(No Model.) 2 Sheets—Sheet 1.

W. C. FARNUM.

KINETOSCOPE FOR ADVERTISING AND EXHIBITION PURPOSES.

No. 547,775. Patented Oct. 15, 1895.

FIG. 1.

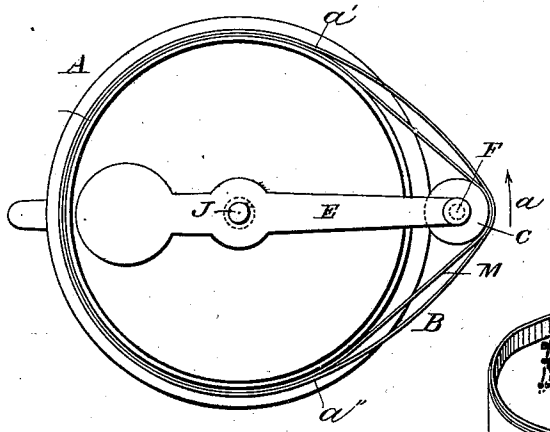
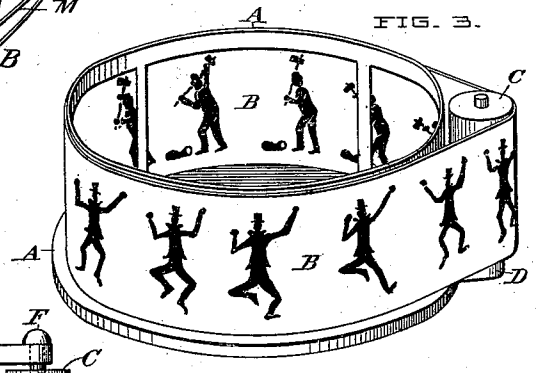


FIG. 3.



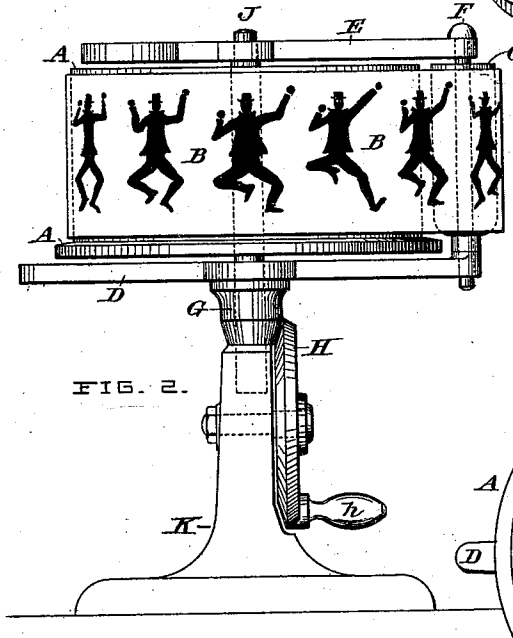


FIG. 2.

FIG. 4.

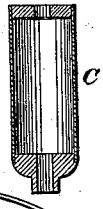
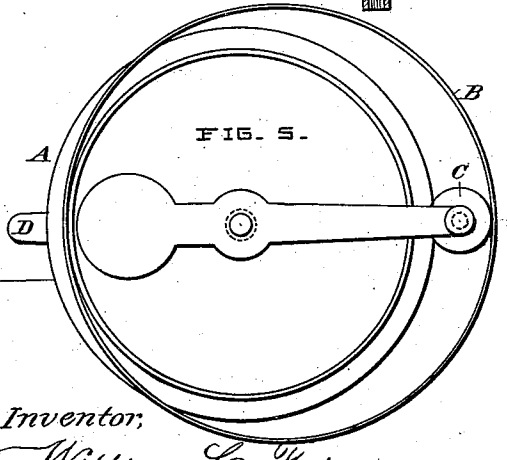


FIG. 5.



Witnesses:
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L. D. Coombs.

Inventor:
William C. Farnum,
by Franklin Scott, Attorney.

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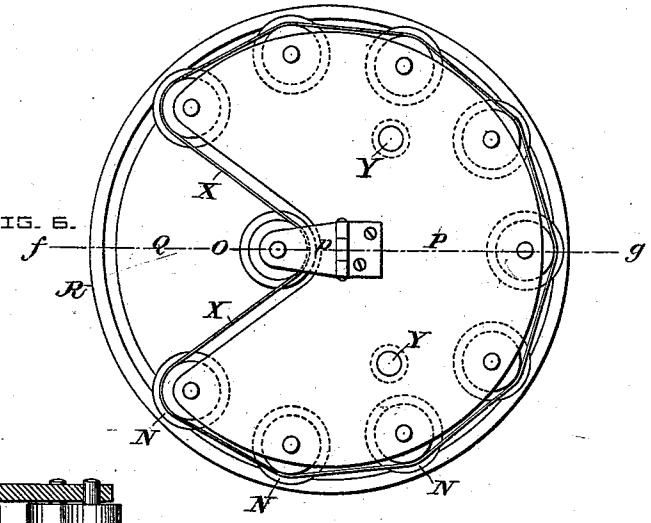
(No Model.) 2 Sheets—Sheet 2.

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FIG. 6.



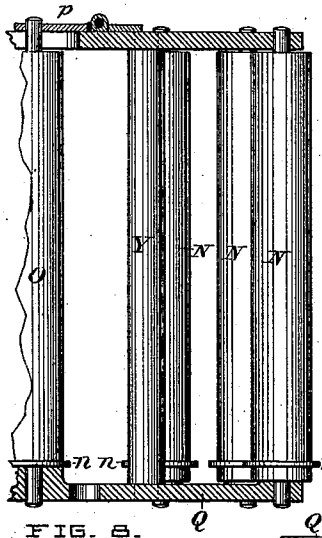
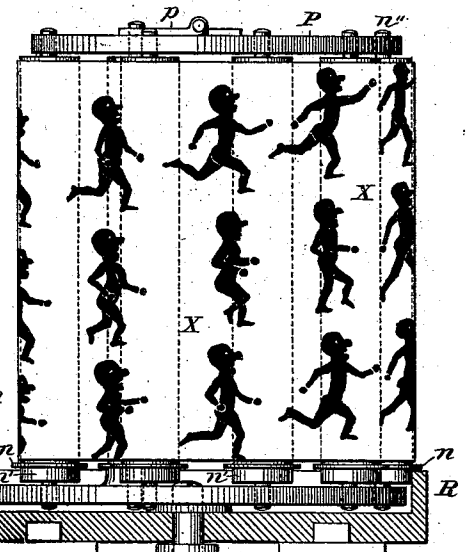


FIG. 8.



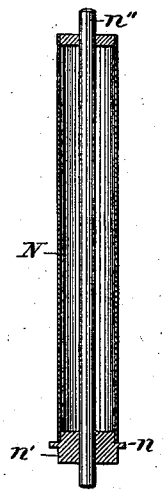


FIG. 9.

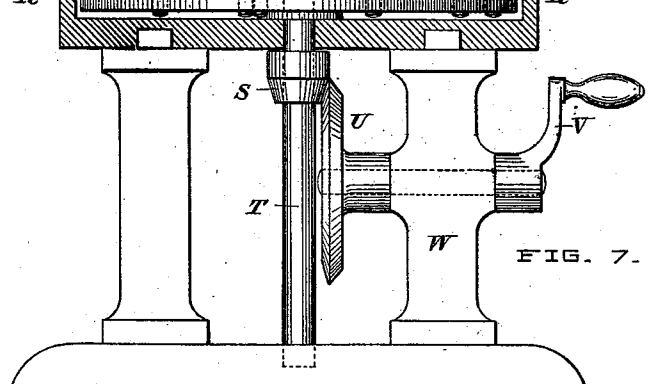


FIG. 7.

Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM C. FARNUM, OF ARLINGTON, VERMONT.

KINETOSCOPE FOR ADVERTISING AND EXHIBITION PURPOSES.

SPECIFICATION forming part of Letters Patent No. 547,775, dated October 15, 1895.

Application filed September 26, 1894. Serial No. 524,146. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. FARNUM, of the town of Arlington, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Kinetoscopes for Advertising and Exhibition Purposes, of which invention the subjoined description, in connection with the two accompanying sheets of drawings, constitutes a specification.

The mechanical principle the application of which is embodied in this invention is as follows: If an endless band of a given length is wrapped around a cylinder of less circumference than the length of the band, the excess of length of band over the circumference of the cylinder forms a slack section which if the band be drawn to one side of the cylinder will constitute a loop or wave. Now if this wave in the band is caused to travel around the cylinder without slip of the band on the cylinder the effect produced on the contact relationship existing between the band and cylinder will be that any given part of the band as the wave involves it will be lifted from the cylinder, elevated to the crest of the wave, and after it has passed will be laid down on the cylinder at a point distant from that it previously occupied by just the difference between the length of the band and the circumference of the cylinder. I have shown embodiments of this principle in three modifications of the instrument illustrated in this application. In one of them this wave-movement is applied through the medium of a flexible band which encircles the periphery of a cylinder, so that the slack loop is taken up on a roller, which I have called a "transfer-roller," and by it can be carried completely around the cylinder very much as the tides move around the earth, and as the wave takes up each part of the band *seriatim* and lifts and drops it it deposits it in a position on the surface of the cylinder in advance of its last previous position. Thus an apparent movement of the band over the cylinder by an actual step-by-step movement is effectuated. In the second instance, instead of a flexible band, I have taken a hoop and placed it over or around a stationary cylinder with its interior on one side in actual contact with the exterior of the cylinder. In this case the loop or interval which constitutes the "wave" embraces the whole included area between the inside of the hoop and the exterior of the included cylinder, and commences at the line of contact between the two and extends entirely around to the same line again. In the third instance a flexible band is placed within the interior of a stationary hoop mounted on a reel, as it were, upon which the transfer-roller is mounted, so that the wave-loop protrudes inwardly and is propelled or carried around by the transfer-roller inside of the stationary hoop.

For the purposes of this application I have designated that element in my instrument which carries the designs or pictures as the "picture-carriage," whether it be a hoop or a band which is flexible, and the stationary element as its support.

My invention relates to that class of optical instruments known as "zoëtropes," "thaumatropes," "kinetoscopes," &c., and has for its object the presenting to the eye of a series of pictures representing one or more moving objects in such a manner as apparently to reproduce the motion of said objects. Pictures of the moving objects at regularly successive periods of their movements are used, as in the present zoëtrope. Instead, however, of these successive pictures being in a state of continuous motion and depending upon moving mirrors or other devices to make the proper impression upon the eye they are placed on a hoop or endless band which is subjected to the manipulation of the wave-movement above described, whereby that part of the picture-carriage involved in the wave-loop is set along one step or space at each revolution of the transfer-roll, thereby making the apparent action directly visible upon the band from any direction. I accomplish this by means of the various devices shown in the drawings, in which—

Figure 1 is a plan view of the complete machine. Fig. 2 is an elevation of the same. Fig. 3 is a perspective view of the picture-carriage with the stationary support and transferring-roll. Fig. 4 is a sectional elevation of the transferring-roll. Fig. 5 shows a plan view of the machine when a rigid picture-carriage is employed. Fig. 6 is a plan view, and Fig. 7 an elevation, of a modification of my

invention. Fig. 8 is a partial sectional elevation of the modified picture-moving head, taken on the line *f g* of Fig. 6; and Fig. 9 is a sectional elevation of one of the rolls used in this modification.

Similar letters refer to similar parts in the several views.

As illustrated, the invention shows a stationary cylinder or drum in connection with a larger cylinder or endless band mounted thereon, which I have called the "picture-carriage," and which carries a series of pictures representing active objects at successive stages of their movements, the length of the picture-carriage exceeding the circumference of the drum which supports it by the length of the space through which it is necessary to move the picture-carriage each time to produce the proper visual effect. Thus when the picture-carriage is placed over its support this surplus length of the carriage will form a slack or loop which is supported and carried by a roller which revolves about the support to produce an intermittent traveling motion in the pictures on said cylinder or band, as hereinafter described.

The carriage for carrying the pictures may be either a rigid hoop or cylinder, a resilient hoop or cylinder, or a flexible band, all of which give good results. The machine is shown with the flexible band in Figs. 1 and 3 and with the rigid cylinder or hoop in Fig. 5.

In Figs. 1 and 2 the stationary drum or support A is shown mounted upon a suitable standard or pedestal K. An upright shaft J is fixed on the top end of the standard K and supports the drum A, besides serving as a spindle or arbor for a pair of roller-carrying arms D and E. To give the picture-carriage the necessary movement the transfer-roll C is made to revolve about the drum A by means of a pair of bevel friction-gears and the arms D and E. Of the bevel gears the larger one H carries a crank-handle and the smaller one G is connected to the arm D, which carries the transfer-roll C. The arm E is intended to resist the centrifugal force of the revolving roll C and is connected to the same by the pin F, which passes down through the arm E, roll C, and arm D, respectively. The picture-carriage B is placed around the drum A and roll C. An extra belt or band M may be used inside the picture-carriage as a support therefor. The inner band may be made smaller than the picture-band to fit snugly over the roll and drum, thus insuring the revolution of the roll C about its own axis and preventing any sliding friction between the roll and the picture-carriage. By sliding the picture-carriage upward it may be removed from the machine and new designs substituted.

Figs. 1 and 2 show a picture-carriage having twelve pictures; but this number may be varied. The picture-band travels at each revolution of the transfer-roll over a space equal to the excess of the distance around the carriage over the circumference of the drum-support. Therefore the distance between the pictures is made equal to the travel of the carriage when the whole or any part of the picture is to appear stationary. When the spacing of the pictures is more or less than the length of the wave-loop under the transfer-roll, the pictures appear to have either a retreating or progressive crawling motion around the same.

The transfer-roll E is considered as being revolved about the drum A in the direction of the arrow *a*. As the roll advances the band is gradually lifted from the drum a certain distance in advance and is relaid upon the drum a certain distance in the rear of the roll. The points at which the band leaves and returns to the drum are designated as *a'* and *a''*, respectively, and advance around the drum in conjunction with the revolution with the roll. Thus it is seen that the band is in stationary contact with the drum over about two-thirds the circumference of the latter. As the roll passes any one of the several pictures it lifts the same from the drum and replaces it one space forward in the direction of the arrow, this action being repeated in the case of each picture. If there are twelve pictures on the carriage, it is obvious that twelve revolutions of the transfer-roll will complete the apparent action of the picture, the number of changes presented to the eye corresponding to the number of revolutions of the roll.

The rate of motion of the wave-loop is variable, gradually increasing from zero at *a'* to the maximum rate at the outside of the roll C, and thence gradually decreasing to zero at *a''*. This gradual starting and stopping is of value in overcoming the inertia and momentum of the band during the rapid revolutions of the transfer-roll.

In Fig. 3 the stationary drum or support A is made in skeleton form to permit a view of the inner side of the picture-carriage, which in this case is provided with an extra series of pictures. When this feature is embodied, the pin F is made fast in the arm D and the top arm E and upper end of shaft J are dispensed with.

In Figs. 6, 7, 8, and 9 is shown a modification of my invention in which the aforementioned slack or wave-loop in the picture band or carriage is taken up by a roll within the periphery of the stationary portion of the carriage. The intermittent travel of the carriage in this modification is the same as in the previously-described form. Fig. 7 shows a picture-band of considerable width having the pictures thereon arranged spirally. This arrangement gives the pictures an apparent motion either up or down upon the band or from side to side across the line of vision in case the apparatus is reclined horizontally. This modified machine is mounted upon a pedestal W, and consists of two parallel horizontal circular disks P and Q, held together by two upright studs Y. These disks carry between

them a set of perpendicular rolls N near their periphery for about two-thirds the distance around, and the transferring-roll O let in from the periphery sufficiently to take up the necessary slack in the band. The lower disk Q is mounted upon an upright shaft T, with which it and the other attached parts carrying the picture-band are made to revolve by means of the bevel friction-gears S and U and crank V. The picture-band X passes around the outside of the rolls N above flanges *n* and inside of the transfer-roll O, as shown in Fig. 6. A segment cut is made in the upper disk P over the loop of the picture-band to facilitate the removal of said band, and the top bearing of the transfer-roll is hinged to lift up for the same purpose. Around the lower disk Q, and in contact with the lower ends *n'* of the rolls N, is an upright annular rim R, which is stationary and forms a fixed part of the pedestal. The rolling contact of the rolls N with the rim R and the picture-band serves to keep the picture-band stationary except when passing over the transfer-roll.

I do not restrict myself to the specific means or any of them described for creating and propelling the wave-loop along the picture-band, as I claim that my invention lies primarily in the discovery that the described optical impressions may be produced and are due to the undulating wave-loop traveling along over the band before the observer, and that it embraces not only the means here shown for creating and propelling it, but also all means of every kind which are capable of producing and sustaining the same optical illusion by propelling a wave-loop along the length of the kinetoscopic band. I also claim as within my invention as herein disclosed any device in place of the wave-propelling roll for advancing the wave-loop along the band; and as it is immaterial whether the wave-propeller acts on the inside or outside of the picture-band I do not restrict myself to the application of the wave-propelling force to either side of the band.

I therefore claim—

1. In instruments of the character described, the combination with the endless picture carriage and the stationary support about which it rotates of mechanism interposed between said carriage and support adapted to propel a wave loop in said carriage around said stationary support, substantially as specified.

2. The combination in a kinetoscope or similar instrument, of a stationary support having a suitable tablet surface over which a picture carriage can be supported and passed, a picture carriage of a length somewhat greater than is necessary to surround the stationary support, leaving a slack section of the carriage termed a wave-loop, a device adapted to distend such wave-loop and to travel around the support, and means connected with said distending device whereby rotary motion may be imparted to it, substantially as specified.

3. The combination of the stationary support, a flexible picture carriage of greater length than the circumference of the support, the transfer roll adapted to rotate around the support and means connected with the roll for propelling it, substantially as specified.

4. A perforated cylindrical supporting hoop and a circumambulating flexible picture carriage adapted to carry designs on its opposite sides in combination with a wave-loop propelling device and means for actuating such device substantially as specified.

5. The combination of the stationary drum, the picture carrying band and the transferring roll and arm, mounted on the centrally fixed shaft, substantially as specified.

6. The combination of the stationary drum, the picture band the transferring roll and arm, the central shaft and the pedestal, with means, substantially as described, for rotating the transfer roll around the drum substantially as specified.

7. The combination of a picture band mounted upon a cylindrical support of less circumference than the length of the band, with a rotating loop carrying device for transferring the band, as the roll C and arms D and E, substantially as specified.

8. A kinetoscopic band bearing a series of designs of the character described, means for supporting it and separate means for propelling a wave loop throughout its extent, such mechanism being so constructed and arranged that in operation all parts of the band not involved in the wave-loop shall remain stationary.

In testimony whereof I have hereto subscribed my name this 22d day of September, A. D. 1894.

WILLIAM C. FARNUM.

In presence of—

C. E. CANFIELD,

WEBB FARNUM.