240. ILLUMINATION,

10.1

No. 817,322. PATENTED APR. 10, 1906.

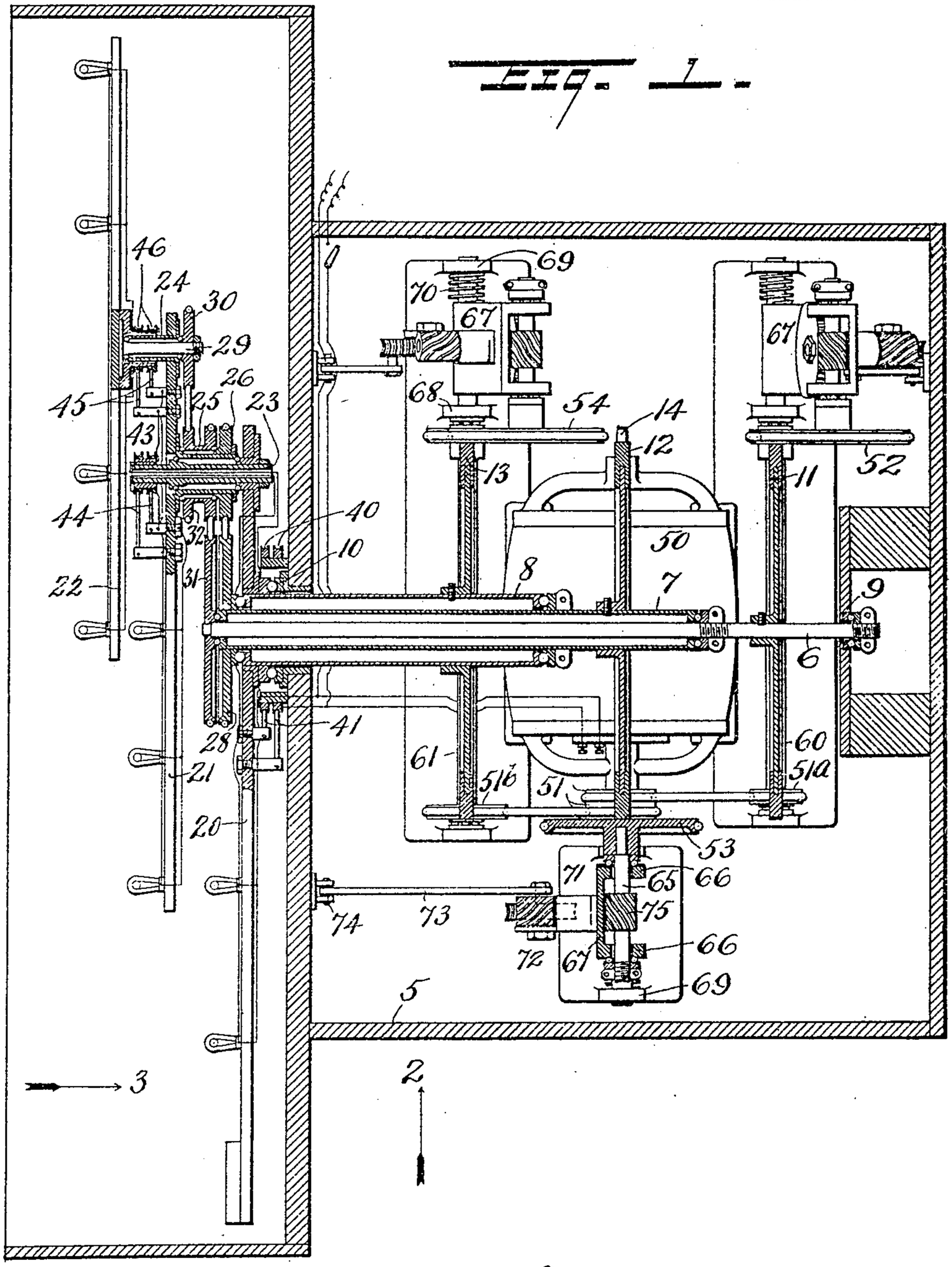
C. JACKSON.

DISPLAY APPARATUS.

APPLICATION FILED MAY 31, 1905.

3 SHEETS—SHEET 1

Fig. 1.



Witnesses
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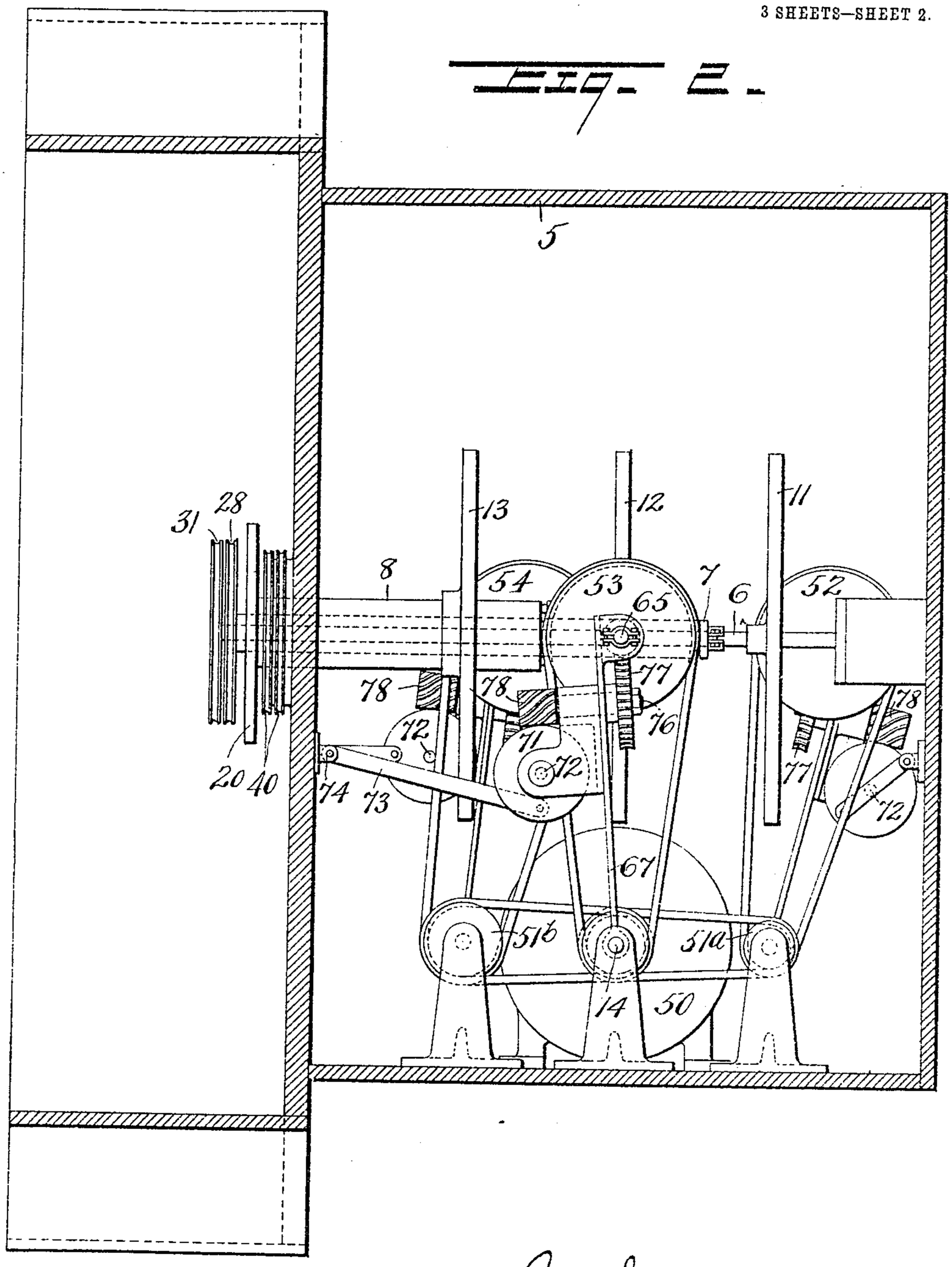
3 SHEETS—SHEET 2.

Fig. 2.



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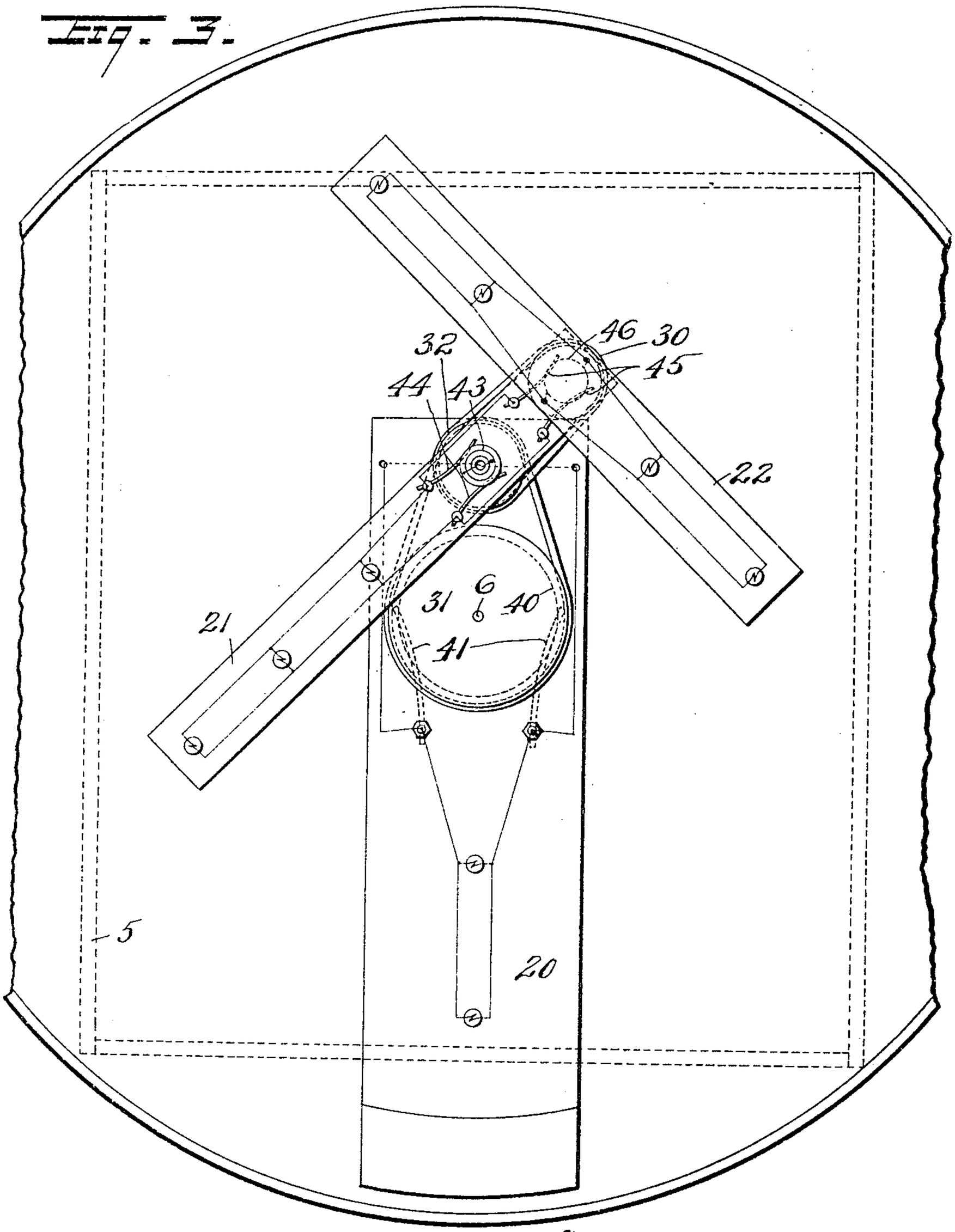
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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DISPLAY APPARATUS.

No. 817,322. Specification of Letters Patent. Patented April 10, 1906.

Application filed May 31, 1905. Serial No. 262,999.

To all whom it may concern:

Be it known that I, CALVIN JACKSON, a citizen of the United States, residing in the city of Reading, county of Berks, and State of Pennsylvania, have invented certain new and useful Improvements in Display Apparatus, of which the following is a specification.

My invention relates particularly to display apparatus adapted to produce constantly-changing figure effects by the rotation of series of lights simultaneously about a common axis and about secondary axes with varying relative speeds and directions of rotation; and it consists in the novel arrangement of coöperatively-driven concentric shafts and connections thereto, hereinafter fully described in connection with the accompanying drawings and the novel features of which are specifically pointed out in the claims.

Figure 1 is a sectional plan view of an electric-light display apparatus embodying the several features of my invention in preferred form. Fig. 2 is an elevation looking in the direction of arrow 2, Fig. 1, the near side of the box inclosing the drive mechanism being removed and a portion only of the exterior rotary parts shown in Fig. 1 being indicated. Fig. 3 is a front view of the exterior rotary parts looking in the direction of arrow 3, Fig. 1.

Mounted in an inclosing box 5 for the driving mechanism are shown three concentric horizontal shafts, (marked, respectively, 6, 7, and 8.) The central shaft 6 has its inner end mounted in a fixed bearing 9 in the box. The tubular shaft 7 forms a rotatable sleeve of reduced length on the shaft 6, and the outer tubular shaft 8 forms a rotatable sleeve of still less length on the shaft 7. The forward portion of the shaft 8 is mounted in a bearing 10 on the box-front, and adjustable antifriction-bearings are provided, as shown, at each end of each shaft. Fixed to these shafts are friction-wheels marked, respectively, 11, 12, and 13, through which rotary movement of varying speed and direction is imparted to each from a main drive-shaft 14, as hereinafter described. In the particular mechanism shown the several concentric shafts are coöperatively employed to impart constantly-varying relative rotary movements to a series of carrier devices marked, respectively, 20, 21, and 22, of which the main one, 20, is directly fixed to the outer shaft 8, while the secondary carriers 21 and 22 are indirectly rotated with said shaft 8, the carrier 20 being provided with a bearing-pin 23, forming a separate axis of rotation for the secondary carrier 21, while the latter is in like manner provided with a bearing 24, forming a separate axis of rotation for the outer carrier 22. The carrier 21, as shown, is provided with a hub-sleeve 25, rotatable upon ball-bearings on the pin 23 and having a pulley 26 fixed thereto, through which rotary motion upon the axis 23 is imparted to the carrier 21 from the intermediate concentric shaft 7, the projecting end of which latter is provided with a drive-pulley 28, arranged in line with said pulley 26. The outer carrier 22 is similarly connected to carrier 21, being provided with a bearing-pin 29, which projects through the hollow bearing 24 of carrier 21 and has a fixed pulley 30 at its inner end, independent rotary motion upon the axis 24 being transmitted to the carrier 22 from the inner concentric shaft 6 by means of a pulley 31 on the forward end of the latter, acting through an idler-pulley 32 on the hub-sleeve 25. Thus the several carriers are jointly rotated about the common main axis, while at the same time the secondary carriers are positively rotated on their separate rotating axes, and the speed and direction of rotation about each axis is separately variable, as determined by the operation of the several concentric shafts.

In order to produce figure effects by means of electric lights mounted on the several rotating carriers, which is the primary purpose of my improved apparatus, I provide a circuit through fixed rings 40, arranged concentric with the main axis, and through rotating contact-fingers 41 to the main carrier 20, while from the latter the circuit is carried through the secondary axis 23 of the carrier 21 to relatively fixed rings 43, concentric with said secondary axis, and thence through the rotating contact-fingers 44 to said carrier 21. To reach the outer carrier 22, as shown, the circuit is carried through contact-fingers 45 of carrier 21 and contact-rings 46, concentric with the outer axis.

The driving mechanism, as shown, comprises an electric motor 70, the main drive-shaft 14, which latter is arranged transversely to the concentric shafts 6, 7, and 8 and di-

rectly below the friction-wheel 12 on shaft 7. Fixed to this main shaft are three pulleys 51, arranged to respectively operate several friction drive-disks 52, 53, and 54, which in turn respectively engage the corresponding friction-wheels 11, 12, and 13 of the several concentric shafts. The outer main shaft pulley 51 is arranged to directly rotate the friction drive-disk 53 in a plane at right angles to the plane of rotation of the friction-wheel 12, the perimeter of which is engaged by the side face of the drive-disk, so that the speed and direction of rotation imparted by the latter will be varied by shifting its axis crosswise of the friction-wheel. The other drive-disks 52 and 54 are similarly operated from the two inner main-shaft pulleys 51, this being effected indirectly, however, through counter-shafts 60 and 61, arranged parallel with the main drive-shaft and provided, respectively, with pulleys 51^a and 51^b for rotating said drive-disks. In order to effect the described crosswise movement of the drive-disks for the purpose of varying the speed and direction of rotation imparted to the engaging friction-wheels and their several concentric shafts, the following construction is preferably provided in each case: The intermediate drive-disk 53, for instance, is fixed to a shaft 65, which is mounted in bearings 66, provided at the upper end of a swinging frame 67, pivoted in the axial line of the drive-shaft 14 between bearings 68 and 69. This frame is pressed inward, as shown, by a spring 70, so as to insure proper frictional contact between the flat face of the drive-disk and the perimeter of the friction-wheel 12. Mounted in suitable bearings 71, provided on the swinging frame 67, is a crank-shaft 72, from which a crank-connecting rod 73 extends to a fixed end pivot 74, so that the rotation of said crank-shaft will produce a swinging movement of the frame 67 and its drive-disk crosswise of the friction-wheel 12, whereby the latter will be varyingly acted upon by the drive-disk, so as, first, to gradually reduce the speed of rotation imparted as the frictional contact-circle approaches the axis of the disk; second, to change the direction of rotation as the contact is shifted to the other side of said axis, and, third, to gradually increase the speed of reversed rotation. This crank-shaft movement, as shown, is transmitted from the drive-disk shaft 65 by means of a worm 75 thereon through an intermediate shaft 76, suitably mounted in the frame 67 and provided with a worm-wheel 77, engaging said worm 75, and with a worm 78, which directly rotates the crank-shaft 72. The latter is thus rotated at a relatively slow speed, so as to very slowly swing the frame 67 to and fro. The other drive-disks 52 and 54 for the central and outer concentric shafts are similarly mounted and operated, the movements being transmitted thereto through the counter-shafts 60 and 61 instead of directly from the main shaft 14. In order to insure a constantly-changing relation of the several shaft movements, however, provision is made for reciprocating the several swinging frames 67 in different times, this being preferably effected by merely rotating the counter-shafts 60 and 61 at different speeds from the main drive-shaft 14 in the ratio, for instance, as shown, of five, seven, and nine, so that the relative speeds and directions of rotation of the several concentric shafts will be indefinitely varied.

As herein applied to an electric display apparatus, my invention provides for a continuous production of striking figure effects in almost infinite variety.

The particular construction and adaptation of my improved mechanism, which has been specifically shown and described, may obviously be readily modified without departing from the invention.

What I claim is—

1. A display apparatus comprising concentric shafts, carriers coöperatively rotated by said shafts, and mechanism for driving the latter with constantly-changing relative speeds.

2. A display apparatus comprising concentric shafts, carriers coöperatively rotated by said shafts, and mechanism for driving the latter with constantly-changing relative directions of rotation.

3. A display apparatus comprising concentric shafts, carriers coöperatively rotated by said shafts, and mechanism for driving the latter with constantly-changing relative speeds and directions of rotation.

4. In a display apparatus comprising concentric shafts, a friction drive-gear for each of said concentric shafts, and a main drive-shaft mechanism arranged to operate said friction-gears.

5. In a display apparatus comprising concentric shafts, a friction drive-gear for each of said concentric shafts, and a main drive-shaft mechanism arranged to operate said friction-gears at different speeds of rotation.

6. In a display apparatus comprising concentric shafts, a friction drive-gear for each of said concentric shafts, means for shifting one of said friction-gears to vary the speed imparted to the engaging concentric shaft, and a main drive-shaft mechanism arranged to operate said friction-gears.

7. In a display apparatus comprising concentric shafts, a friction drive-gear for each of said concentric shafts, means for shifting each of said friction-gears in different times to differently vary the speeds imparted to the several engaging concentric shafts, and a main drive-shaft mechanism arranged to operate said friction-gears.

8. In a display apparatus comprising concentric shafts, a friction drive-gear for each of said concentric shafts, means for shifting

one of said friction-gears to vary the speed and direction of rotation imparted to the engaging concentric shaft, and a main drive-shaft mechanism arranged to operate said friction-gears.

9. In a display apparatus comprising concentric shafts, a friction drive-gear for each of said concentric shafts, means for shifting each of said friction-gears in different times to differently vary the speeds and directions of rotation imparted to the several engaging concentric shafts, and a main drive-shaft mechanism arranged to operate said friction-gears.

10. The combination with a driven shaft having a friction-wheel, of a variable-speed driving mechanism therefor comprising a friction drive-disk, a movable frame in which said drive-disk is journaled, and means operated by the drive-disk to impart a reciprocating movement to said frame crosswise of said friction-wheel.

11. In a display apparatus comprising multiple concentric shafts each provided with a friction-wheel, separate variable-speed driving mechanisms for said shafts each comprising a friction drive-disk journaled in a movable frame and disk-operated means for reciprocating said frames crosswise of the engaging friction-wheel, and a common drive-shaft for said separate driving mechanisms.

12. In a display apparatus comprising multiple concentric shafts each provided with a friction-wheel, separate variable-speed driving mechanisms for said shafts each comprising a friction drive-disk journaled in a movable frame and disk-operated means for reciprocating said frames crosswise of the engaging friction-wheel, and a common drive-shaft for said separate mechanisms, the several frames being reciprocated in different times.

13. The combination with a driven shaft having a friction-wheel, of a variable-speed driving mechanism therefor comprising a friction drive-disk, a swinging frame in which said drive-disk is journaled, a crank-shaft also journaled in said swinging frame and arranged in gear with said drive-disk, and a crank connection whereby reciprocating movement is imparted to said swinging frame crosswise of said friction-wheel.

14. The combination with a series of concentric shafts each provided with a friction-wheel, of separate drive-disks for each of said shafts, separate swinging frames for each of said drive-disks, separate means for reciprocating each of said frames, and coöperating drive-shafts substantially as set forth.

15. In a display apparatus comprising concentric shafts, a main carrier fixed to one of said shafts and rotated thereby, and a secondary carrier eccentrically mounted on said main carrier and simultaneously rotated on its own axis by another of said shafts.

16. In a display apparatus comprising concentric shafts, a series of pivotally-connected carriers rotated together about the main axis by one of said concentric shafts and simultaneously rotated about their own axes by the other shafts.

17. An electric display apparatus comprising concentric shafts, a main carrier fixed to one of said shafts and rotated thereby, a secondary carrier eccentrically mounted on said main carrier and simultaneously rotated on its own axis by another of said shafts, lights on said carriers, and an electric circuit embracing axial contact-rings, and contact-fingers rotated with the carriers.

In testimony whereof I affix my signature in the presence of two witnesses.

CALVIN JACKSON.

Witnesses:
HOWARD J. POTTS,
D. M. STEWART.