116,921

PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

Improvements in Printing Apparatus for Cinematograph Films.

I, WILLIAM CECIL JEAPES, of 76 and 78, Wardour Street, London, W., Cinematograph Expert, do hereby declare the nature of this invention to be as follows:—

This invention relates to printing apparatus for cinematograph films and in particular to that part of the apparatus for regulating the intensity of the light according to the density of the film.

As is well understood, a complete film is usually built up of a plurality of sections and each of such sections may have been produced under varying conditions, that is, the general surroundings, light and time of day at which the exposure was made, may vary in each case thereby producing lengths of film negative of varying densities.

In order to produce good results in the production of positive films from negatives of this nature, it is necessary to vary the intensity of the light passing through the exposure aperture so as to obtain as far as possible a positive film of even density throughout.

Various methods have heretofore been adopted for effecting the desired result, the usual method being to control the light by hand, this however, requires the continuous attention of the operator, the result is however, irregular and unsatisfactory. Semi-automatic mechanism has been provided for varying the area of the exposure aperture of the printing machine, this necessitated the resetting of the mechanism by hand in advance for each section of the film such mechanism being intermittently released by an electro-magnetic device automatically controlled by a switch mechanism co-acting with notches in the side of the film.

Another known arrangement which enables the light to be varied automatically within certain limits after a setting of the device by hand consists in the provision of a resistance box furnished with a plurality of holes for the reception of a number of contact plugs corresponding to the number of film sections in the complete film. To facilitate the correct positioning of the plugs an index card is provided said card being furnished with a number of perforations or holes adapted to coincide with certain of the holes in the resistance box, each perforation representing a certain resistance for use with a particular section of the film. The relative densities of the several sections of the film having been previously determined and indicated on the index card by the perforations, the card is placed in position in the resistance box in front of the holes therein, a plug is placed through each perforation in the card and thereby in the holes in the resistance box, each plug corresponding to the resistance it

[*Price 6d.*]

is desired to throw in as any particular section of the film passes the exposure aperture. The mechanism for bringing a series of spring contacts connected to the resistance into successive engagement with the respective plugs is actuated by an electro-magnetic device, adapted to co-act with the negative film and causes a selector bar, carrying said spring contacts, to fall step by step as the sections pass through the printing machine.

The object of the present invention is to provide improved means for automatically varying the resistance and thereby the intensity of the light without having to re-set or change any part of the actual mechanism for different films and to enable said resistance to be controlled in such a manner that it is possible, by the provision of a moving template of paper or the like, to make a series of contacts directly through same.

According to this invention, the template consists of a strip or band of paper, which may be in an endless form if desired for repetition of the lighting and other effects or operations. A separate template is provided for each complete film and for the purpose of driving same is furnished with perforations or the like along each side. The template is made by punching or otherwise perforating same in positions determined by the varying densities of the several sections of the film and for other purposes.

The strip or band template thus formed is adapted to be placed in a machine furnished with a plurality of separate horizontally disposed spring contacts each of which is arranged to coincide with all perforations in the template located in a vertical line so that as each perforation comes opposite a contact said contact passes through said perforation and bears on a pole common to all contacts and completes a circuit through the resistance connected to that particular spring contact.

In carrying out this invention the strip or band template may be ruled and is otherwise provided with means for indicating a certain number of resistance values or other features said values or the like being arranged transversely of the strip.

As the densities of the various sections of the film are determined a perforation is made in the film in a position immediately below (that is, longitudinally of the strip) the index figure representing a particular resistance value. The perforations for the different sections of the film are arranged in a transverse line immediately below the preceding perforation.

In addition to perforations for regulating the activity of certain resistance contacts, the template may also be furnished with perforations controlling contacts actuating a device for counting the number of pictures, and for cutting out the light and driving motor.

A form of mechanism devised for use with a strip or band template as above described will now be referred to.

The device contains means adapted to carry the template, a plurality of spring contacts, a common pole for all said contacts, and a drum or drums furnished with a plurality of driving pins or equivalent means adapted to engage with the perforations or their equivalent in the edges of the template. A step by step rotary motion is imparted to the drum or drums by means of a ratchet wheel engaged by a pair of pawls actuated by an electro-magnetic device. The device also contains the plurality of resistances or cut outs equal to the number of spring contacts.

Assuming that a strip or band template of the form above referred to has been perforated in the desired positions, the strip is so arranged in the machine that it passes between the fixed contacts and the common pole and in front of the drum or drums against which it is pressed by spring pressed rollers or in any other desired manner.

In operation, as the negative film, which is provided with slots or cut away portions on its edges adapted to co-act with any desired form of electrical device including a switch, passes through the printing machine and a slot or

cut away portion causes the actuation of the electrical device, a circuit is completed through the electro-magnet and the ratchet wheel is actuated to cause the drums to drive the template so as to bring a perforation therein into co-incidence with one of the spring contacts which thereby completes a circuit through the resistance connected thereto and a variation of the light is effected. The parts will remain in this position until the electrical device is again actuated by the film when a further movement of the template is effected to bring another perforation in the template into co-incidence with another spring contact and causing a further change in the intensity of the light.

Dated this 26th day of June, 1917.

PHILIP M. JUSTICE,
Chartered Patent Agent,
55 & 56, Chancery Lane, London,
For the Applicant.

COMPLETE SPECIFICATION.

Improvements in Printing Apparatus for Cinematograph Films.

I, WILLIAM CECIL JEAPES, of 76 and 78, Wardour Street, London, W. 1, Cinematograph Expert, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to printing apparatus for cinematograph films and in particular to that part of the apparatus for regulating the intensity of the light according to the density of the film.

As is well understood, a complete film is usually built up of a plurality of sections and each of such sections may have been produced under varying conditions, that is, the general surroundings, light and time of day at which the exposure was made, may vary in each case thereby producing lengths of film negative of varying densities.

In order to produce good results in the production of positive films from negatives of this nature, it is necessary to vary the intensity of the light passing through the exposure aperture so as to obtain as far as possible a positive film of even density throughout.

Varying methods have heretofore been adopted for effecting the desired result, the usual method being to control the light by hand; this however requires the continuous attention of the operator, the result is, moreover, irregular and unsatisfactory.

Plans have been proposed by which when the relative densities of the several sections of the film have been determined, conductors corresponding to the sections are inserted in positions on a card depending upon the relative densities of the film at these sections and resistances are automatically inserted in the circuit of an electric lamp by the revolution of contact bars adapted to engage with the stationary conductors; the progressive movement of the apparatus controlling the variations of light being effected by an electromagnet energised by perforations or the like on the negative film.

The present invention relates to an improved apparatus of this general type and comprises a template consisting of a strip or band of insulating material which is intermittently moved as the negative film is advanced in the printing machine, and is perforated in positions determined by the densities of the sections of the film to allow electric contact to be established with spring contact arms connected to suitable points in a variable resistance controlling the intensity of the printing light.

In the accompanying drawing, which illustrates this invention:—

Fig. 1 shows a portion of the template;

Fig. 2 is a front elevation of a form of machine in which said template is employed;

Fig. 3 is a side elevation of Fig. 2 partly in section, and

Fig. 4 is a side elevation, partly in section, of a contact device.

In carrying out this invention the strip or band template 1 is, as shown in Fig. 1, provided with a plurality of longitudinal and transverse lines 2, 3 respectively and is otherwise provided with means for indicating a certain number of resistance values 4 or other features 5, said values or the like being arranged transversely of the strip 1.

As the densities of the various sections of the film are determined a perforation 6 is made in the strip 1 in a position immediately below (that is, longitudinally of the strip) one of the index figures 4 representing a particular resistance value. The perforations for the different sections of the film are arranged in a transverse line immediately below the preceding perforation.

In addition to perforations for regulating the activity of certain resistance contacts, the template may also be furnished with perforations positioned under one of the indicating letters 5 controlling contacts actuating a device for counting purposes, and for cutting out the light and driving motor respectively.

A form of mechanism devised for use with a strip or band template as above described will now be described with reference to Figs. 2, 3 and 4.

The device comprises a box or casing 7 provided with means for supporting the template 1, such means comprising a base plate 8 provided with a rigid support 9 and a spindle 10 adapted to carry the reel 11 upon which the template 1 is wound. The outer end of the spindle 10 is supported by a movable arm 12, and, to prevent the template 1 from unwinding too freely a presser roller 13 carried by a spring controlled frame 14 is adapted to bear against the surface of the rolled template.

As the template 1 leaves the reel 11 it passes over a roller 15 furnished with guide flanges 16, thence downwardly over the face of the box 7 between guide plates 17 and under gates 18 and 19, after which it leaves the device and is collected in any desired manner until re-wound on the reel 11.

The gate 18 is, in the example illustrated, formed of fibre and on the inner face is grooved to adapt it to receive a brass plate 20 which acts as a common pole for a plurality of spring controlled contacts 21 connected to a plurality of resistance coils 22, said contacts being carried by a fibre bar 23 hinged at 24 in the interior of the box 7. The front board 25 of the box 7 is furnished with a plurality of slots or openings 26 corresponding to the number of contacts 21, such slots being located immediately behind the plate 20.

The gate 18 is hinged at 27 to enable the template 1 to be placed in position and is held in its closed position by a catch 28. To enable the current to the plate 20 to be cut off when the gate 18 is open, a spring plunger contact 29 (Fig. 4) is secured to the inside of the front board 25, said plunger passing through said board as shown.

The gate 19 is hinged at 30 and is held in its closed position by a catch 31. This gate as shown consists of two rollers 32, 33, the extreme ends of which are adapted to bear on drums 34, 35 projecting through apertures provided in the board 25, said drums being furnished with a plurality of driving pins or equivalent means 36 adapted to engage with the perforations or their equivalent 37 in the edges of the template 1.

Centrally disposed on the spindle 38 carrying the drums 34, 35 is fixed a ratchet wheel 39 adapted to be engaged by a pair of spring connected pawls 40, 41 pivotally mounted within the forked end of a pivoted lever 42, which lever constitutes the armature of an electromagnet 43. The spindle 38 is carried by two supports 44 secured to the casing.

The lever 42 is normally held out of contact with the magnets 43 by means

of a spring 45, an adjustable stop 46 being provided for limiting the movement of said lever.

Assuming that a strip or band template 1 of the form above referred to has been perforated in the desired positions, the strip is so arranged in the machine that it passes between the common pole 20 and the spring contacts 21 and in front of the drums 34, 35 against which it is pressed by the rollers 32, 33.

In operation, as the negative film, which is provided with slots or cut away portions on its edges adapted to co-act with any desired form of electrical device including a switch, passes through the printing machine and a slot or cut away portion causes the actuation of the electrical device, a circuit is completed through the electro-magnet 43 and the ratchet wheel 39 is actuated to cause the drums 34, 35 to drive the template 1 so as to bring a perforation 6 therein into coincidence with one of the spring contacts 21 which consequently comes into contact with the common pole 20 and completes a circuit through the resistance 22 connected thereto, thereby effecting a variation in the intensity of the light in the printing machine. The parts will remain in this position until the electrical device is again actuated by the film when a further movement of the template is effected to bring another perforation in the template into coincidence with another spring contact, thereby causing a further change in the intensity of the light.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In printing apparatus for cinematograph films a strip or band of insulating material perforated with holes spaced at regular intervals for the purpose of feeding the template and with holes perforated in positions determined by the densities of the sections of the film to allow electric contact to be established with spring contact arms connected to suitable points on a variable resistance controlling the intensity of the printing light.

2. Printing apparatus for cinematograph films, as claimed in Claim 1, in which the movements of the template are controlled by an electromagnet actuated by a device co-acting with the film being printed from.

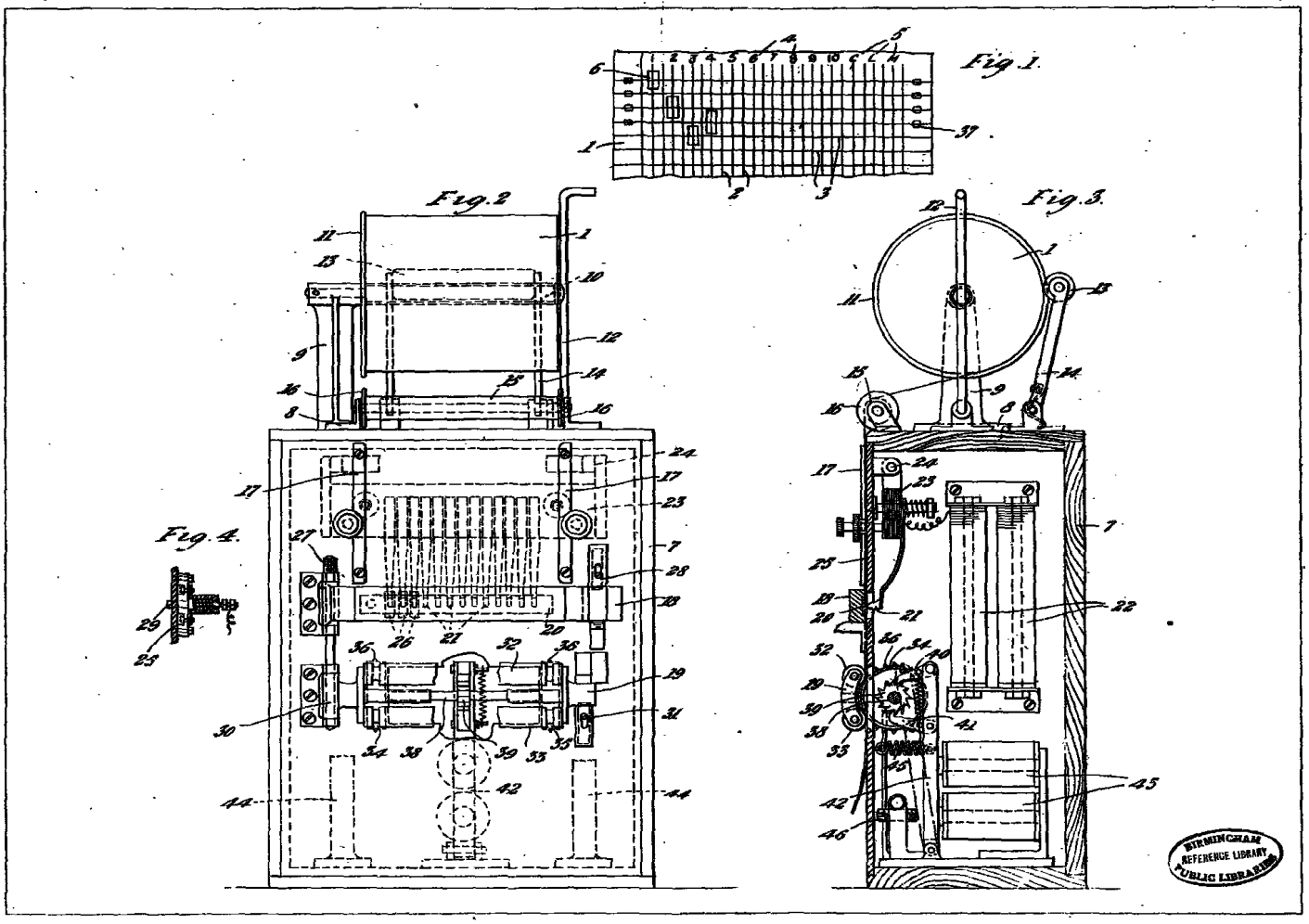
3. A template for use in apparatus for printing cinematograph films, substantially as described with reference to Fig. 1 of the accompanying drawing.

4. An apparatus, for use with a template as claimed in Claim 1, substantially as described with reference to Figs. 2, 3 and 4 of the accompanying drawing.

Dated this 2nd day of January, 1918.

ABEL & IMRAY,
Bank Chambers, Southampton Buildings, London, W.C. 2,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1918.



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[This Drawing is a reproduction of the Original on a reduced scale.]

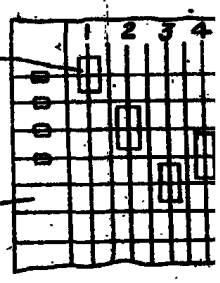


Fig. 2.

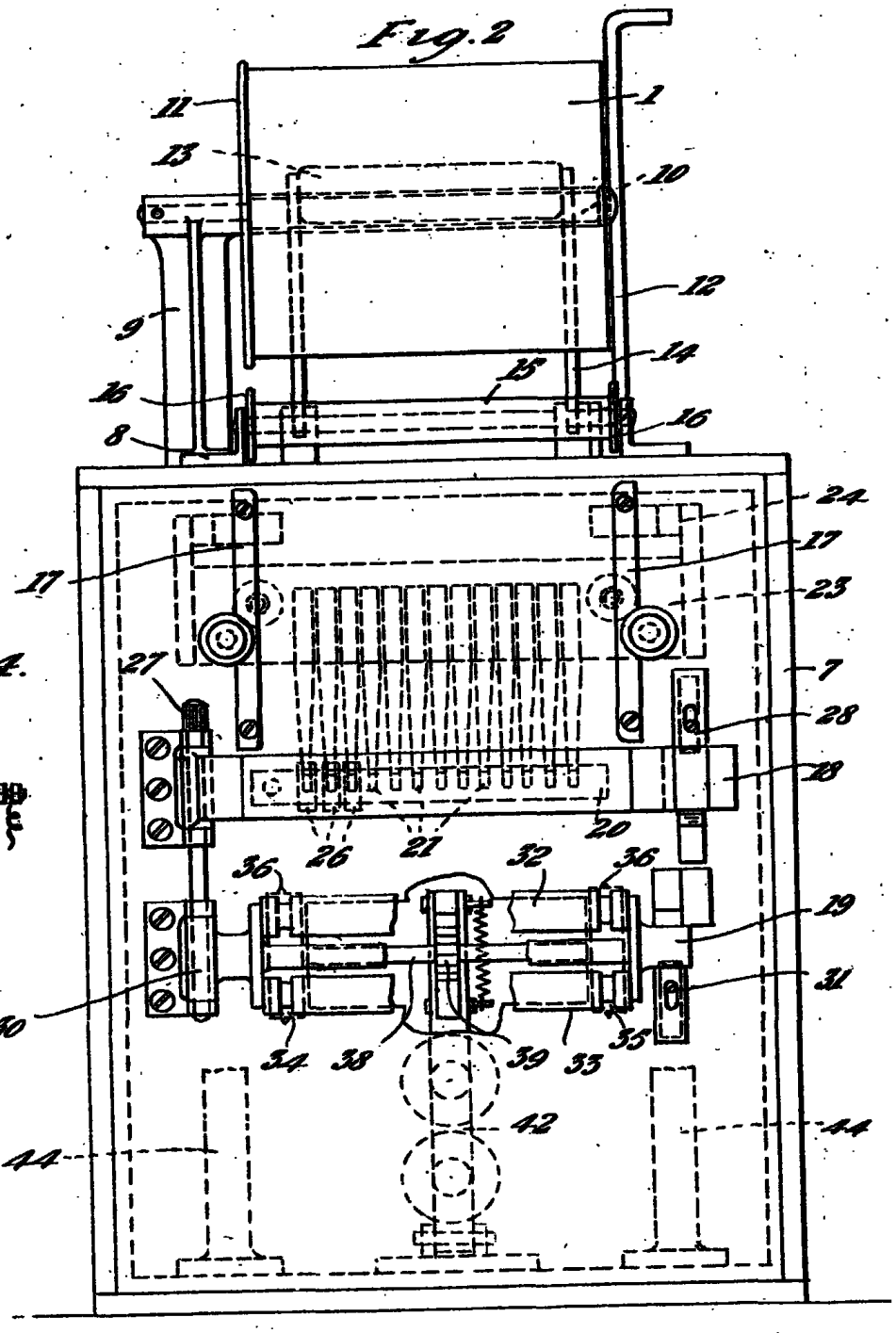
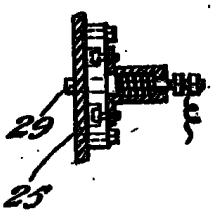


Fig. 4.



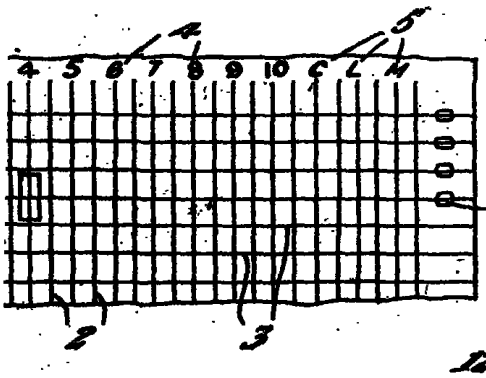
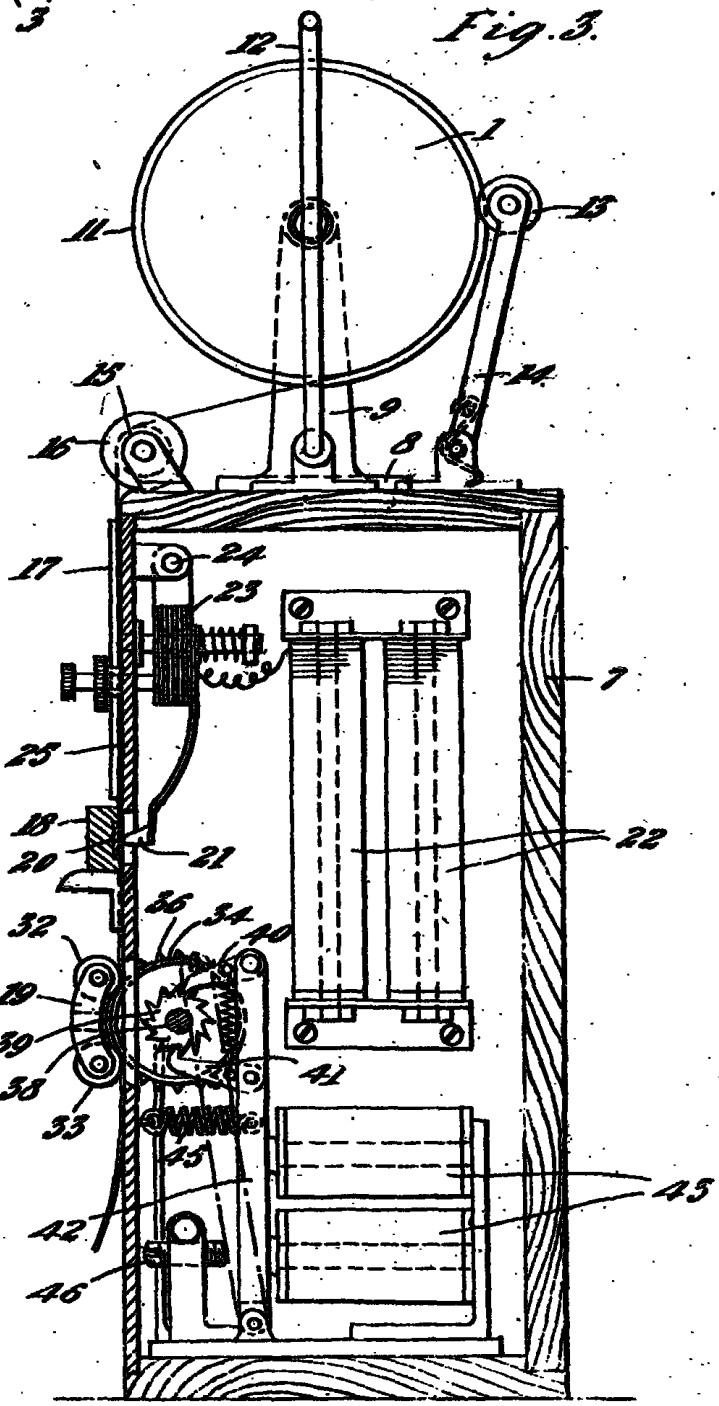


Fig. 1.

Fig. 3.



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