(No Model.) 2 Sheets—Sheet 1.

W. C. FARNUM.

TROPOGRAPH.

No. 547,066. Patented Oct. 1, 1895.

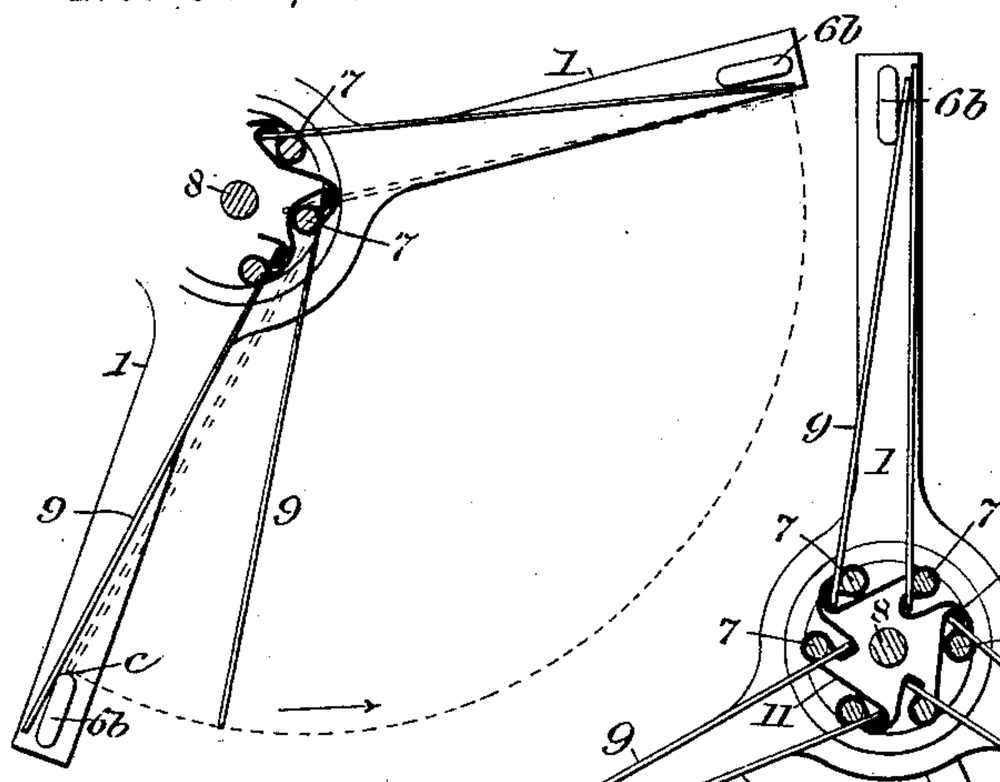

FIG. 3.

FIG. 2.

FIG. 4.

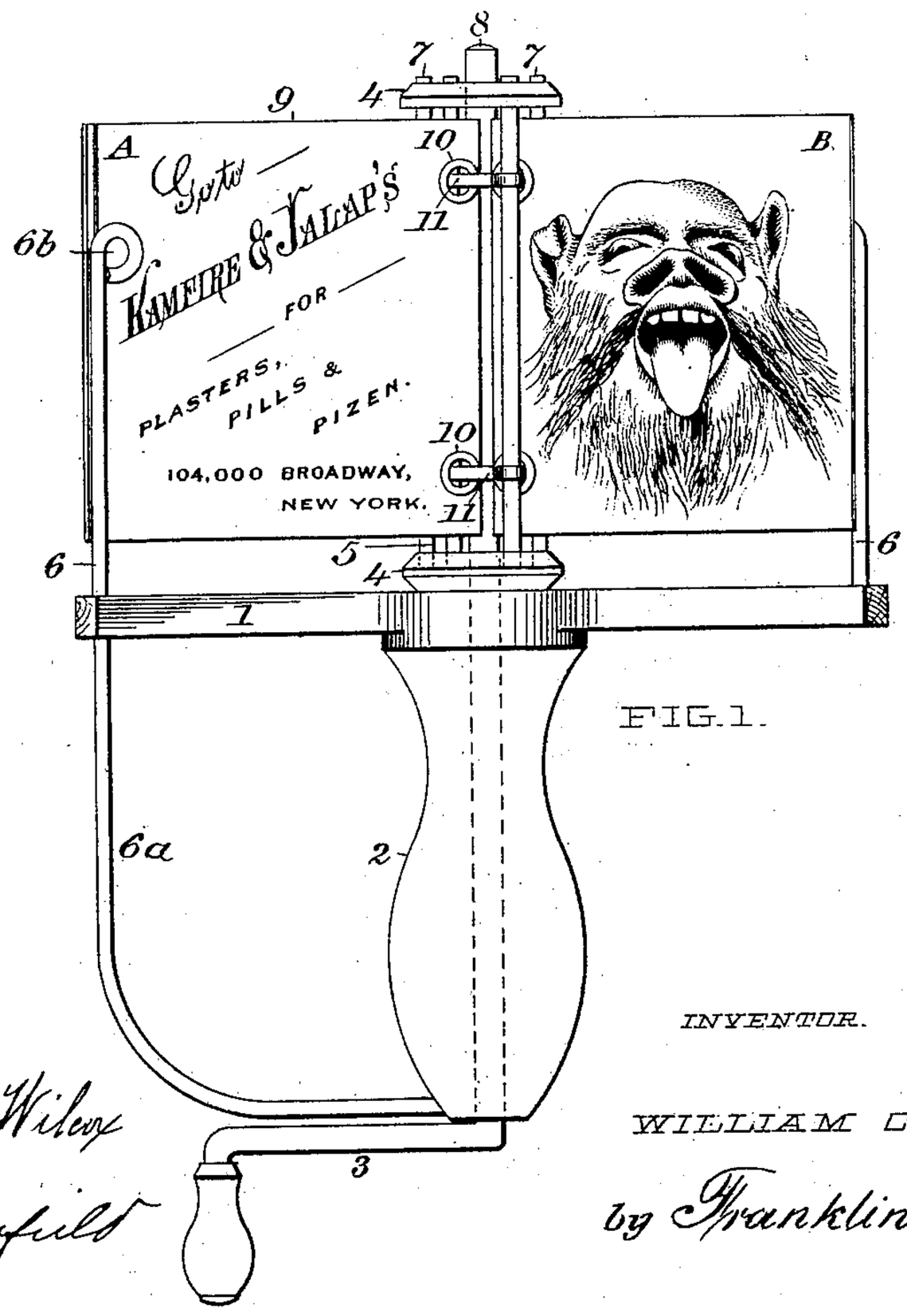

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 5.

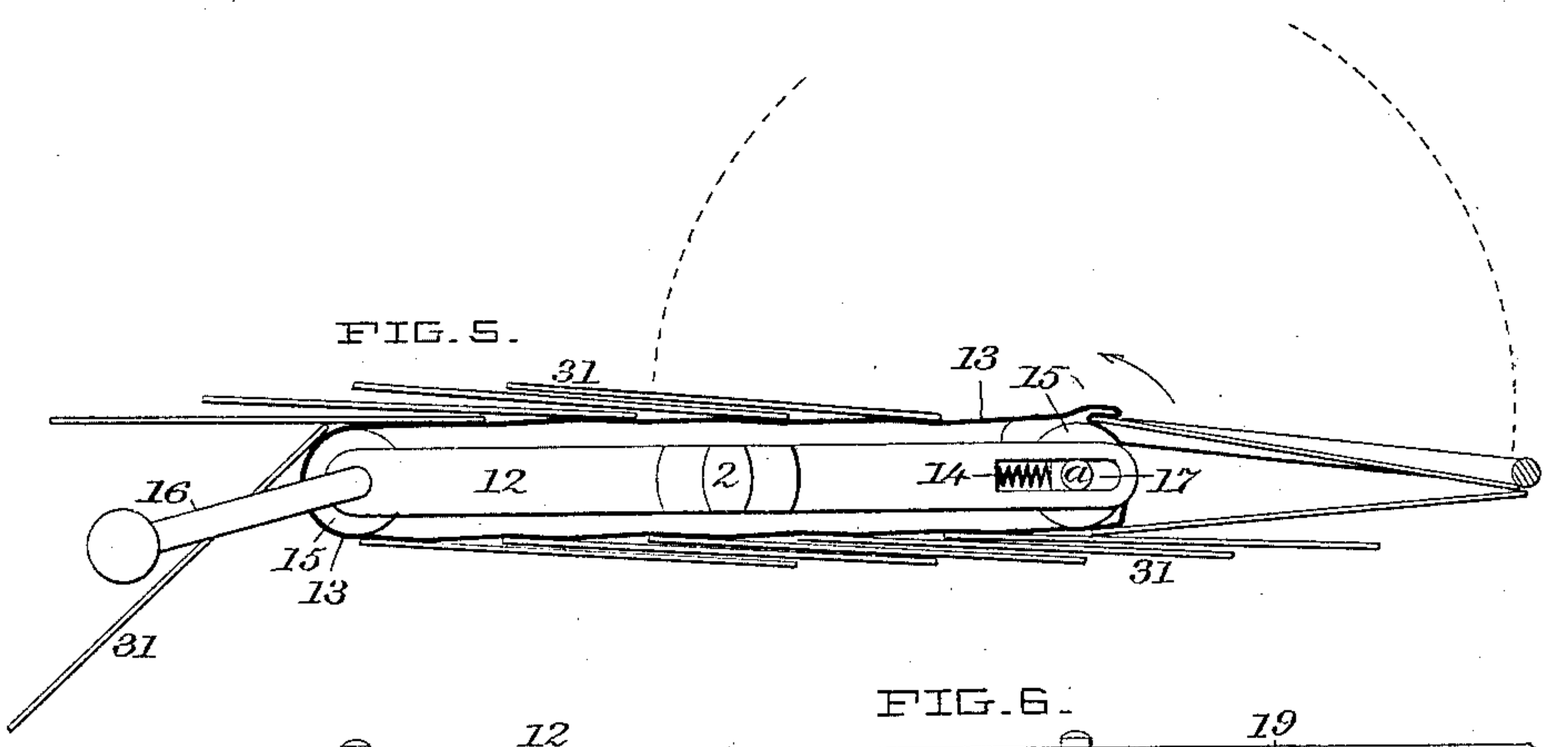
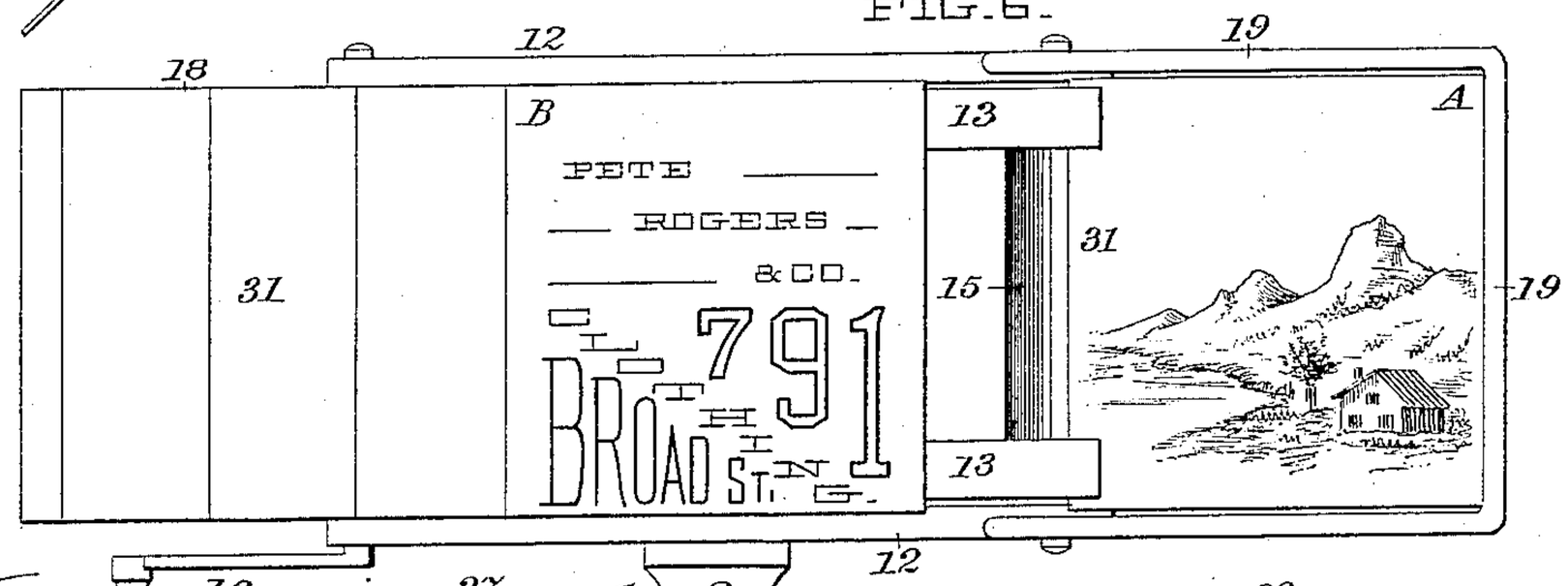


FIG. 6.



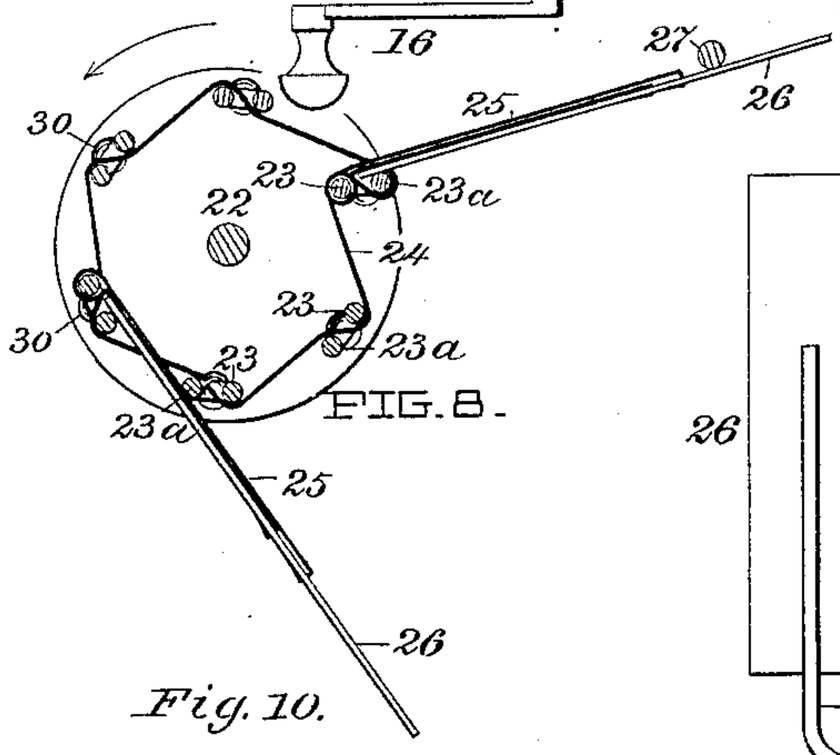
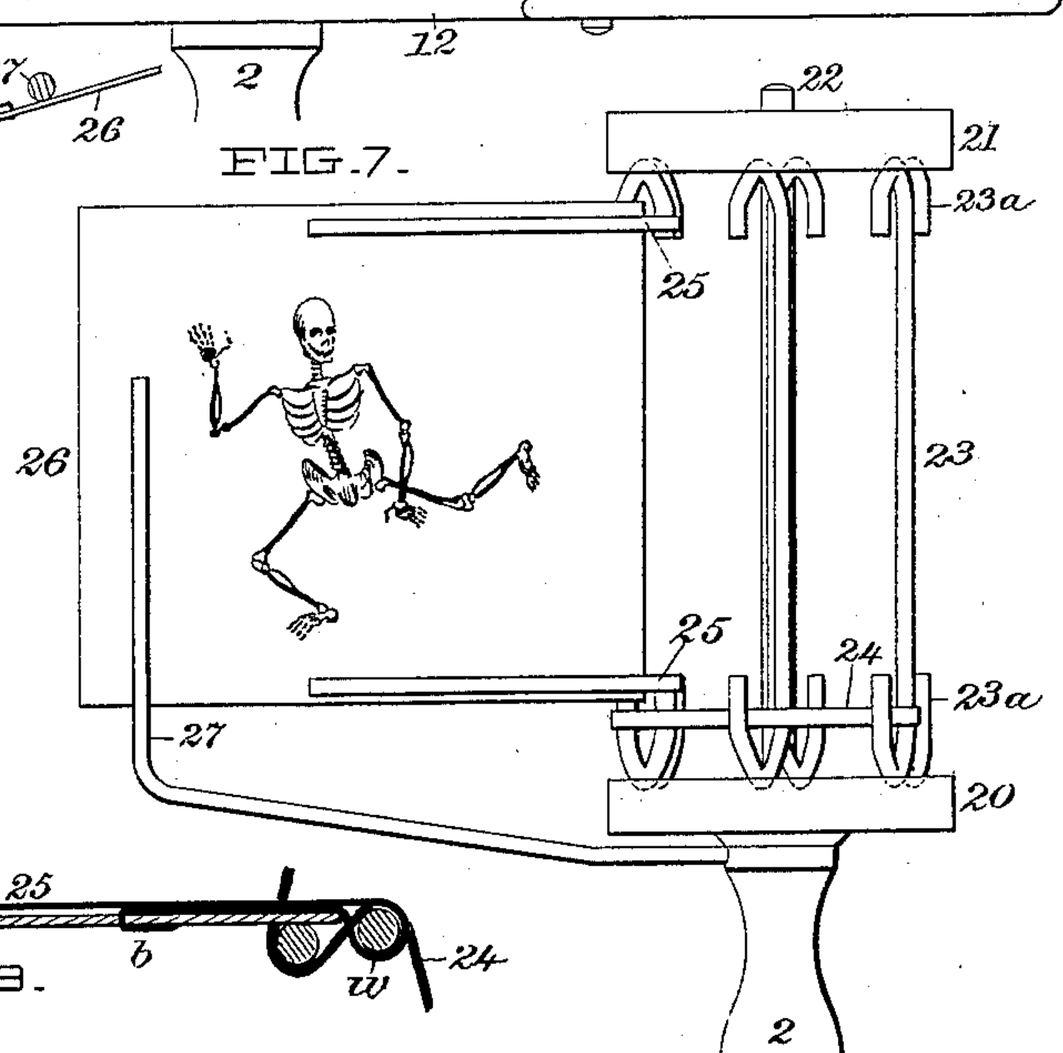


FIG. 8.

Fig. 10.

FIG. 7.



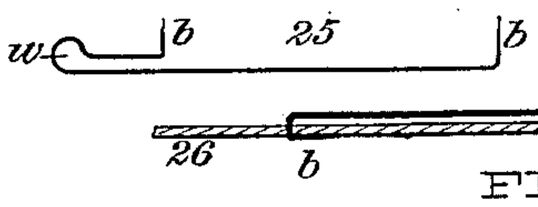


FIG. 9.

WITNESSES,

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UNITED STATES PATENT OFFICE.

WILLIAM C. FARNUM, OF ARLINGTON, VERMONT.

TROPOGRAPH.

SPECIFICATION forming part of Letters Patent No. 547,066, dated October 1, 1895.

Application filed August 28, 1893. Serial No. 484,190. (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 Toys, which invention I have designated as a Tropograph, of which the subjoined description, in connection with the accompanying drawings, constitutes a specification.

The mechanism constituting the subject-matter of this patent is designed to hold and manipulate a series of picture-cards containing the designs of successive stages of a continuous action or movement, which cards or pictures are intermittently, successively, but rapidly presented directly to the eye of the observer, without the interposition of any aid or obstruction to vision, and its successful operation depends upon the law of the persistence of visual impressions.

The characteristics which distinguish this invention from the "thaumatrope," "zoetrope," and kindred devices heretofore devised for producing optical illusions of the character above referred to are these: In the former the designs are separate and detached from each other, and move forward, when approaching the site of observation, face foremost—that is to say, the presentative movement toward the eye is substantially on the line of the axis of vision instead of passing across it at right angles, as in the latter class of devices or apparatus, where the successive designs are displayed on a practically endless ribbon or slip, which moves laterally across the path of vision. In the use of this invention such aids to the eye as screens to partially cover the running pictures, observation slots or holes, and kindred optical aids may be and are dispensed with, the desired optical impressions being perfect without them.

The drawings fully illustrate the invention, wherein—

Figures 1, 6, and 7 exhibit elevations of three different modifications of my tropograph in which the aforesaid application of the resilient hinge is shown. Fig. 2 is a top plan of the toy shown in Fig. 1. Fig. 3 shows the position of the parts seen in Fig. 2 as they appear just as the card escapes the guard. Fig. 4 is a face view of one of the cards, showing its connection with the pivot-wire about which it turns. Fig. 5 is an edge view of the modification seen in Fig. 6. Fig. 8 is a plan of a transverse section of the modification shown in Fig. 7. Fig. 9 is an edge view of a metallic card-fastening, as related to the pivot-wires. Fig. 10 is a detail view of the same metallic fastening.

For the purpose of carrying out my invention a series of designs printed or impressed upon cards are prepared upon the same principles as are exhibited in designs for pictures for use in the thaumatrope, the zoetrope, and other analogous devices for producing visual impressions of objects in action, representing progressive changes of position in the same moving object. The construction and mode of use of these cards in the several modifications will first be described, after which the features of invention will be pointed out in the claims.

In Fig. 1 I have shown a handle-frame having three projecting arms, all alike, or as many, more or less, as may be desired, upon the outer end of each of which a guard 6 is erected, so as obstruct the path of the cards as they are rotated around the axis of the frame. This frame has a handle 2, by which the apparatus is firmly held by one hand while it is operated by the other. Through the axis of the handle extends the crank-shaft 8, which is turned by the crank 3. Upon this shaft a reel made up of the two heads 4 4 and the pivot-wires 7 7 7 is firmly fixed so as to revolve with the crank. In connection with this reel a series of cards 9 9 9, each provided with two eyeleted holes 10 10, are provided, and two rubber bands 11 11 are passed through the eyelet-holes and are looped around the pivot-wires, as shown in Fig. 2. The cards are too broad to swing around in a radial position and clear the guards 6 6 6; but by analyzing Fig. 2 it will be seen that as the reel is turned beyond a position where it moves the card out of a radial position it draws its outer end from behind the guard, thus leaving it free to swing around into its normal idle position under the contraction of the rubber bands. When all the parts are assembled, the contraction of the rubber bands in position holds all the cards and pivot- wires in proper relative position, as shown in the drawings.

The instrument is used as follows: The rubber bands are first slipped over the reel-head. Then with a hook, first passed through one of the eyelet-holes in the card, the band is caught and drawn through and one of the pivot-wires entered through such loop. Then with the hook draw a loop of the other band through the other eyelet-hole, and, further, enter the pivot-wire through that loop. So proceed with all the cards and wires until all the cards and wires are engaged, after which enter the bottom ends of the wires in the lower head of the reel and place the top head of the reel in position. The guard 6^a prevents the instrument from turning in the hand while the crank is being turned. As the crank is turned, the card on the left is gradually drawn from beneath the guard-lip 6^b, and the moment it escapes it the contraction of the rubber bands flops the card instantly over to its position on the right, where it remains at rest an instant before it is passed along to the next section of the instrument. By rapidly turning the crank the picture on the right becomes practically a continuous one as to its fixed outlines and a constantly-changing one as to its variable ones.

The modification seen in Figs. 5 and 6 consists of two parallel bars 12 12, mounted on a handle 2 and carrying rollers 15 15 at each end of the frame so constituted, one of which has a crank attached to it whereby it may be rotated and the other rests in a spring-supported bearing a^{14}. Around these rollers one or more bands 13 13 run, to which the cards 31 are attached. When the bands are in their normal condition and the cards at rest, they all lie down flat upon each other, as they appear on the upper and lower sides of Fig. 5; but if one of them is folded back upon the bands, such act of folding doubles the band upon itself, as seen on the upper right hand of Fig. 5, thus producing compression of the spring 14, the expansive tendency of which is to distend the rollers and thus to straighten the bands. At one end of the frame the guard 19 is attached for the purpose of arresting the outer ends of the cards while the butt-ends are being carried around the roller and the bands are being folded, as shown. This guard in this case answers in function to the guards 6 6 of Fig. 1. Thus when the bands are rotated by the crank and the ends of the cards are caught and held by the guard 19, the picture stands at display until its butt is drawn around the roller far enough to pull its outer end out from under the guard, when, the spring 14 acting to straighten the bands, the card is suddenly flopped over backwardly upon its fellows to be succeeded by its trailing follower. A chain can be used in place of a nonelastic band with spring 14, or an elastic band may be used without the spring.

In Fig. 7 I have shown a different kind of pivot-wire and different means of connecting the card with the wire. In this case I have bent the ends of the wires over to the shape shown, thus creating a conical pivot on each end thereof, which are seated in pivot-sockets 30 30, provided therefor in both reel-heads 20 and 21. The returned end 23^a of the pivot-wire 23 may be termed a "tang," and the rubber bands 24 24 are stretched around the wires, so as to come between the main wire and the tangs, as shown. Thus if the reel is rotated—as, for instance, in the act of turning the crank 3—the bands will be folded back, as shown in Fig. 8, owing to the advance movement of the cards or designs being impeded by the guard 27, and after passing the guard the resiliency of the bands will act to restore them to their first position. The cards are attached to the pivot-wires 23 by means of the metallic fastenings 25, applied as seen in Fig. 9, the ends passing through the card and are bent down, as shown. The cards are connected with the reel by passing the tangs of the pivot-wire through the eyes *w w* of the fastening 25. This modification is operated in the same way as that shown in Fig. 1.

Although the element of resiliency in the attachment of the design to its base of support contributes largely to the production of the most striking impressions in the use of this instrument, yet it is not indispensible, and the same effect in kind can be produced without its use. Fig. 5 furnishes an illustration in point. Here the resilient feature resides in the spring 14, which yields as each card passes the guard; but the observer will notice that the cards in revolving about roller 15 are spread open and separated in such a way as to display the successive designs squarely to the eye by a motion which swings them individually, separately, and successively into a plane perpendicular to the axis of vision, and although such movement is not retarded or qualified by the interposition of a stop or guard, as previously described, yet the optical impression of progressive motion is well established and sustained as long as the traveling motion of the band 13 is kept up.

I therefore claim as my invention—

1. A tropograph consisting of a series of substantially separate display cards each attached by a resilient connection with a movable carriage which is mounted on a non-movable framework provided with stops located in the path of movement of the cards, whereby the cards, while being withdrawn from engagement with such stops, stand momentarily comparatively at rest, and provisions connected therewith for rotating said card carriage, substantially as specified.

2. A series of display cards, each of which is attached by a resilient hinge to a common base of support so as to lay the cards normally in the same direction; means for rotating said base of support in a direction to distend said hinges, in combination with one or more guards for arresting the otherwise free ends of the cards, substantially as specified.

3. As an advertising device, a tropograph consisting of a frame provided with the card arresting guard or guards, a card supporting

base, mounted on said frame, adapted by means substantially as shown, to be rotated thereupon; and a series of display cards each attached to said base by a resilient hinge connection normally adapted to lay the cards so that their free ends shall be presented toward the arresting guards when the supporting base is rotated, the whole being combined and arranged to operate substantially in the manner described and for the purposes specified.

4. A rotating series of picture cards, in combination with an endless band of elastic material which rotates with them and to which they are attached and a stop arranged in the path of the said cards so as to arrest each card in turn and put the said band under tension, the cards being free to fold back and also to snap forward under the resilient action of the said spring as each card passes the said stop substantially as set forth.

In witness whereof I have hereto subscribed my name this 25th day of August, A. D. 1893.

WILLIAM C. FARNUM.

In presence of—
FRANKLIN SCOTT,
WILLIAM WILCOX.