, one for each cam ring, a cam roller journaled in one end of each switch lever and each lever having a switch knife at the other end, each roller located to be actuated by the cam of its accompanying cam ring and a switch fork for each switch knife.

3. In a switch operating device the combination of a drum having a scale on its outer surface, means to rotate the drum, an adjusting gage having a flexible blade located adjacent to the drum and enabled to be pressed on the surface thereof to bring its outer edge in alinement with a division of the scale, a split cam ring adjustably supported on the drum and enabled to have one of its edges brought in alinement with the edge of the adjusting gage.

4. In a switch operating device the combination of a drum having a scale on its outer surface, a plurality of split cam rings adjustably supported on the drum, means to rotate the drum and thereby the cam rings, a pair of columns adjacent to the drum, a rod with its ends supported in said columns, a plurality of switch levers supported on the rod, a cam roller journaled in one end of each rod and a switch knife formed at the other end of each lever, the said rollers coacting with the cams on the cam rings, a second rod above the first rod with its ends supported in the column and a spring for each switch lever, one end of

each spring fastened to its accompanying switch lever and its other end fastened to the second rod.

5. In a switch operating device the combination of a bed plate, a pair of journal brackets supported on the bed plate, a drum shaft journaled in said brackets, a drum having a scale on its outer surface fastened to the drum shaft, a plurality of split cam rings adjustably supported on the drum, a pair of columns supported on the bed plate, a rod with its ends fastened in the upper portion of the columns, a plurality of switch levers supported on the rod, a cam roller journaled in one end of each switch lever and each switch lever having a switch knife formed at the other end thereof, means to normally cause the rollers to bear on the surface of the cam rings in the path of their cams, a switch board extending up from the bed plate and a plurality of switch forks supported on the switch board coacting with the switch knives.

Signed at the borough of Manhattan, city of New York, in the county of New York and State of New York, this 28th day of March, A. D. 1918.

ERNEST E. G. HEDENSTROM.

Witnesses:
LOUIS F. STUMPF,
A. A. DE BONNEVILLE.