June 11, 1929. J. HALLA 1,716,774

APPARATUS FOR WINDING CINEMATOGRAPHIC OR PHOTOGRAPHIC FILM BANDS

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Fig. 1

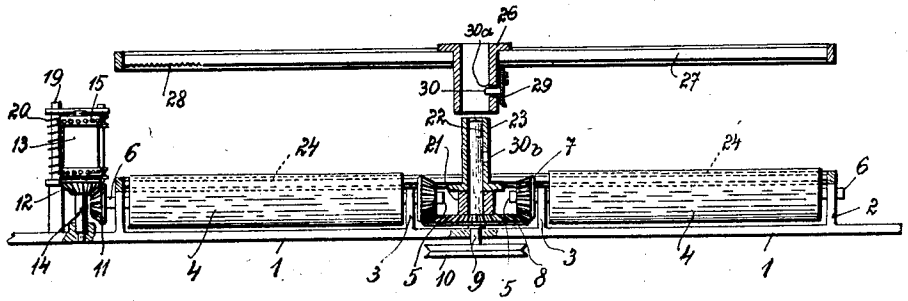


Fig. 2

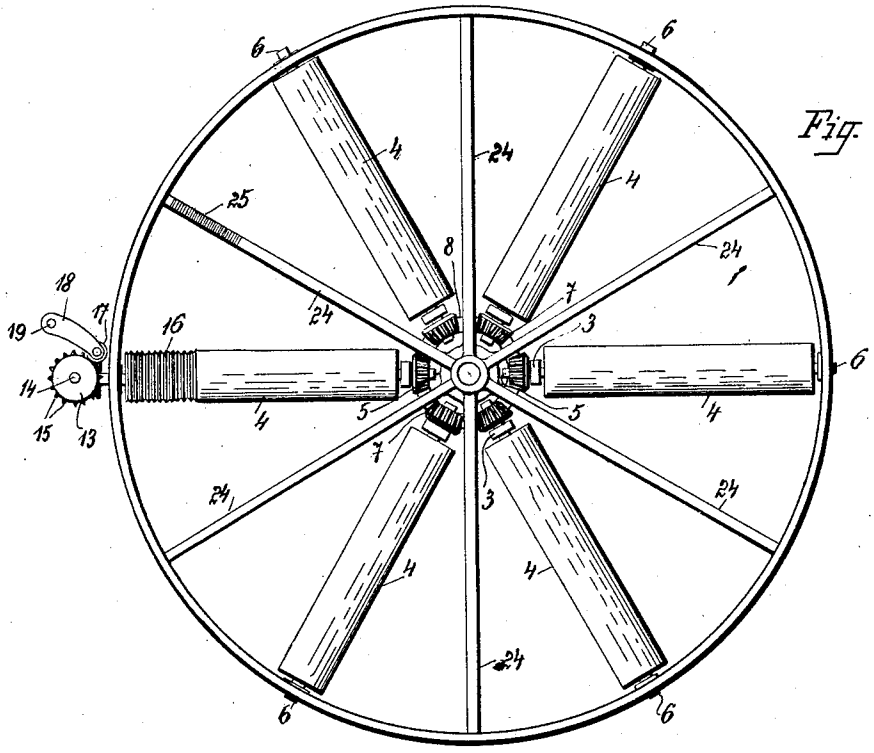
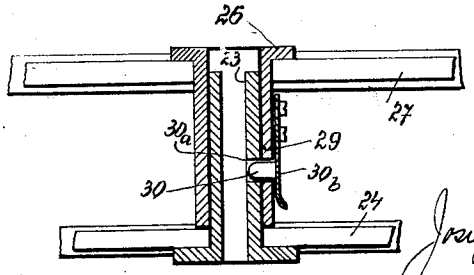


Fig. 3



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Fig. 5

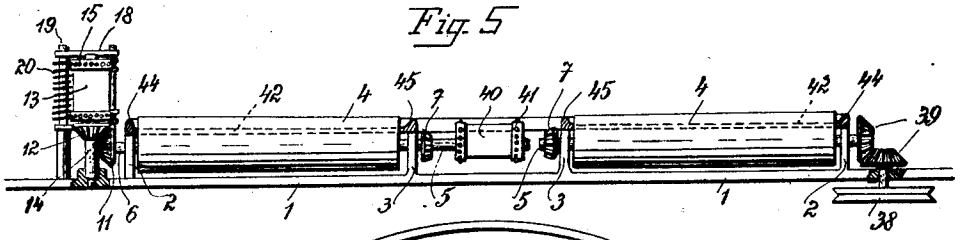
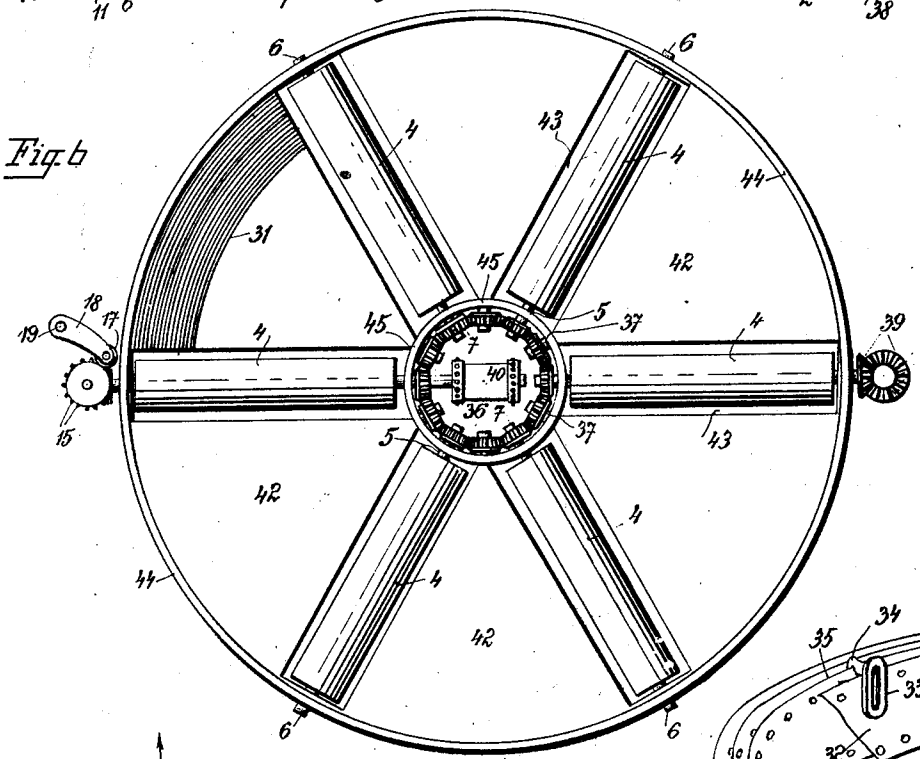


Fig. 6



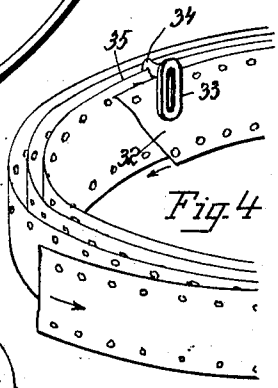
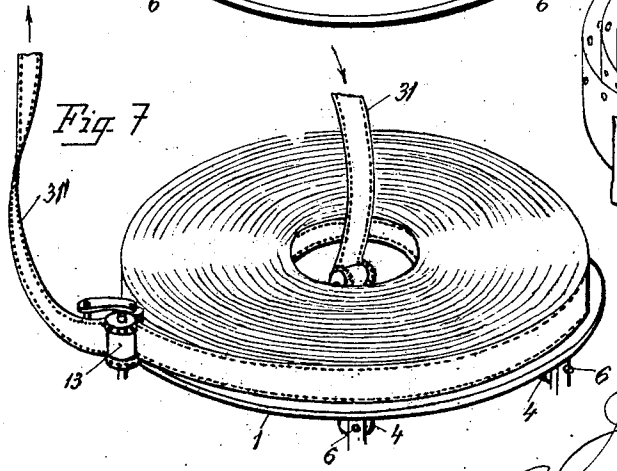


Fig. 4

Fig. 7



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Patented June 11, 1929. 1,716,774

UNITED STATES PATENT OFFICE.

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APPARATUS FOR WINDING CINEMATOGRAPHIC OR PHOTOGRAPHIC FILM BANDS.

Application filed July 6, 1925. Serial No. 41,795.

This invention relates to an improved apparatus for winding photographic or cinematographic film-bands.

Heretofore photographic or cinematographic film-bands were wound upon a centrally disposed shaft, which rotates about its axis. Thereby the band is subjected to tension and the individual windings of the film-band bear directly on top of one another, so that the diameter of the film-band roll is gradually increased.

This mode of winding up the film-band has the drawback that, owing to the superposition of the windings in direct contact with each other, the said windings are subjected to an injurious friction. In consequence of the increasing diameter of the film-band roll and the difficulties resulting in the circumferential speed at a steady number of rotations of the shaft, special auxiliary devices have to be employed, in order to remove the said difficulties.

Now the present invention has for its object the production of an improved apparatus, in which photographic or cinematographic strips or bands, particularly cinematographic film-bands, are arranged in spiral-windings in such a manner, that a clear and predeterminable space is left between the spiral windings for allowing the development of the film-band and which are maintained continuously in this position by a convenient lifting device, and further the present invention relates to a means for carrying out the method just described.

As only the borders of the film-band are secured, the entire image-surface of the film-band can be treated with the chemical fluids and subjected to a drying air-current without any difficulty, thus ensuring a quick and uniform treatment of the film-band.

With small alterations the means above mentioned can be employed as a device for winding up film-bands and may be used on kinematographic projection-apparatus, and by employing this device the film-band is wound-up in such a manner, that is is ready for use for the next performance without requiring rewinding. Therefore also endless film-bands, e. g. film-bands in which the beginning and end are pasted together to form a loop, may be employed, which is of particular advantage in the case of film-bands for advertising purposes, as the same may be shown without interruption as often as desired. In consequence of the dispensation with re-winding, the film-bands are not much worn. The winding up device according to the present invention is constructed in such a manner, that the film-band is arranged in close spiral-windings, which do not contact with each other, in order to prevent the injurious frictional contact between surfaces. Owing to this arrangement the surface of the film-band is not loaded and the latter rests on one of its lateral borders only. The device according to the present invention can be arranged on any projection-apparatus beside one of the common winding-up devices, which may be placed into operation in case the film-band is torn in two during the performance.

Two modes of carrying out the present invention are shown by way of example on the accompanying sheets of drawings in which

Fig. 1 is a vertical sectional view through the device for developing film-bands,

Fig. 2 illustrates the device shown in Fig. 1 in plan view, and

Fig. 3 a detail view thereof.

Fig. 4 illustrates the guiding of the beginning of the film-band along a winding previously produced.

Figs. 5 and 6 show in sectional elevation and plan view respectively the device for winding-up and simultaneously winding-off endless film-bands.

Fig. 7 is a diagrammatic and perspective view of the device illustrated in Figs. 5 and 6.

The device shown in Figs. 1 to 4 essentially comprises a base-plate 1 with a frame 2, corresponding in size to the circumference of an entirely wound-up film-band. By means of pins 5 and 6, radially disposed rollers 4 are rotatably mounted in bearings 3 secured to the base-plate 1 and in the said frame 2. On the pins 5 are mounted bevel-wheels 7, which are in mesh with a common bevel-wheel 8, the rotary shaft 9 of the latter passing through the base-plate 1 and being rotated by the aid of a driving disc 10, secured to the outer end of the said shaft 9. A bevel-wheel 11 is fixed to the outer pin 6 of one of the rollers 4 and by means of a bevel-wheel 12 operates a supply drum 13, rotatably mounted in the base-plate 1 by means of a shaft 14 and furnished at both sides with sprockets 15, which correspond to the common perforations of photographic or cinematographic

film-bands. The diameter of the supply drum 13 and the ratio between the bevel-wheels is such, that the drum 13 and the rollers 4 are rotated with a uniform circumferential speed. The surface of the rollers is either smooth or provided with grooves 16, the distance between the latter corresponding to the desired distance between the successive windings of the film-band roll.

A pressure roller 17 cooperates with the supply drum 13, the former being supported in arms 18, which are movable about a shaft 19, secured to the base-plate 1. A spring 20, arranged on the shaft 19, has the tendency to force the pressure roller 17 against the drum 13.

A collar 21, through which a pin 22 passes, is arranged above the bevel-wheel 8 and is carried by supports of the base-plate 1. The pin 22 is fixed to the collar and a sleeve 23 is pushed over the former. A number of radially disposed spokes 24 pass away from this sleeve and are arranged slightly lower than the uppermost surfaces of the rollers 4. The spokes are provided with notches 25, which correspond to the grooves 16 in the rollers 4. A sleeve 26 is pushed over the sleeve 23 and is also provided with radially disposed spokes 27, furnished with notches 28 at the bottom side thereof. A plate-spring 29 is fixed to the outer surface of the sleeve 26, and a pin 30 is secured to the free end of the said spring and adapted to automatically pass through holes 30^a and 30^b in the sleeves, in case they are brought into alignment with each other, in order to connect the sleeves with one another.

The device operates in the following manner:

A film-band 31 is passed over the supply drum 13, whereby the pins of the sprocket-wheels 15 engage the perforations of the film-band. The first part of the film-band is placed right around into the outermost groove 16 of each roller 4, and the beginning 32 of the film-band is provided with a clamp 33 (Fig. 4), a nose 34 of the latter engaging on and being guided by the border 35 of the already laid winding. Now on rotating the driving disc 10, also all rollers 4 and the drum 13 are rotated with the same rotary speed. The drum 13 feeds fresh parts of the image-band to be wound up to the rollers 4, which now take over the feed of the film-band owing to the weight resting on the rollers, so that the beginning 32 of the film-band is fed forward by the nose 34 along the border 35 parallel to the preceding winding, until it reaches to innermost groove 16. The dimensions of the device are such, that now a film-band of ordinary length rests on the rollers 4 in the shape of a spiral. In case the sleeves 23 and 26 are connected with each other by means of the resilient pin 30, the borders of the film-band are retained between the notches 25 and 28 of the spokes 24 and 27 respectively, and the film-band can be lifted off the rollers 4 without varying its windings.

In the construction shown in Figs. 5, 6 and 7, the operation of the individual bevel-wheel 7 is effected by intermediate wheels 36, rotatably mounted on pins 37, the latter being secured in supports of the base-plate. The entire device is driven by a driving disc 38, operating bevel-wheels 39, which are disposed outside the frame 2. The pin 5 of one of the rollers 4 is extended toward the centre of the device and carries a winding-off drum 40, provided with sprockets 41 in a manner similar to the supply drum 13. The arrangement for taking-off the film-band preferably consists of a disc 42, resting on the frame 2 and furnished with slots 43, through which the upper parts of the rollers 4 pass. The outer edge 44, as well as also the inner edge 45 of the disc 42 are bent upward, in order to prevent the winding-off of the wound-up film-band. In this construction the rollers 4 are provided with smooth surfaces, and the space between the spiral windings is attained by turning up the beginning of the film-band.

In this construction the image-band is wound-up in the shape of a spiral by the supply drum in the manner already set forth. The beginning of the image-band is, however, passed over the winding-off drum 40 and from there is conducted for instance through a projecting apparatus, so that a fresh projection has not to be preceded by a re-winding in order to again introduce the beginning of the film-band into the projecting apparatus. If desired the beginning and end of the film-band may be united, so as to produce an endless band, which can be shown without interruption.

The film-band may be wound also in the reversed direction, e. g. from the inside to the outside.

I claim—

1. A device for winding photographic or cinematographic film-bands, comprising in combination a number of horizontally and radially disposed rotary rollers of like diameter for supporting the film-band to be wound-up, means for rotating all rollers in the same direction and at a uniform speed and forming a spirally wound-film-band, a sleeve with radially extending arms arranged in the centre of the radially disposed rollers, and a second sleeve with radially extending arms slidably mounted on the sleeve first mentioned, the arms of the one sleeve extending between the said rollers and the arms of the other sleeve extending above the said rollers.

2. A device for winding photographic or cinematographic film-bands, comprising in combination a number of horizontally and radially disposed rotary rollers of like diameter for supporting the film-band to be wound-up, a drum of the same diameter as the said

rollers and provided with sprockets for engaging the perforations of the film-band and feeding the latter onto the said rollers, means for rotating all rollers in the same direction and at a uniform speed and forming a spirally wound film-band and for rotating the said drum at the same speed as the rollers, a sleeve with radially extending arms arranged in the centre of the radially disposed rollers, and a second sleeve with radially extending arms slidably mounted on the sleeve first mentioned, the arms of the one sleeve extending between the said rollers and the arms of the other sleeve extending above the said rollers.

3. A device for winding photographic or cinematographic film-bands, comprising in combination a number of horizontally and radially disposed rotary rollers of like diameter for supporting the film-band to be wound-up, means for rotating all rollers in the same direction and at a uniform speed and forming a spirally wound film-band, grooves in each roller in which the individual windings of the spirally wound film-band rest and prevent the contact between the individual windings, a sleeve with radially extending arms arranged in the centre of the radially disposed rollers, and a second sleeve with radially extending arms slidably mounted on the sleeve first mentioned, the arms of the one sleeve extending between the said rollers and the arms of the other sleeve extending above the said rollers.

4. A device for winding photographic or cinematographic film-bands, comprising in combination a number of horizontally and radially disposed rotary rollers of like diameter for supporting the film-band to be wound-up, means for rotating all rollers in the same direction and at a uniform speed and forming a spirally wound film-band, a sleeve with radially extending arms arranged in the centre of the radially disposed rollers, a second sleeve with radially extending arms slidably mounted on the sleeve first mentioned, the arms of the one sleeve extending between the said rollers and the arms of the other sleeve extending above the said rollers, and means provided on the said sleeves for locking the latter with respect to each other.

5. A device for winding photographic or cinematographic film-bands, comprising in combination a number of horizontally and radially disposed rotary rollers of like diameter for supporting the film-band to be wound-up, means for rotating all rollers in the same direction and at a uniform speed and forming a spirally wound film-band, a sleeve with radially extending arms arranged in the centre of the radially disposed rollers, a second sleeve with radially extending arms slidably mounted on the sleeve first mentioned, the arms of the one sleeve extending between the said rollers and the arms of the other sleeve extending above the said rollers, holes in the one sleeve, and a spring-bolt on the other sleeve adapted to engage the said holes and lock the two sleeves with respect to each other.

6. A device for winding photographic or cinematographic film-bands, comprising in combination a number of horizontally and radially disposed rotary rollers of like diameter for supporting the film-band to be wound-up, means for rotating all rollers in the same direction and at a uniform speed and forming a spirally wound film-band, grooves in each roller in which the individual windings of the spirally wound film-band rest and prevent the contact between the individual windings, a sleeve with radially extending arms arranged in the centre of the radially disposed rollers, a second sleeve with radially extending arms slidably mounted on the sleeve first mentioned, the arms of the one sleeve extending between the said rollers and the arms of the other sleeve extending above the said rollers, and notches on the said arms corresponding to the grooves in the rollers for engaging the border of the spirally wound film-band and securing its windings in position.

In testimony whereof I affix my signature.

JOSIP HALLA.