April 3, 1945. E. NASSOUR 2,372,843

APPARATUS FOR MODELING FIGURES FOR ANIMATED PHOTOGRAPHY

Original Filed Oct. 16, 1939 2 Sheets-Sheet 1

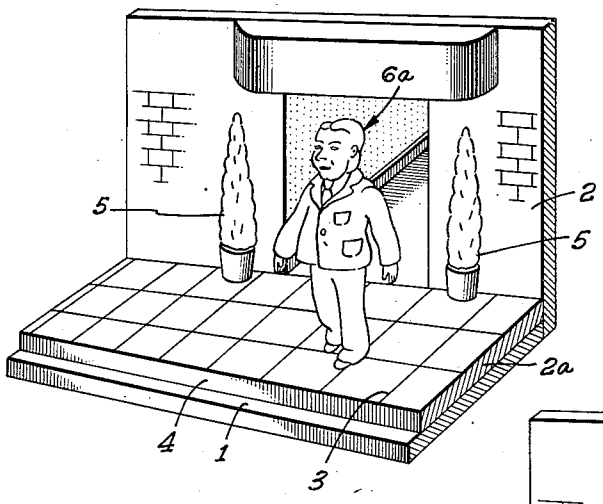


FIG. 1.

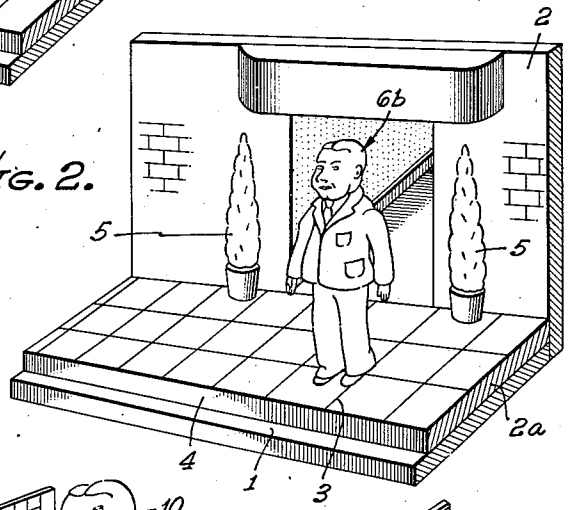


FIG. 2.



FIG. 3.

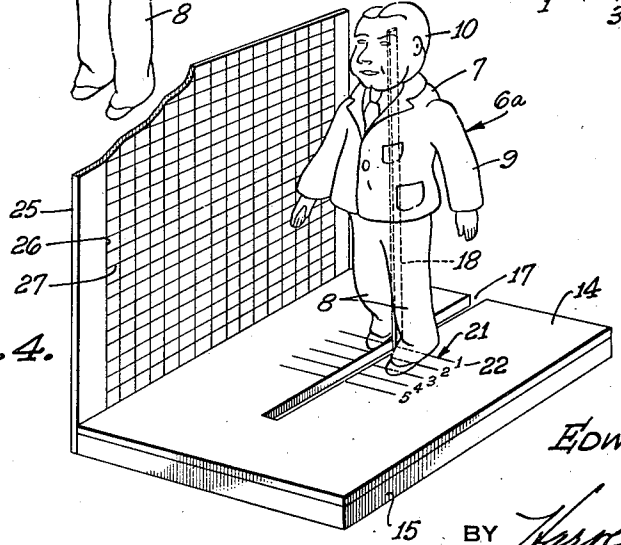


FIG. 4.

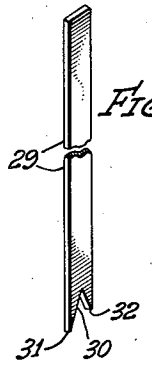


FIG. 9.

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APPARATUS FOR MODELING FIGURES FOR ANIMATED PHOTOGRAPHY

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FIG. 5.

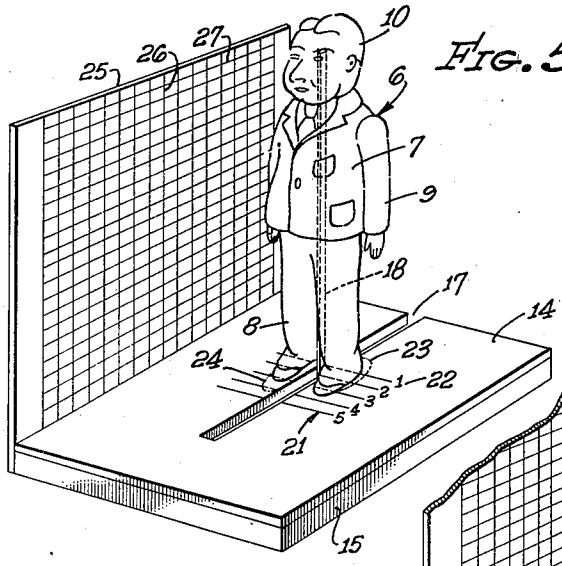


FIG. 6.

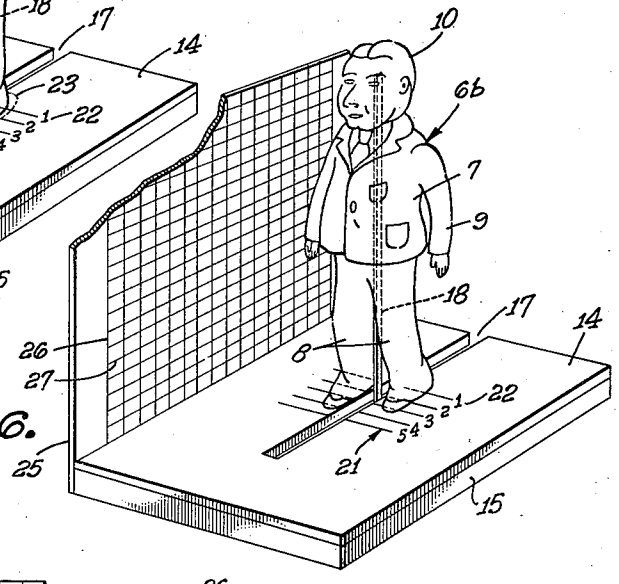


FIG. 7.

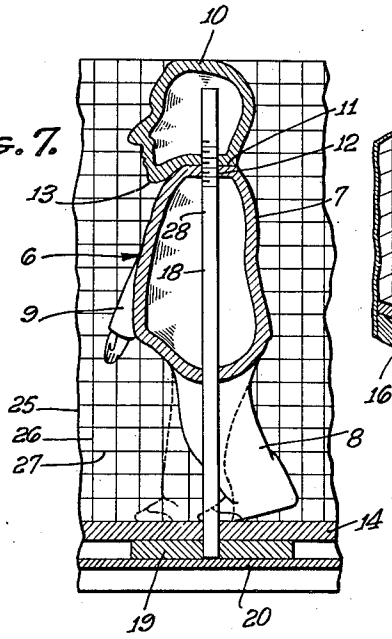
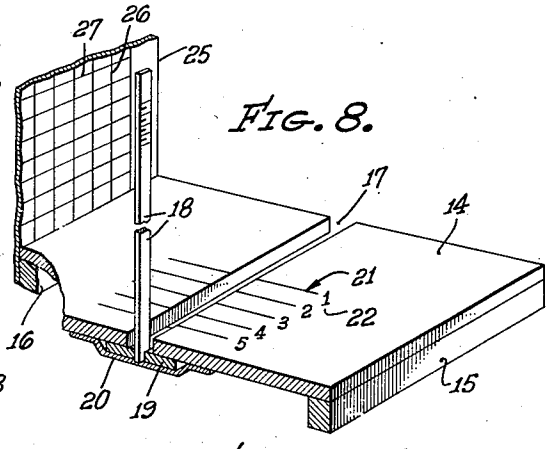


FIG. 8.



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APPARATUS FOR MODELING FIGURES FOR ANIMATED PHOTOGRAPHY

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Original application October 16, 1939, Serial No. 299,644. Divided and this application February 1, 1943, Serial No. 474,283

3 Claims. (Cl. 33—1)

My invention relates to the production of animated pictures and has particular reference to an apparatus to be employed for the purpose of checking and controlling the difference in posture or position of a plurality of substantially duplicate figures or models each representing a different animated aspect of a person or object to be sequentially photographed to produce a series of pictures or a motion picture film in which the represented person or object moves with life-like animation through a sequence of movements.

This application is a division of my copending application Serial No. 299,644, filed October 16, 1939 and entitled "Apparatus for producing animated pictures."

It has been the practice to produce animated pictures by means of step by step photography of sets of drawings or paintings in which each drawing or painting differs from the others of the set by depicting those objects or characters which are to be animated as being in a slightly different animative aspect.

Attempts have been made in the past to provide an improved illusion of realism over that derived by the photography of drawings or paintings. These prior attempts to produce such improved animated pictures have been characterized by the employment of flexible or plastic figures which are placed on a stage setting and photographed by a step by step process, the posture or animative aspect of these figures being altered between successive photographs taken and such alteration of the figures being permitted by reason of their flexible construction.

While these attempts do provide a greater illusion of realism than was provided by the previous methods of production, they have not been entirely satisfactory because of certain inherent disadvantages residing in the methods employed. Among these disadvantages is found the extreme difficulty with which these plastic figures are modeled into the next animative aspect without altering such parts of those figures as should remain unchanged. Inadvertent alteration of the parts intended to remain unchanged spoils the animation effect by tending to give a fuzzy or ragged contour to the pictures so photographed. Furthermore, a great deal of time is required in the performing of the photographing operation since much time is consumed between successive exposures in arranging and altering the aspect of the figure and its location on the setting so that this method of producing animated pictures is very costly.

Certain of the difficulties and disadvantages noted above can be overcome or eliminated by providing a plurality of duplicate figures, each differing from the other by slight changes in position of limbs, torso or other parts of the figure, such changes representing the motion through which those parts should go in a series of steps to produce the desired animation. The first of these individual but slightly different figures is placed upon a suitable setting or background and photographed. Then the figure representing the next step in the animation is substituted for the original figure and a second photograph is made, and this process is repeated for each of the remaining figures in the sequence necessary to produce the illusion of animation, with the result that a much more realistic or life-like appearance may be given to the figures than would be possible if a single figure were used and the position of its limbs, torso or other parts was required to be altered between each photograph.

In producing such a series of individual figures to be successively photographed, it is difficult to determine the extent to which the positions of arms, legs or other component parts of the figure should differ in the successive models or figures representing the successive steps in a sequence of animation to insure that the successive photographing of the series of figures will produce the appearance of a smooth, life-like motion in the finished series of pictures or motion picture.

It is, therefore, an object of my invention to provide an apparatus which may be employed in the making or modeling of a series of such figures by which the position of the various component parts of one figure in the series may be checked against the position of the component parts of the next figure in the series next preceding or succeeding figure in the series as to permit the correct modeling of each of the figures to represent an exact change in position from the position of the preceding or succeeding figure.

Other objects and advantages of my invention will be apparent from a study of the following specifications, read in connection with the accompanying drawings, wherein:

Fig. 1 is a perspective view representative of a miniature stage set and illustrating a miniature figure placed thereon in a fixed animated position;

Fig. 2 is a view substantially identical to Fig. 1 but illustrating a second animated aspect and position of the figure which is shown in Fig. 1;

Fig. 3 is a perspective view illustrating the appearance of one form of miniature figure which may be used in the practice of my invention and illustrating the appearance of such figure before it is subjected to any modeling operations for the purpose of altering the posture or animative aspect of the figure;

Fig. 4 is a perspective view illustrating the manner in which a figure, such as that illustrated in Fig. 3, may be supported upon a guiding apparatus and modeled to provide the desired animative position associated with a specified location of the figure in the environment in which it is to be photographed;

Fig. 5 is a perspective view similar to Fig. 4 but illustrating the appearance of a figure and the guiding apparatus when the figure illustrated in Fig. 4 is removed and a second figure is substituted therefor and disposed in a position corresponding to a new location in the environment in which that figure is to be photographed;

Fig. 6 is a perspective view similar to Fig. 5 and showing the changes in the aspect of the figure illustrated in Fig. 5 which may be made by a modeler to cause that figure to assume the animative aspect properly associated with the second location of that figure in the environment in which it is to be photographed;

Fig. 7 is a longitudinal section through one of the figures and the guiding apparatus illustrating the manner in which the figure is supported upon the guiding apparatus for manipulation by the modeler;

Fig. 8 is a fragmentary perspective view with parts shown in section to illustrate the details of construction of one form of guiding apparatus which may be employed in the practice of my invention; and

Fig. 9 is a perspective view illustrating a guiding member which may be employed to assist in properly locating the completed figure on the setting in which it is to be photographed.

Referring to the drawings, I have illustrated in Figs. 1 and 2 a typical miniature stage setting which might be used in the production of an animated series of pictures or motion picture film by sequentially photographing the set upon which will be successively placed one by one the individual models or figures representing the successive steps of position of arms, legs or other parts of the figure would assume in the animation of such figure in motion relative to the set.

The particular typical set illustrated comprises a stage door 1 disposed before a scenic back drop 2. The scenic back drop 2 may be embellished as desired and in the form illustrated is painted or inscribed to represent the front entrance of a building. In this case the stage floor 1 is fitted with another slab 2*a* which may be marked, as at 3, representative of squares which are normally marked off on concrete sidewalks. The upper slab 2*a* is preferably made somewhat narrower than the floor 1 of the set so that a forward edge 4 thereof may represent a curb defining the difference in elevation between the sidewalk and a street. Miniature stage properties, such as representations 5 of potted trees, may be disposed upon the stage floor as desired.

I have illustrated in Fig. 1 a miniature figure 6*a* comprising one of a set of similar figures 6, each of which is a replica or complete perspective representation of an object, the animation of which it is desired to portray. By complete perspective representation I mean that the figures are substantial duplicates usually on a reduced scale of the objects they represent and that the figures are complete and entire, permitting them to be photographed at substantially any angle.

I have chosen for the purpose of illustration a man as the animated object represented by the figure 6, the figure 6*a* being one of the figures 6 having its component parts placed in such position as to represent an arrested animative aspect of a man leaving the entrance to the building and walking toward the curb. In case it is desired to photograph a sequence in an animated picture representative of a man leaving the front of the building and walking across the sidewalk to the curb, the photographer would employ a motion picture camera to expose one or more frames of a motion picture film to a scene such as that represented by Fig. 1. Thereupon the figure 6*a* would be removed from the miniature stage set and another similar figure 6*b* (see Fig. 2) would be substituted therefor.

The figure 6*b* is identical with the figure 6*a* in all respects except that the arms and legs and head thereof occupy slightly different positions relative to each other and relative to the torso so as to represent a later animative aspect of the figure during the traversal of its course from the front of the building to the curb at the edge of the sidewalk.

As soon as the figure 6*b* has been placed in its new desired position the miniature stage set is again photographed by the motion picture camera. This operation of photographing the set with one of the figures 6 in place, removing that figure and substituting another similar figure representative of a later animative aspect of the scene, photographing the set with the substituted figure in place and so forth is continued until the desired sequence is completely photographed to provide a film which comprises successive photographs corresponding to successive phases of the animation.

The figures 6*a*, 6*b* and other additional and similar figures are all preferably modeled and prepared ready for photographing prior to the performing of the photographing process so that the removal of the figure 6*a* and the substitution of the next figure 6*b* in its new position on the miniature stage set may be performed without appreciable delay.

The substitution of the figures in their correct order may be facilitated by placing an identifying mark on each of the figures at some point which will not be "seen" by the motion picture camera, such as on the bottoms of the feet, etc.

Each of the figures may be molded from clay or other suitable material and may be constructed in any suitable manner, preferably including a body or torso portion 7 with legs 8, arms 9 and a head 10. If desired, the head 10 may be molded separately from the torso and formed with a flat undersurface 11 at the neck line adapted to rest upon a similar horizontal surface 12 disposed at the upper end of the torso 7, in which event the chin line of the figure, as indicated at 13 in Fig. 7, may be brought down below the level of the surfaces 11 and 12 to hide the junction between the head and the torso.

A series of these figures may be initially molded or modeled of identical construction such as in the shape or form shown in Fig. 3 and while the figure is still plastic the arms, legs or other component parts of the figure may be moved or modeled to assume the particular positions required

of that figure which is to be used for any individual picture in the animated sequence.

To aid the artist or modeler in disposing the various parts of each of the individual figures to conform with the desired position for that figure in relation to the preceding and succeeding figures in the set or sequence involved in the complete sequence, I provide a guiding and indexing apparatus as an aid to the modeler in re-forming or altering the postures and aspects of each of the figures constituting the set of identical figures 6. This apparatus may be constructed along the lines illustrated in Figs. 7 and 8 and include a horizontally disposed base portion 14 which may be supported in spaced relation to a bench top or similar working surface by means of longitudinally extending supporting members 15 and 16. The base portion 14 is provided with a longitudinally extending slot 17 adapted to receive a vertically extending supporting rod 18. The rod 18 is mounted for slidable movement along the slot 17 as by means of a plate member 19 secured to the lower end of the rod 18 and received in a guide channel 20 affixed to the undersurface of the base portion 14 and extending along the slot 17. It will be observed that with this construction the rod 18 may be slid along the slot 17 and be maintained in a substantially vertical position at any point along the slot.

The base portion 14 is also preferably inscribed with a set of indexing marks, such as those indicated at 21 in Fig. 8. These marks are spaced apart a distance equal to the distance the figure to be photographed is intended to be moved between successive photographing operations. Each of the marks 21 is preferably identified with an index member (22 in Fig. 8) which corresponds to the identifying markings which will be placed upon each of the figures after they are modeled.

The steps of preparing the individual members of the set is illustrated in Figs. 4, 5, and 6. Referring to Fig. 4 I have illustrated therein one of the figures 6 as having been placed upon the guide rod 18, this rod being received in suitable openings formed in the upper and lower ends of the torso 7 and in the lower surface of the head 10. This figure is also represented as having had its arms, legs and face altered from the positions which those members occupied at the time the figure was removed from the mold to a new position causing the figure to assume an animative aspect representative of the first photographing operation and identical with that illustrated in Fig. 1. This being the first of the figures to be photographed in the sequence, this modeling operation is performed with the guide rod 18 disposed opposite the first of the index marks 21. As soon as the artist who performs this modeling operation has imparted to the figure the desired animative characteristics, the position of the arms and legs and the facial expression is carefully noted and the artist also records the leg positions by marking upon the base portion 14 the outline of the figure's feet so that after the figure is removed there will be left these marks indicative of the positions occupied by the feet of the first figure 6*a*. This figure 6*a* is then removed from the supporting rod 18 and subsequently hardened by any suitable means as by firing.

The artist then takes a second one of the figures 6 and after moving the guide rod forwardly to a position opposite the second one of the indexing marks 21 places the figure 6 thereon. The position of the apparatus and the figure 6 at this phase of the modeling operation is indicated in Fig. 5. It will be observed that the positions of the arms and legs differ materially from the positions which were occupied by the corresponding members of the preceding figures 6*a*, this difference in position being clearly observed through the use of the marks 23 and 24 which were made by the modeler in outlining the feet of the figure 6*a*. Using these marks as a guide, the modeler then models the still plastic figure to bring the various members of the figure into positions representative of the second animative aspect of the sequence to be photographed, this disposition of the parts being indicated in Fig. 6. As soon as this figure is modeled to the artist's satisfaction, the figure is removed for hardening as was the figure next preceding. This operation is continued until a complete set of figures representing all of the animative aspects of the sequence to be photographed are prepared and ready for use. Each of the figures may be ornamented by painting or staining after they have been fired.

In the particular sequence of operations illustrated, it will be noted that in Fig. 4 the figure 6*a* is apparently carrying the weight upon its left foot, the right foot being disposed a short distance off of the surface upon which the figure is standing so as to be carried forward in the simulation of a step being taken by the figure. Attention is called to the fact that in modeling the next figure 6*b* the position of the left foot relative to the surface upon which the figure is standing must remain unchanged since the weight of the figure is being carried upon that foot. The artist accordingly marks the outline of the left foot as indicated by the marks 23 upon the base portion 14 so that when the guide rod 18 is moved to a position corresponding to the second animative position, the left leg of the figure 6 will be then modeled and displaced rearwardly until the left foot is disposed in a position congruent with the marks 23. In a similar manner the artist may, by means of the marks 24, indicate the desired position which is to be occupied by the right foot of the figure 6*b* so that when one of the figures 6 is disposed upon the guide 18 in the manner illustrated in Fig. 5, the amount of modeling and displacing of the right leg that must be performed may be readily observed.

Reference has been had hereinbefore to the fact that before removing from the supporting member 18 a finished modeled figure the artist carefully notes the positions of the arms, legs and head. I have found that the provision of a checkered background, such as that illustrated in Figs. 4 through 8, facilitates this operation of noting the relative positions of the parts. This background may, as illustrated, comprise a relatively thin sheet of material 25 secured in an upright position to one edge of the base member 14 and disposed in a position extending parallel to the slot 17. The face of the sheet 25 which is directed toward the supporting member 18 is preferably marked in a checkered pattern by spaced horizontal and vertical lines 26 and 27. The manner in which the relative positions of the legs and arms may be noted is clearly brought out in Fig. 8. It will be seen by reference to this figure that by assigning proper identifying indicia to each of the horizontal lines 27 and each of the vertical lines 26, the locations of each of the parts of the figure will be readily noted by noting the

apparent positions of these parts on such a checkered background.

While the supporting rod 18 may be made of any desired shape and the holes provided in the various figures 6 for receiving the rod 18 may also be made of any desired shape, I have found that distinctly advantageous results ensue if the rod 18 is made of a rectangular or similar cross section providing a major axis which extends parallel to the slot 17 and is adapted to be closely received in elongated openings provided in the figure 6. Providing a supporting rod of this shape insures that the figure 6 will, at all times during the modeling operation, be held in the proper position facing along the length of the slot 17 and prevented from turning at an angle to the desired direction of movement of the model.

If desired, a series of spaced indexing marks or graduations 28 may be provided on the rod 18 so that the vertical positioning of the body 7 of the figure 6 may be readily controlled by observing the location of the upper surface 12 thereof relative to these indexing marks. By this means the body of each of a series of figures may be held in precisely the same vertical position or may be caused to appear in the completed sequence as having a smooth, flowing, vertical movement as in the case of a man walking.

It will be observed that the method of preparing the figures which I have set forth hereinbefore permits the rapid and accurate modeling of a relatively large number of these figures in a much shorter time than would be required by any other known method of modeling. Attention is called to the fact that the accuracy and speed with which this modeling process may be carried out is enhanced through the use of the guiding and indexing apparatus.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

I claim:

1. In a guiding apparatus for use in successively modeling a set of figures representing an object into positions representing successive aspects of the animation of said object, the combination of: a base member; a supporting member for supporting one of said figures while it is being modeled; means mounting said supporting member for movement over said base member along a prescribed path; means on said base member identifying points spaced along said path with corresponding aspects of said animation; and means associated with said base member for noting the positions of portions of one of said modeled figures supported at any one of said points, whereby the portions of another figure supported at an adjacent point may be modeled according to said notations into positions representing the corresponding aspect of said animation.

2. In a guiding apparatus for use in successively modeling a set of figures representing an object into positions representing successive aspects of the animation of said object, the combination of: a base member; means on said base member defining a slot; a supporting member for supporting one of said figures while it is being modeled; means mounting said supporting member for movement along said slot; a plurality of index marks on said base member adjacent said slot for identifying points spaced along said slot with corresponding aspects of said animation; and means associated with said base member for noting the positions of portions of one of said modeled figures supported at any one of said points, whereby the portions of another figure supported at an adjacent point may be modeled according to said notations into positions representing the corresponding aspect of said animation.

3. In a guiding apparatus for use in successively modeling a set of figures representing an object into positions representing successive aspects of the animation of said object, the combination of: a base member; a supporting member carried by said base member for supporting one of said figures while it is being modeled; and means on said supporting member for indicating the location of said supported figure relative to said base member, whereby another figure may be substituted on said supporting member and modeled in accordance with the indicated location of the next previous figure.

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