

Feb. 14, 1933.

H. J. TEMPLETON

1,897,283

MOVING PICTURE PROJECTOR

Original Filed Feb. 10, 1928

2 Sheets-Sheet 1

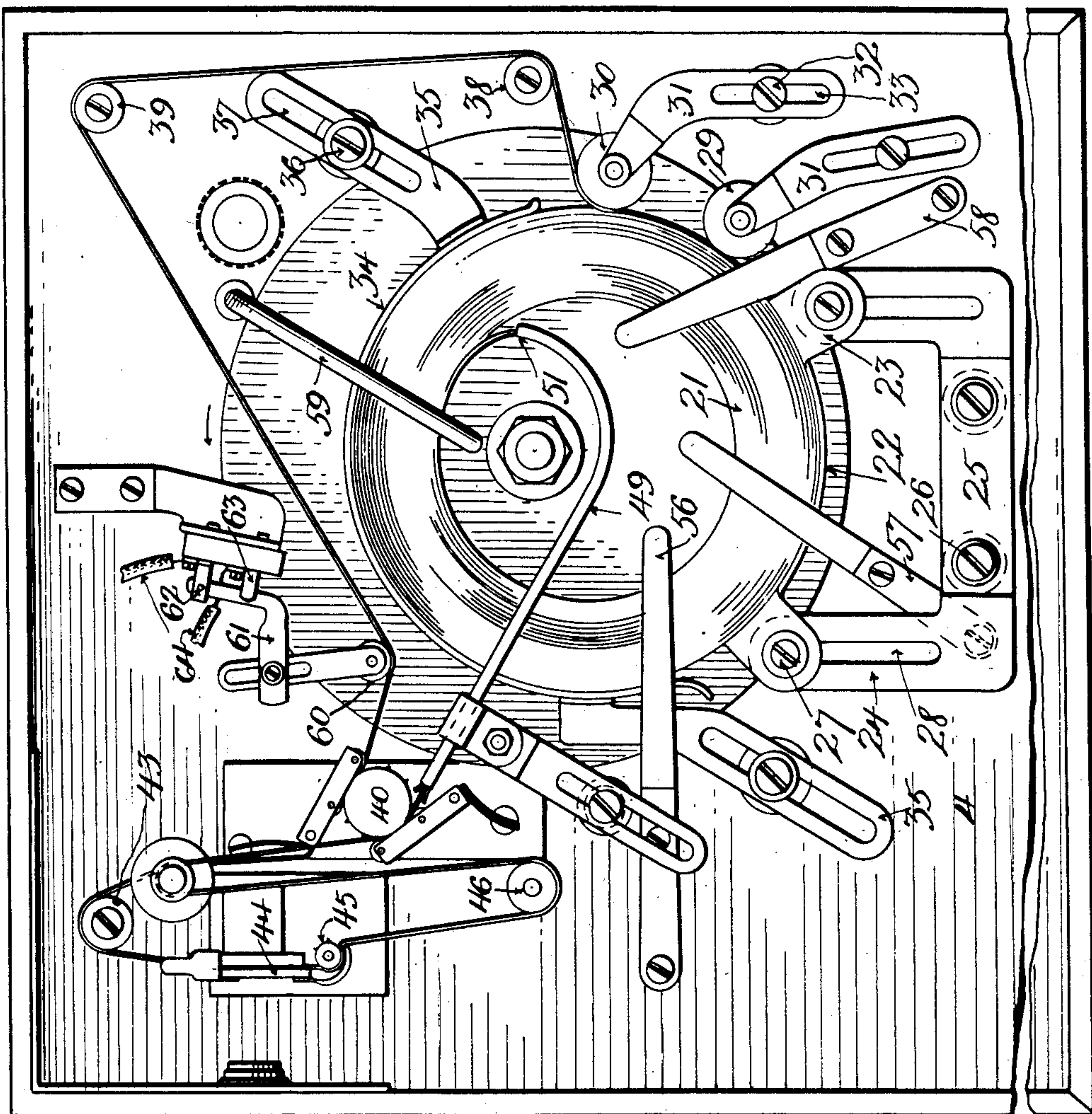


Fig. 1

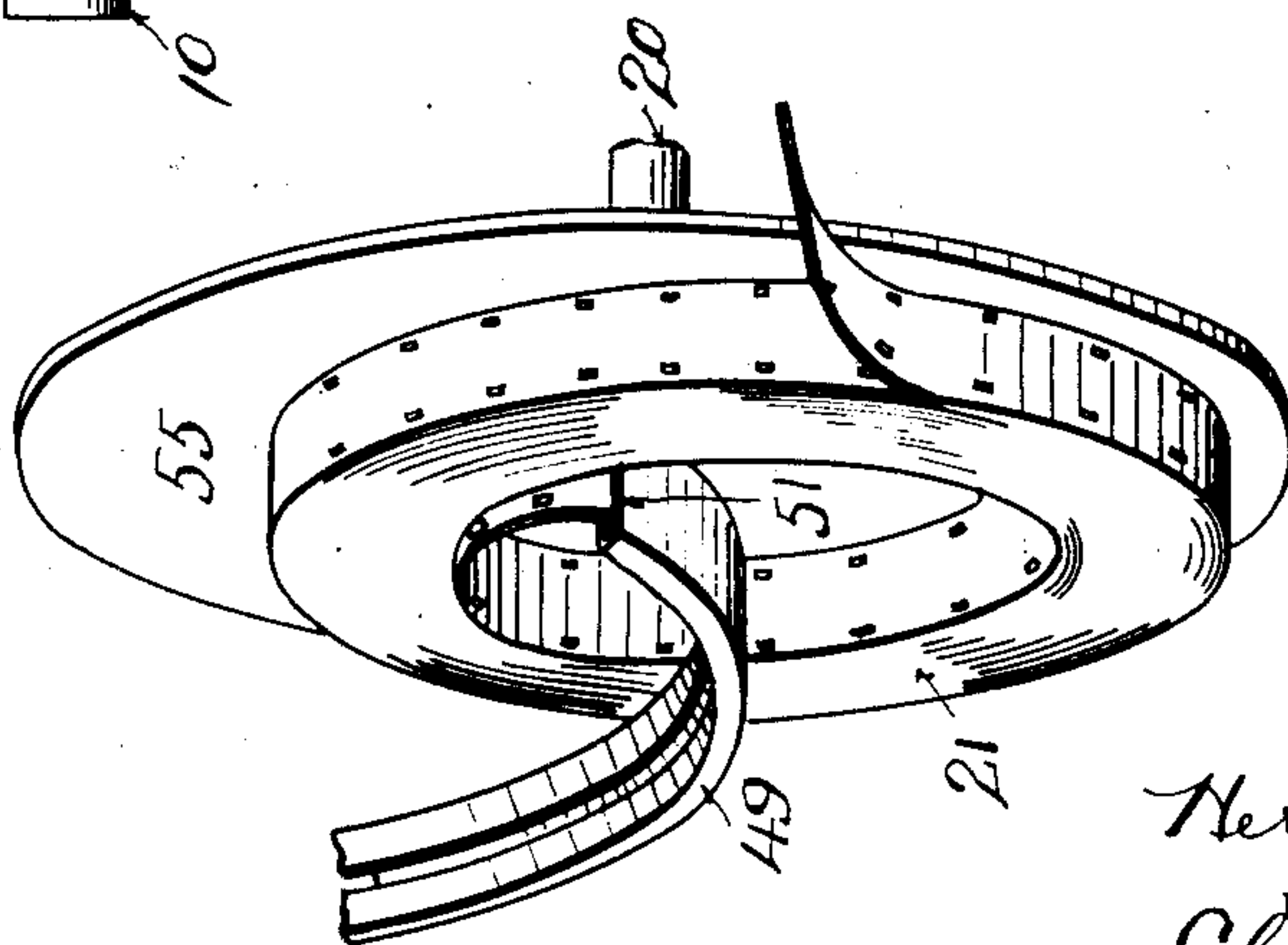


Fig. 2.

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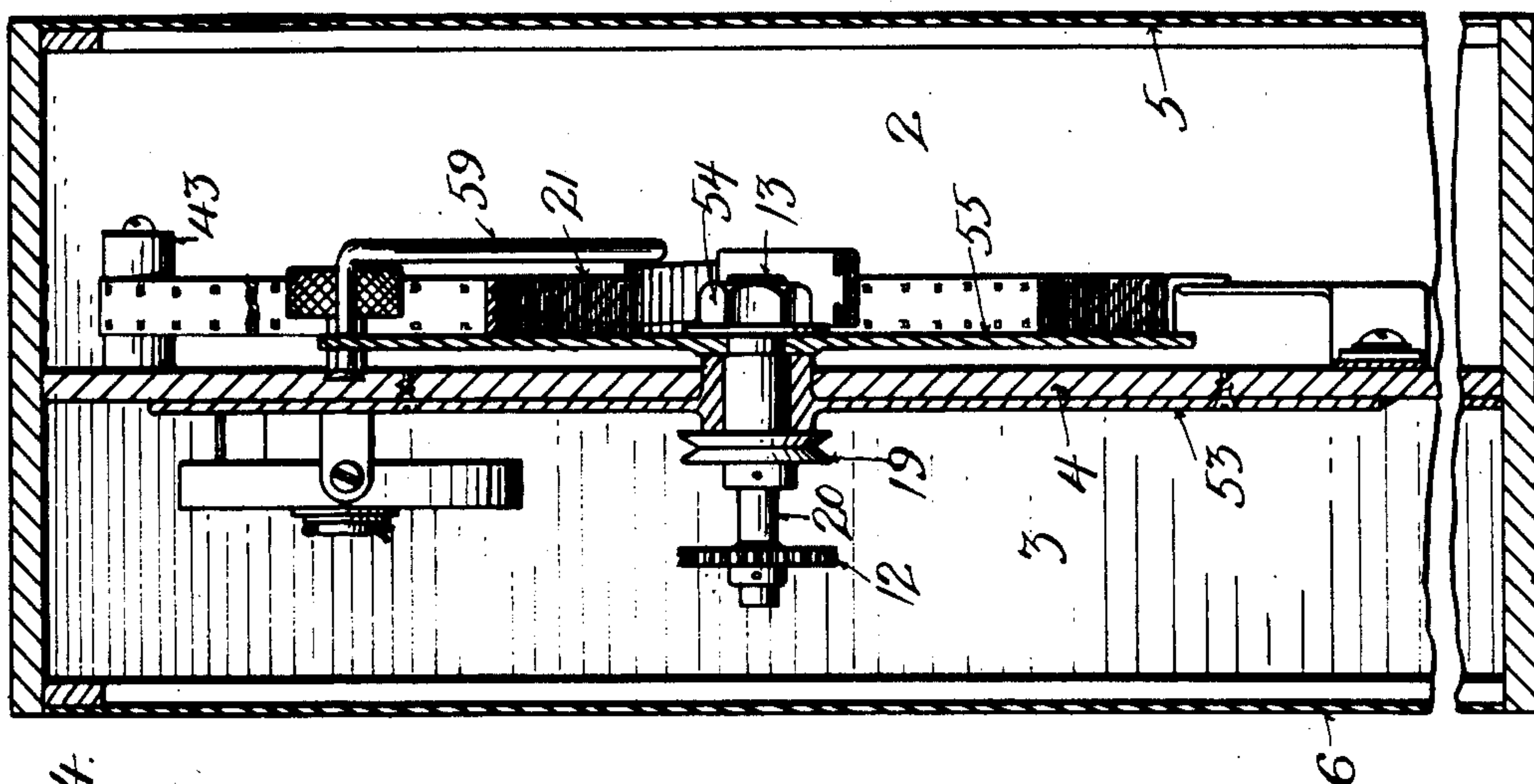


Fig. 4.

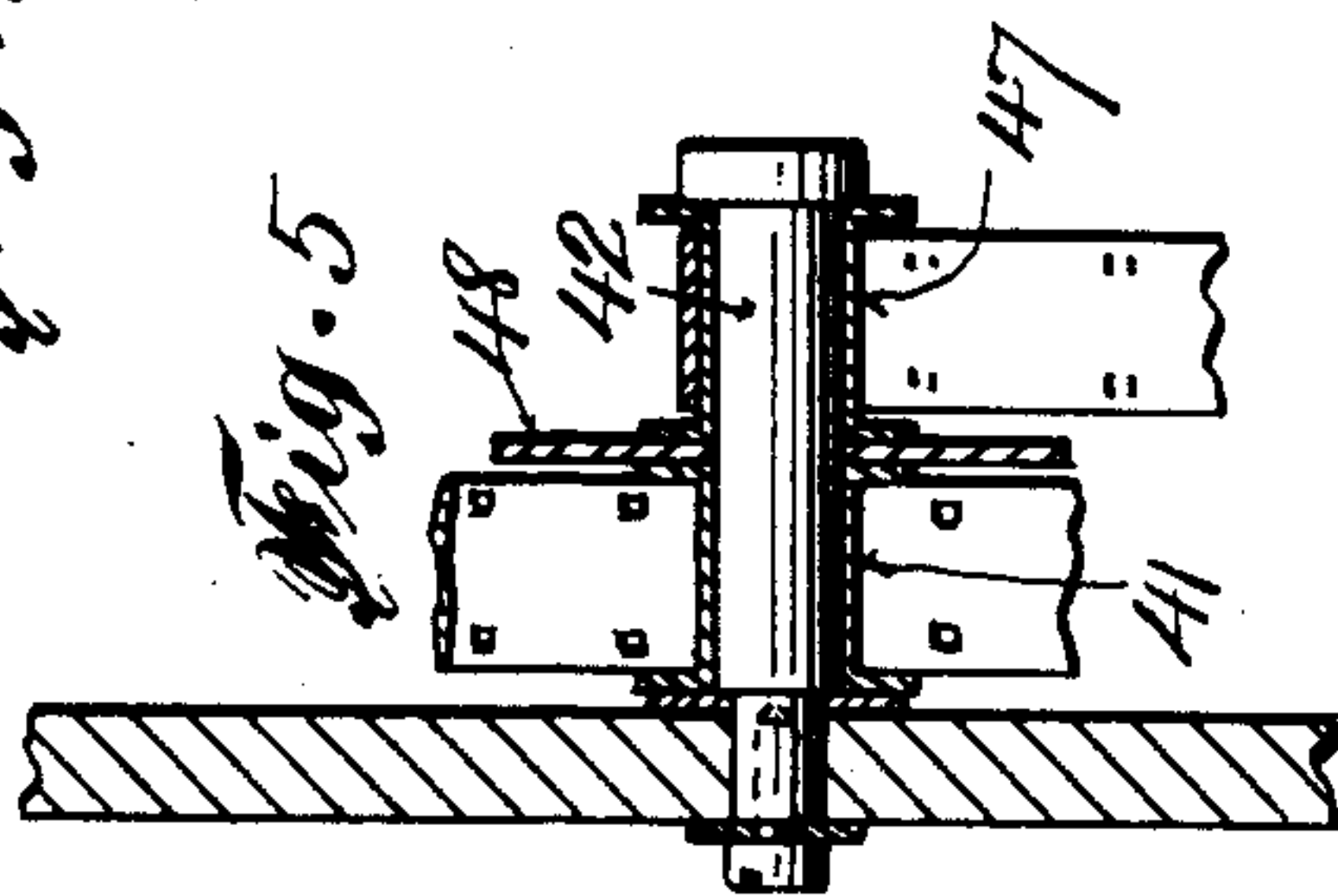


Fig. 5.

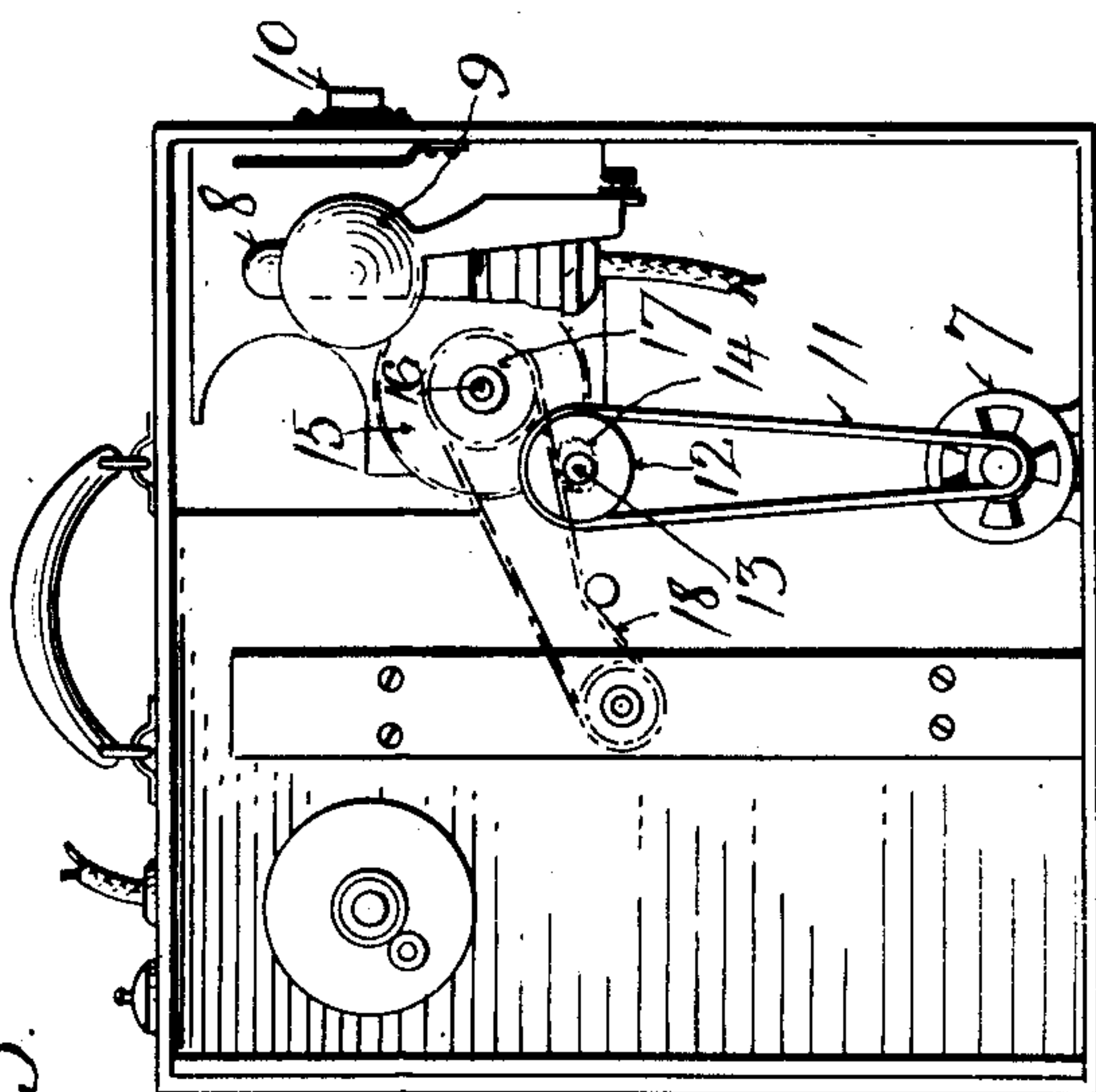


Fig. 3.

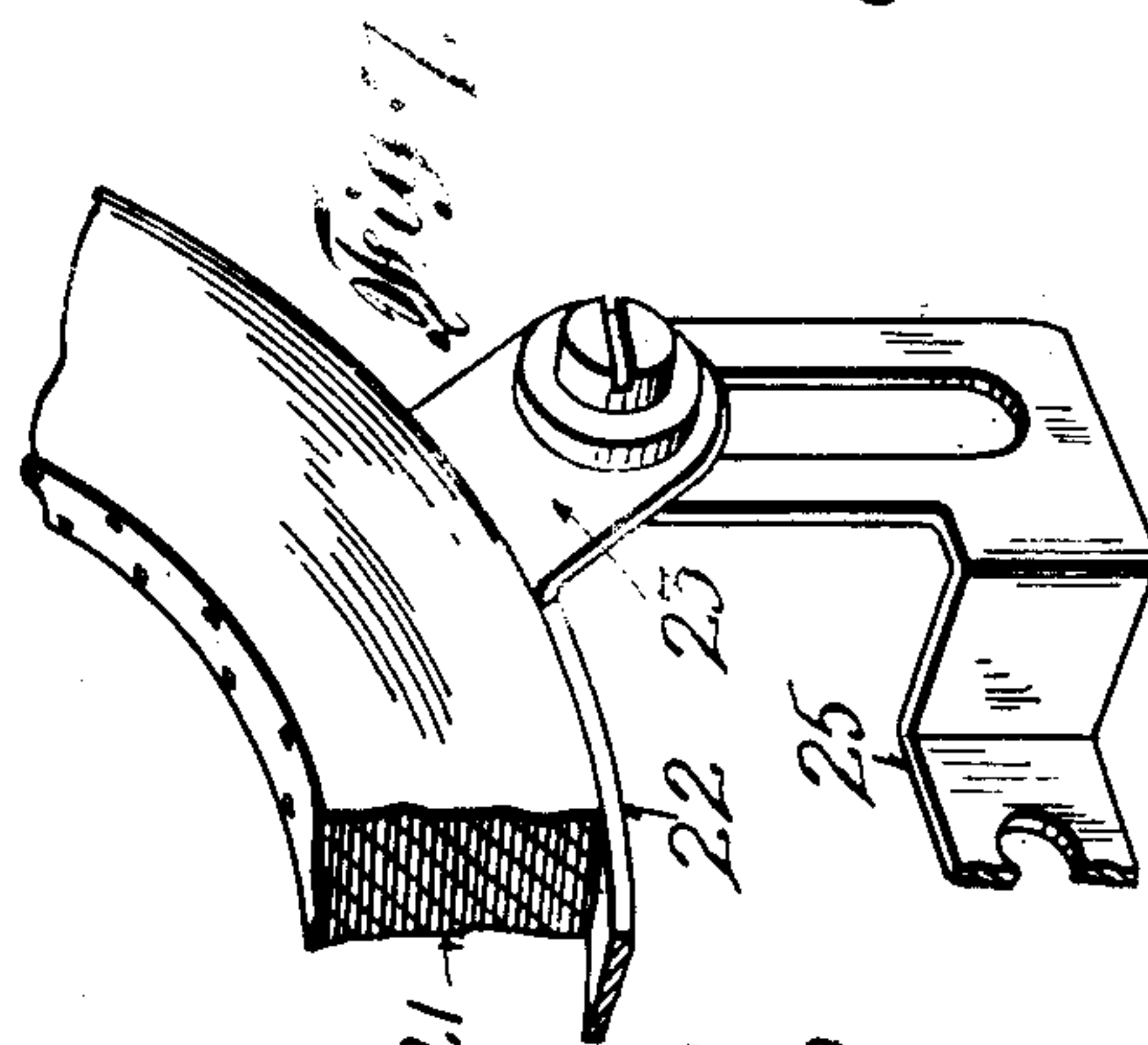


Fig. 1.

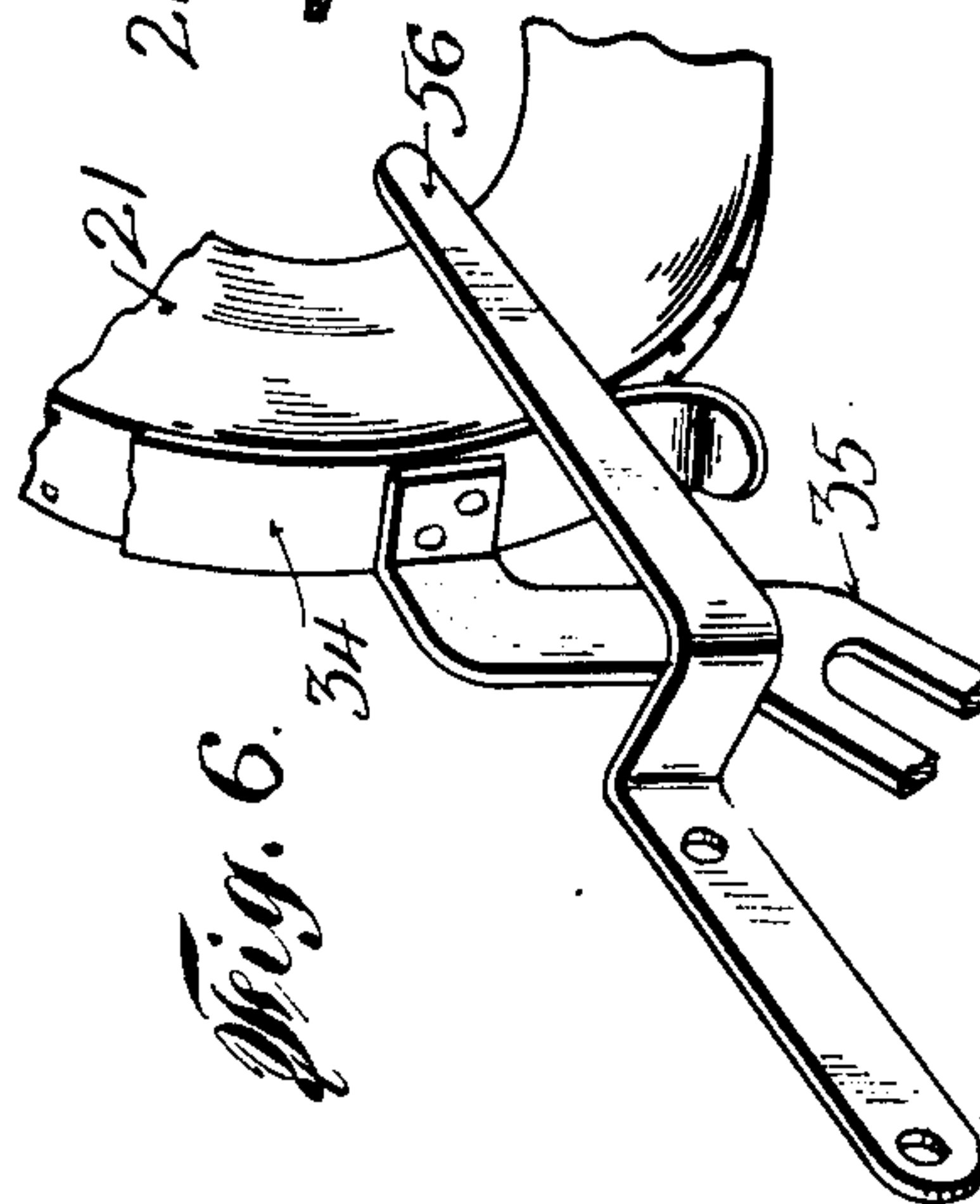


Fig. 6.

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## MOVING PICTURE PROJECTOR

Refile of application Serial No. 253,368, filed February 10, 1928. This application filed May 27, 1932.  
Serial No. 614,015.

This is a refile of my application Serial No. 253,368, filed February 10, 1928.

My invention relates to apparatus for projecting moving pictures. The principal object of the invention is to provide a projecting machine in which the film is joined at its ends to form a continuous strip and this film is so operated that it may be projected continuously. That is to say, instead of the film being run once through the machine, and being then rewound for a succeeding operation, in the present machine the film runs continuously so that all portions of it may be projected over and over again without stopping the machine for rewinding. In my Patent No. 1,861,197, May 31, 1932, I have shown and described an apparatus for this same general purpose and the present device is intended as an improvement on the device shown in that application. In the present case I employ what I call a floating coil of film, the outer layer being continuously removed to pass through the projecting portion of the machine, and the return run of the film being fed back to the inner layer of the floating coil. I employ, in addition to the features shown in my said copending case, means for acting on the face of the floating coil of film, for assisting in the rotating of the coil. This face engaging means also assists the several convolutions of the film to separate from each other as the convolutions gradually expand in the process of progressing from the inner layer of the coil to the outer layer.

In the preferred construction the means for engaging the face of the coil of film consists of a smooth faced revolving disc which travels at a slightly greater speed than the portions of the coil with which it contacts, and I provide means for engaging the opposite side of the coil to press it lightly against the revolving disc.

Another object of the invention is to provide automatic means for arresting the operation of the apparatus in case of trouble. This device is controlled by the film itself and if the latter becomes unduly taut the safety device is thereby rendered operative to stop the machine.

In the drawings forming part of this application,

Figure 1 is an elevation of a projecting apparatus containing my invention with the door of the receptacle or case removed to show the interior construction,

Figure 2 is a perspective view of the coil of film and the disc which co-operates with it.

Figure 3 is a view similar to Figure 1 on a smaller scale, showing the opposite side of the apparatus, also with the cover removed.

Figure 4 is a transverse, sectional view of the film operating mechanism,

Figure 5 is a detailed sectional view showing certain of the pulleys for guiding the film,

Figure 6 is a perspective view showing a portion of the film and members co-operating therewith, and

Figure 7 is a similar perspective view of another portion of the coil of film.

As far as the means for projecting the light through the film is concerned, as well as the means for guiding and propelling the film through the projecting portion of the apparatus is concerned, the present machine may conform to the construction shown in my said patent.

In the drawings I have shown a case 1 for containing the operative parts of the mechanism and this is divided into two compartments by means of the vertical dividing wall 4 forming within the casing the two parallel compartments 2, 3. These may be closed at opposite sides of the casing by means of doors or covers 5, 6 which may be hinged to the casing if desired. On one side of the dividing wall 4 I arrange a motor 7 for driving the movable parts of the apparatus as well as the lamp 8 for projecting light through the objective; whereas on the opposite side of the dividing wall 4 I arrange the coil of film and the various parts for controlling and operating the film. The lamp 8 has arranged behind it a reflector so that light rays are projected through an opening in the wall 4 and are then directed at right angles by a prism through the projection area of the film, and thence through the projecting lens arranged in one of the end walls of the casing.



The motor 7 operates a belt 11 which engages a pulley 12 mounted on the shaft 13. A small gear 14 on this same shaft meshes with a larger gear 15 on the shaft 16 so that the latter is driven by the motor, and this shaft is part of the film moving device. On the shaft 16 there is a pulley 17 around which engages a belt 18 for transmitting power from the shaft 16 to the pulley 19 on the shaft 20. The latter shaft is the one which carries the revolving disc which engages the side face of the coil of film.

In the drawings I have shown a coil of film 21 which is floating; that is to say, it is supported by contact exterior of and near the bottom of the coil. The coil is adapted to revolve on its support and the coil itself is adapted to expand and contract within certain limits. The coil of film in the present device is supported upon a curved or arcuate plate 22 disposed substantially centrally below the axis of the coil and I have shown this plate as provided with laterally extending ears 23.

These ears are attached to the vertically extending arms 24 of a bracket 25 which is secured to the wall 4 by the screws 26. Bolts 27 pass through apertures in the ears 23 and engage in the elongated slots 28 in the arms 24 for securing the curved plate 22 in position to support the coil of film. The slots 28 permit of adjustment of the supporting plate 22 in order to adapt its position to suit coils of different sizes. Toward the right in Figure 1 I have shown rollers 29, 30 which act as idlers and contact with the outer surface of the coil of film for the purpose of guiding it and preventing it from being displaced by the portion of the film which is leaving the outer portion of the coil. These idlers are shown as supported by adjustable arms 31 suitably attached to the wall 4 by means of screws 32 which engage in the elongated slots 33 of the arms. The arms are adapted to be adjusted in order to adapt the positions of the idlers 29, 30 to conform to coils of film of different diameters.

I prefer to arrange a plate above the coil of film to act as a guide to prevent displacement of the coil and to serve as a brake on the outer layer thereof, in order to prevent excessive expansion of the coil of film. For this purpose I have shown a curved plate 34 engaging the upper portion of the periphery of the coil of film; and this plate is provided with laterally extending arms 35 near its opposite ends, which are attached to the wall 4 by the screws 36 engaging in the elongated slots 37 of the arms. By releasing the screws 36 the position of the plate 34 may be adjusted toward or from the axis of the coil of film in order to accommodate coils of different sizes.

The outer layer or convolution of the film leaves the floating coil adjacent the roller 30

and then passes around a guide roller 38 and from there the free portion of the film travels upwardly around a guide roller 39 and thence to the toothed sprocket 40 for feeding the film. From the feeding device the strip of film passes upwardly over a guide roller 41 on the shaft 42, thence over the guide roller 43, thence through the framing device 44, thence partly around the feeding sprocket 45. From there the strip of film passes around the lower guide roller 46, thence upwardly over the flanged roller 47 arranged on the shaft 42 at the side of the roller 41 the intermediate flange 48 leaving this portion of the film separated from the portion which is approaching the guide roller 42. After passing over the roller 47 the film passes to the under side of the feed sprocket 40 and from there it passes into a guiding chute 49. This chute is directed toward the axis of the coil of film and thence it turns in the form of a coil at 50 and is directed laterally, so that the free end 51 discharges the film in a direction almost conforming with the line of the innermost convolution of the floating coil. From the above it will be apparent that the film is continually leaving the outer portion or periphery of the floating coil and it is being continually returned to the inner layer thereof. It will be understood that the ends of the film are joined together to make the film continuous the same as in my said co-pending application. The film is preferably provided with the usual feed apertures 52 at each side and the device for feeding the film represented by the sprockets 40, 45 may conform to present practice.

The shaft 20 which is mounted in a suitable hub of a plate 53 secured to the dividing wall 4 extends into both compartments 2, 3 and on one end of this shaft there is secured by means of a nut and washer 54 a vertically arranged disc 55.

This disc, as previously described, is operated by the belt 18 which acts on the pulley 19 of the shaft 20. The surface of this disc lies parallel or substantially parallel to and adjacent one face of the floating coil of film and this surface of the disc is preferably smooth in order that it shall not injure the edges of the several convolutions of the film. The disc 55 is revolved preferably at a speed which is somewhat greater than the speed at which the coil of film revolves. In Figure 1 I have shown a number of light pressure springs for lightly pressing the coil of film against the surface of the disc 55. I have shown three arms 56, 57, 58 attached to the wall 4 and having their free ends extending across one face of the film, parallel thereto. These are arranged to engage the coil of film below the axis of the latter. They exert a light spring pressure against the outer surface of the coil, so that the opposite face is



pressed into light contact with the revolving disc 55 to provide sufficient traction between the disc and the coil to secure the result herein referred to. I have shown an arm 59 attached to the wall 4 and extending across the upper portion of the coil 21 but this arm preferably does not normally come into contact with the film but merely serves as a guide to prevent the coil from tipping out of place while the device is being transported.

I have arranged a roller 60 carried upon a switch arm 61 and this roller is adapted to engage the strip of film where it passes between the guide roller 39 and the feed sprocket 40 so that it depresses the film slightly out of a direct path, as shown in Figure 1, as long as the film is operating in its normal or intended condition.

If the run of film which is passing through the projecting apparatus becomes unduly taut by reason of the failure of the coil of film to properly revolve, as will be the case if the film becomes entangled, then the tightening of the film will cause the switch arm 61 to be swung upwardly on its pivot 62 and this will cause the arm 61 to disengage from the contact 63 and thus open an electric circuit which includes the wires 64 connected in series between the motor 7 and the source of electrical supply. Thus when the film becomes unduly taut the circuit is opened and the motor stopped before serious damage is caused to either the film or the projecting machine.

When the apparatus is in operation the film is continuously withdrawn from the outer layer or convolution of the coil of film and this action serves as the principal means for revolving the floating coil. The portion of the film which has passed through the projecting apparatus is being fed back through the chute 49 to the interior convolution or layer of the coil. It will be obvious that each portion of the film which is fed by the chute 49 to the inner surface of the coil must progress from this inner layer by gradually expanding as subsequent inner layers are fed under it, so that finally what was an inner layer of film will ultimately become the outer layer and will be taken off from the outer surface of the coil. There must be sufficient freedom between the several convolutions of the coil to allow them to gradually expand. The speed of revolution of the inner layers of the coil will naturally be less than that of the outer layer due to the difference in distance from the coil axis. I have found that with the floating coil the interior diameter may vary according to the natural requirements of the film and even the outer diameter of the coil may vary from time to time as the spaces between various convolutions vary.

As the face of the disc 55 revolves in contact with one face of the coil, it provides a

slight traction urging the coil to revolve in the same direction as that caused by the film feeding device. I have indicated the direction of movement of both the disc 55 and the coil 21 in Figure 1. The light contact of the face of the disc 55 against one face of the coil, while urging the coil to revolve, will not materially alter the free shifting of the several convolutions of film in the coil, and in fact it will assist the several convolutions to expand in the manner necessary as each portion of the film passes from a convolution of smaller diameter to one of larger diameter. The revolving disc, therefore, assists the rotation of the coil of film and assists the expansion of the several convolutions thereof. This is especially true where the disc revolves at a slightly greater speed than the coil. The weight of the coil of film comes upon the lower supporting plate 22 and for a great part of the time there may be no contact between the upper portion of the coil and the upper plate 34 but if the coil has a tendency to expand beyond the intended limit, the outer surface may touch this upper guiding plate but the pressure will not be sufficient to materially hamper the free revolution of the coil.

I have found that by combining the propelling action of the film feeding device with the revolving disc, a comparatively large floating coil of film may be propelled over long periods of time without material injury to the film. For this reason the present device may be used for continuous display purposes and it is therefore suitable for advertising by means of continuous projection. The present device is so simple and uniform in its operation that it may be used upon moving vehicles because the vibrations of the vehicle will not interfere with the propulsion of the coil of film to any extent.

Having described my invention, what I claim is:

1. In a projecting apparatus the combination of means for projecting pictures from a film arranged in the form of a coil having a portion of the film strip operated on by the projecting means, means for holding the coil of film in floating condition while the same is being revolved by a propelling force acting through the film strip, means for guiding a strip of film from the outer portion of said coil to the projecting means, means for guiding the strip of film from the projecting means back to the interior of said coil, and means engaging the film strip between said coil and the projecting means and adapted to be actuated by the tightening of the film strip to effect the stopping of the propulsion of the film.

2. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil, a portion of the



film arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact with the periphery thereof and adapted to permit the coil to be revolved by propelling force acting through the strip of film, the inner portion of the coil of film being free to expand and contract, means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil and revolving means independent of said support engaging the side of the coil of film for assisting in the revolution thereof.

3. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil, a portion of the film arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact with the periphery thereof and adapted to permit the coil to be revolved by propelling force acting through the strip of film, the inner portion of the coil of film being free to expand and contract, means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil, and a revolvable member arranged substantially parallel with the plane of said coil and engaging the side face thereof, and means for propelling said latter means whereby the same will assist in the revolution of said coil of film.

4. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil, a portion of the film arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact with the periphery thereof and adapted to permit the coil to be revolved by propelling force acting through the strip of film, the inner portion of the coil of film being free to expand and contract, means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil, and a revolvable member having a smooth surface lying substantially parallel with and engaging the side face of said coil, and means for revolving said revolvable member whereby the same will assist in the revolution of said film.

5. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil, a portion of the film arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact with the periphery there-

of and adapted to permit the coil to be revolved by propelling force acting through the strip of film, the inner portion of the coil of film being free to expand and contract, means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil, and a revolvable member lying substantially parallel with the plane of said coil and engaging the side face thereof, and means for revolving said revolvable member to propel the same, and means for engaging the opposite side face of said coil to press said coil in contact with said revolvable member.

6. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil, a portion of the film arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact with the periphery thereof and adapted to permit the coil to be revolved by propelling force acting through the strip of film, the inner portion of the coil of film being free to expand and contract, means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil, said coil being mounted in a vertical plane, and a revolvable member arranged substantially parallel with the plane of the coil and engaging one side face thereof, means for revolving said revolvable member and means engaging the opposite side face of said coil below the axis thereof for pressing said coil into contact with said revolvable member.

7. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil, a portion of the film arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact with the periphery thereof and adapted to permit the coil to be revolved by propelling force acting through the strip of film, the inner portion of the coil of film being free to expand and contract, means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil, revolving means arranged substantially parallel with said coil and engaging the side face thereof, and means for operating said revolving means at a greater speed than the speed of movement of said coil.

8. In a projecting apparatus the combination of means for projecting pictures from a continuous strip of film arranged in the form of a multi layer coil disposed in a substan-



tionally vertical plane, a portion of the film being arranged to be operated on by the projecting means, means for supporting said coil solely by exterior contact therewith and  
5 adapted to permit the coil to be revolved by propelling force acting through the strip of film, said supporting means being arranged under said coil, the inner portion of said coil of film being free to expand and contract,  
10 means for guiding the strip of film from the outer layer of said coil to the projecting means, means for guiding a portion of the film coming from said projecting means to the inner layer of said coil, and a top guide  
15 for the coil of film adjustable in relation to said supporting means to accommodate coils of different diameters between them.

Signed at the city, county and State of New York, this 26th day of May, 1932.  
20 HERBERT J. TEMPLETON.

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