~~Confidential~~

This invention relates in general to electrical systems in which are incorporated a plurality of circuits, and contemplates the provision of mechanism for varying the electrical continuities and circuit relations of such a system in an irregular or aperiodic manner.

As distinguished from the idea of controlling the processes of the system in an orderly sequence, the present invention has the opposite function and proposes means to randomize the operations of such a system.

An object of this invention is to provide a means of selecting from a plurality of available electrical circuits a single circuit at random, which electrical circuit will be operative for a period of time, the length of which depends upon one or several variable factors.

Another object of this invention is to provide apparatus for varying the speed of rotating bodies by means of a friction drive mechanism working in conjunction with cam wheels of irregular outline and operatively coordinated with a differential gearing system for the purpose of opening and closing electrical circuits for varying periods of time.

A further object of this invention is to provide a device, to be used in connection with or as an attachment for, a sorting device, such as a card sorting device, for selecting from an assortment of punched cards, a set of cards which are chosen at random from the basic assortment.

In order that the invention and its mode of application may be readily understood, there is disclosed in the accompanying drawing and in the detailed following description thereof, one form or embodiment of the invention.

In the drawing, the single Figure shows in schematic form an apparatus for carrying out the invention .

Referring to the drawing, 1 is a gear, driven by any prime mover such as a motor M ; gear 1 meshes with the two gears 2 and 2', having different numbers of teeth. Gear 2 is fixed to shaft 3 and drives the worm gear 4, which in turn, through the train of gears 5, 6, 7, drives shaft 8, on which is mounted cam 9 of irregular outline. Roller 10 rides on the periphery of cam 9 and serves to move lever 11, through a succession of angles which are determined by the depressions and elevations of cam 9. The free end of lever 11 is connected by a pin 12 to a collar 13 which is free to slide up and down on shaft 3 but is independent of the latter in its rotation. The upper end of collar 13 presses against disk 14, which is also mounted on shaft 3 but, by a slot and bar arrangement, is driven by shaft 3. Spring 15 serves to keep the assembly 12, 13, and 14 in place on the shaft 3 and also to cause the roller 10 to follow the outline of cam 9. Disk 14, by frictional effect, drives wheel 16, keyed to shaft 17 so that as shaft 3 turns disk 14 turns and slides up and down against the face of wheel 16, causing shaft 17 to rotate at constantly varying speeds as the roller 10 rides on the periphery of cam 9. On the shaft 17 is mounted the commutator generally designated as 18

and a contact wheel 19, provided with a plurality of contacts 20, connected in a random manner to the commutator rings 21, 22, 23, 24, 25. Resting against the commutator rings are collectors 26, which are connected to conductors 27 leading to individual circuits, which circuits may include any conventional means or instrumentalities suggested schematically as at 33 for utilising the randomizing function of the present invention.

The action of the members 2 to 17 inclusive is the same as that of the members 2' to 17'. Shaft 17' rotates switch arm 30, carrying brush 31 which sweeps over the contacts 20 as it rotates. Brush 30 is connected to the common return conductor 32 for the circuits R_1, R_2, R_3, R_4, R_5 are selected in the order of the contacts 20 on wheel 19, but each circuit is operative for a different interval of time.

In the drawing, specific mechanical principles are shown for effecting the movements of the various parts of the apparatus. However, these are shown only for the purpose of demonstration of the principles incorporated in this invention, and it is pointed out that any other mechanical means for varying the angular velocity of the commutator 18 rotating with contact disk 19 and the contact arm 30, either separately or conjointly, will effect the result desired. It is also pointed out that, while five commutator rings are depicted in the drawing, any number may be used, and that the number of contacts on the face of the

disk 19 may be equal to the number of contact rings or greater by any practicable number. It will also be noted that cams 9 and 9' are intended to be detachable and interchangeable, means being shown in the drawing to facilitate removal for that purpose, or to permit substitution of other cams of different shape.

Changes, modifications and equivalent arrangements are contemplated within the scope of the invention as defined by the appended claims :

We claim :

1. In a mechanism of the character described for controlling an electric circuit system, a set of switching devices having movable connecting elements for establishing a plurality of circuit relations ; and means for varying the relation between said elements to effect a random operation of the system.

2. A mechanism of the character described, comprising a wiring system and including therein a set of switching devices provided with movable contacts for establishing a plurality of circuit connections ; and means for changing the relation between said contacts for varying periods of time to effect a random operation of the system.

3. In a mechanism for randomizing the operation of an electrical system, a set of switching devices provided with relatively movable contact elements for establishing a plurality of circuit relations in said system; and means for continuously and aperiodically varying the relation between said elements.

4. In a mechanism of the character described, an electric circuit system comprising switching devices provided with electrical contacts, said devices being rotatable with respect to each other for establishing a plurality of circuit connections ; a friction drive mechanism for each of said devices, and including means for independently and differentially operating said mechanisms to effect a random operation of the electrical system.

5. Means for randomising the continuities of an electrical system, comprising an arrangement of circuits including a set of relatively movable switching devices provided with contacts for establishing a plurality of different circuit connections ; means for varying the circuit connections, comprising frictional drive mechanisms operable independentàyywith said switching devices; and means for changing the rate of movement of said mechanisms to effect a random operation of the system.

6. In a mechanism of the character described, a pair of rotating bodies associated for operative movement relative to one another; friction drives arranged to move said bodies independently; and means including a system of differential gearing and cams of irregular contours operatively coordinated with said gearing and with each of said drives individually to effect aperiodic movement of said bodies relative to one another.

7. A mechanism of the character described for controlling the operation of an electrical system, comprising a rotatable commutator provided with contact elements and a rotatable switching device operable with said elements for establishing a plurality of circuit connections ; and means to effect a random operation of said system comprising gearing for driving said commutator and said switching device independently, and means for differentially controlling the operation of the gearing.

8. A combination according to claim 7, in which the last named means includes cams of irregular contours individually operable with said gearing.

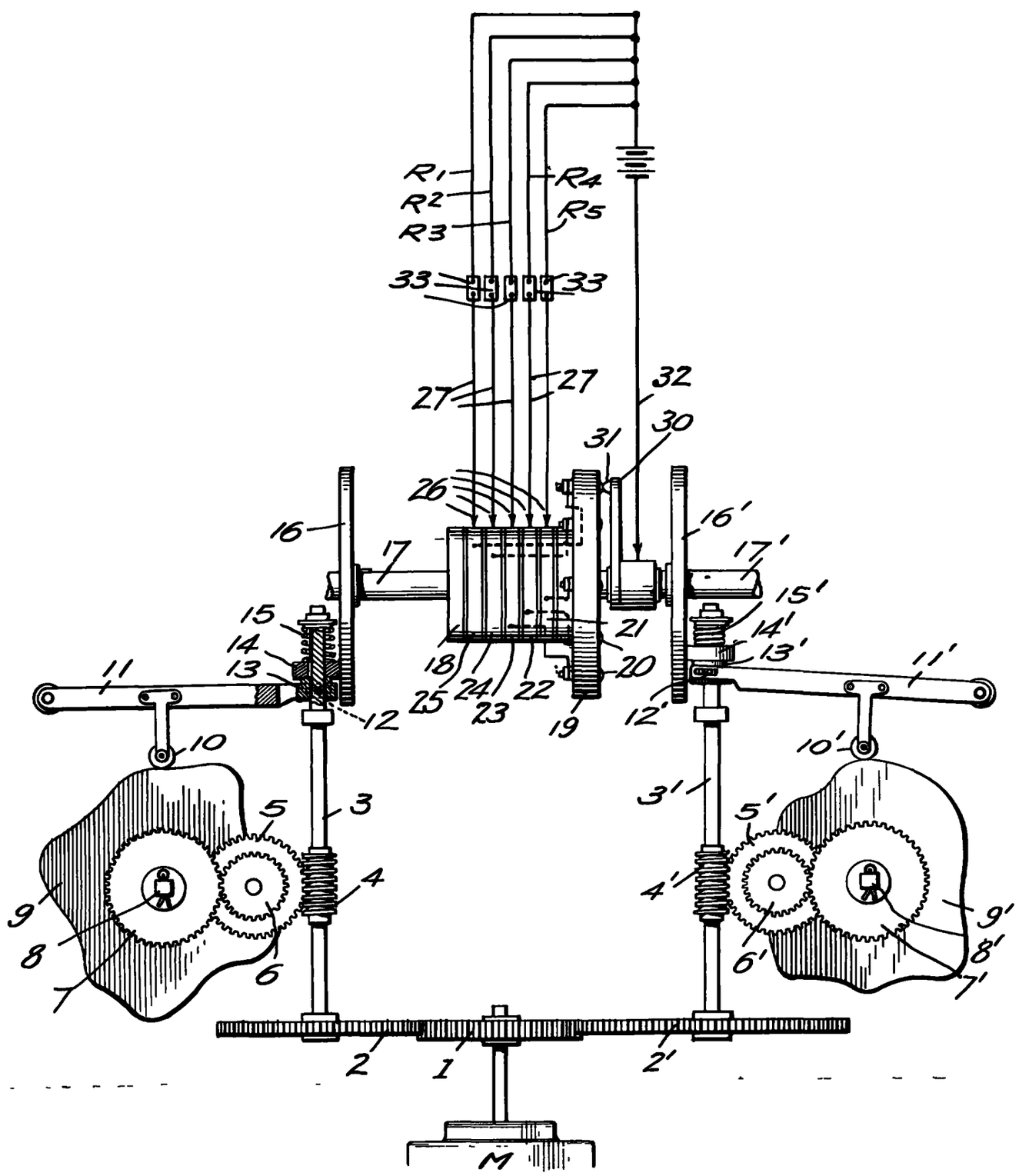
9. A combination according to claim 7, in which the last named means includes cams of different irregular contours.

10. In a mechanism for randomising the operation of an electrical system, in combination, a rotatable commutator provided with contact elements and a rotatable conductor operable with said elements for establishing a plurality of circuit connections; friction drives for operating said commutator and said conductor independently; and means including differential gearing, and cams of irregular contours operatively coordinated with said gearing and individually with each of said drives to vary the circuit connections aperiodically.

11. A randomizing mechanism of the character described, comprising a rotatable commutator provided with a plurality of contact elements and a rotatable conductor operable with said elements for establishing a plurality of circuit connections ; and means for continuously and irregularly changing the relative speed of said commutator and said conductor to vary the circuit connections aperiodically, said means including a friction drive operative with the commutator and conductor individually, cams of irregular contours operatively coordinated with each drive independently, and gearing for actuating the cams differentially.

12. A mechanism for controlling the operation of an electrical system, comprising relatively rotatable switching devices provided with cooperating contact elements for establishing a plurality of circuit connections; and means for continuously and aperiodically varying the relative

speed of rotation of said switching devices to effect random permutations of the circuit connections, said means comprising change speed drives individually operative with said switching devices, interchangeable cams of different irregular contours independently operative with said drives, and a differential gearing system for operating the cams and drives in opposing relation.



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This invention relates in general to electrical devices in which are incorporated a plurality of circuits, and in particular to any sorting device for punched cards using an electric circuit for the zoning of a particular card. It has for its object the provision of apparatus and means for automatically arranging a large set of punched cards in a purely arbitrary or random order.

A further object of this invention is to provide a device, to be used in connection with a sorting device, for selecting from an assortment of punched cards, a set of cards which are chosen at random from the basic assortment.

A further object of this invention is to provide a means of selecting from a plurality of available electrical circuits a single circuit at random, which electrical circuit will be operative for a period of time, the length of which depends upon one or several variable factors.

A further object of this invention is to provide apparatus for varying the speed of a rotating shaft by means of a friction drive working in conjunction with a cam wheel of irregular outline for the purpose of opening and closing electrical circuits for varying periods of time.

In order that the invention and its mode of application may be readily understood, there is set forth in the accompanying drawing and in the detailed following description thereof, a specific embodiment of one form of the invention.

Referring to Figure 1, which is a schematic diagram, 1 is a gear, driven by a motor or clock spring mechanism, not shown in the drawing; gear 1 meshes

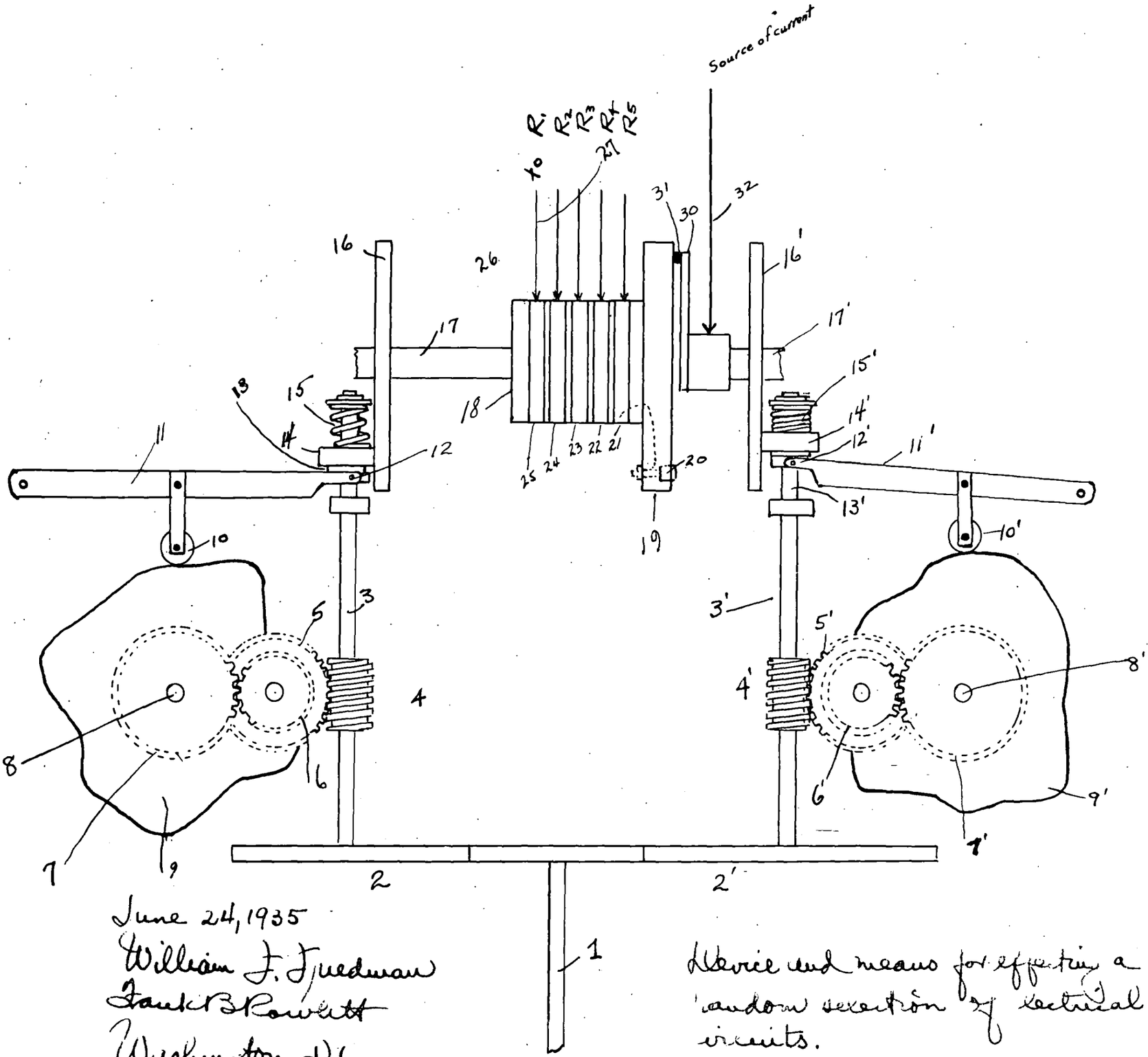
with the two gears 2 and 2', having different numbers of teeth. Gear 2 is fixed to shaft 3 and drives the worm gear 4, which in turn, through the train of gears 5, 6, 7 drives shaft 8, on which is mounted cam 9 of irregular outline. Roller 10 rides on the periphery of cam 9 and serves to move lever 11, through a succession of angles which are determined by the depressions and elevations of cam 9. The free end of lever 11 is connected by a pin 12 to a collar 13 which is free to slide up and down on shaft 3 but is independent of the latter in its rotation. The upper end of collar 13 presses against disk 14, which is also mounted on shaft 3 but, by a slot and bar arrangement, is driven by shaft 3. Spring 15 serves to keep the assembly 12, 13, and 14 in place on the shaft 3 and also to cause the roller 10 to follow the outline of cam 9. Disk 14, by frictional effect, drives wheel 16, keyed to shaft 17 so that as shaft 3 turns disk 14 turns and slides up and down against the face of wheel 16, causing shaft 17 to rotate at constantly varying speeds as the roller 10 rides on the periphery of cam 9. On the shaft 17 is mounted commutator 18 and a contact bearing wheel 19, carrying a circle of contacts, 20 connected in a random manner to the commutator rings 21, 22, 23, 24, 25. Resting against the commutator rings are collectors 26, which are connected to conductors 27 leading to individual circuits.

The action of the members 2 to 17 inclusive is the same as that of the members 2' to 17'. Shaft 17' rotates brush arm 30, carrying bruch 31 which sweeps over the contacts 20 as it rotates. Brush 30 is connected to the common

return conductor 32 for the circuits R_1, R_2, R_3, R_4, R_5 to which conductors 27 lead.

Since wheel 19 and brush arm 30 rotate in different directions and at constantly varying speeds the circuits R_1, R_2, R_3, R_4, R_5 are selected in the order of the contacts 20 on wheel 19, but each circuit is operative for a different interval of time.

In the drawing of Figure 1 specific mechanical principles are shown for effecting the movements of the various parts of the drawing. However, these are shown only for the purpose of demonstration of the principles incorporated in this invention, and it is pointed out that any other mechanical means for varying the angular velocity of the disk 19 and the contact arm 30, either separately or conjointly, will effect the result desired. It is also pointed out that, while five commutator rings are depicted in the drawing of figure 1 any number may be used, and that the number of contacts on the face of the disk 19 may be equal to the number of contact rings or greater by any practicable number.



June 24, 1935

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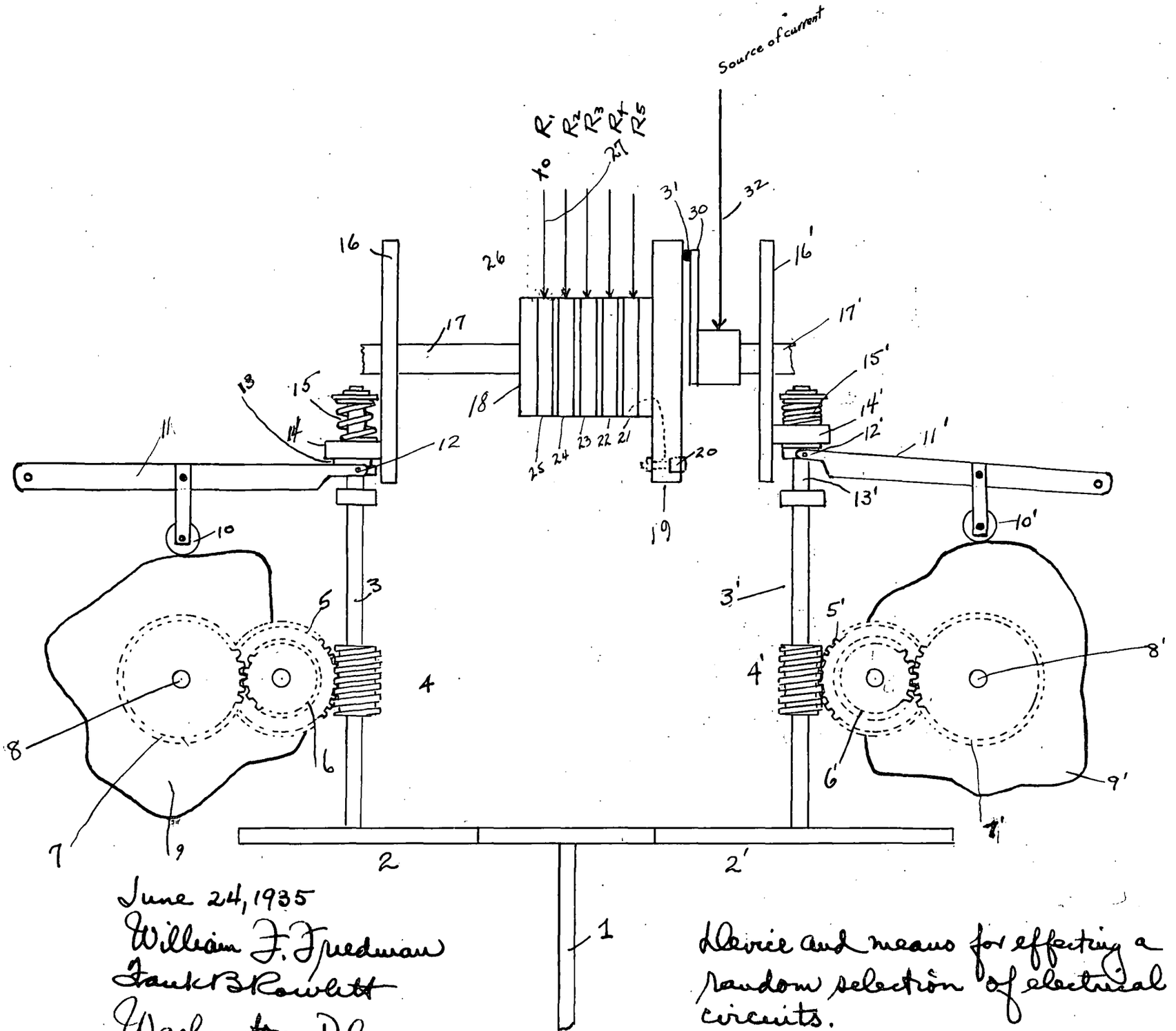
Device and means for effecting a random selection of electrical circuits.



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