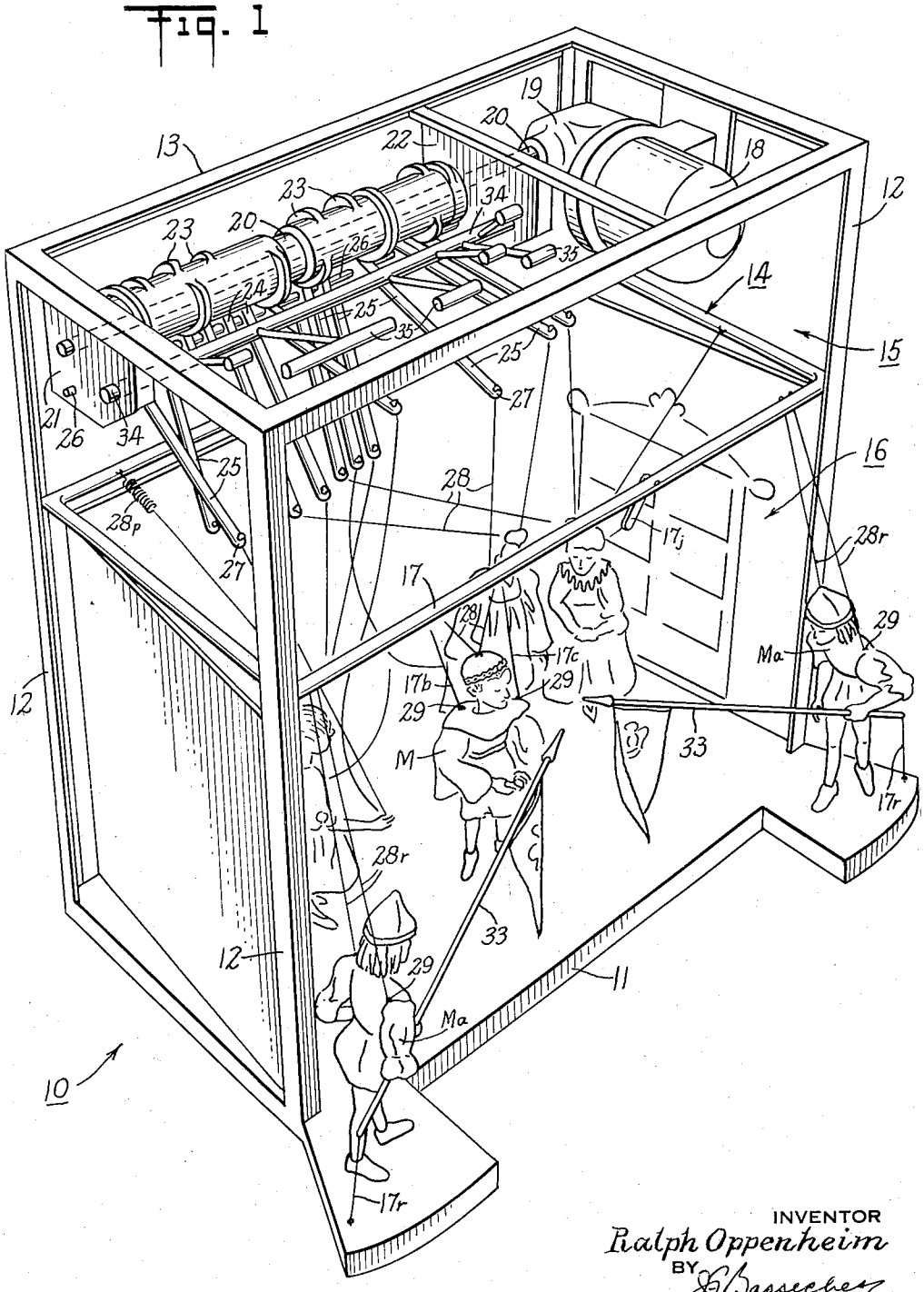
March 13, 1962 R. OPPENHEIM 3,024,551

AUTOMATIC PUPPETEER

Filed Jan. 22, 1959 5 Sheets-Sheet 1

Fig. 1



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AUTOMATIC PUPPETEER

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Fig. 2

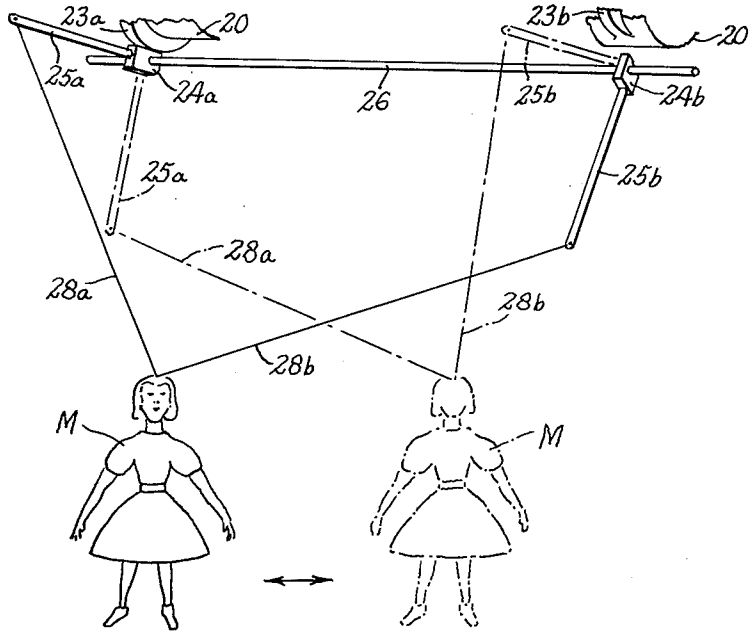


Fig. 3

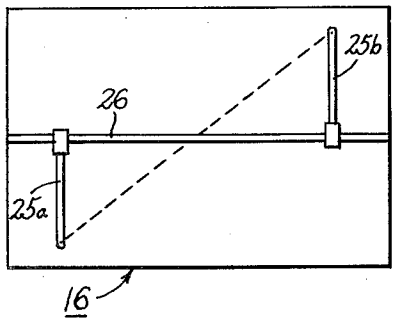


Fig. 4

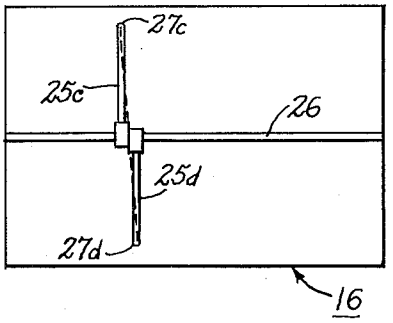
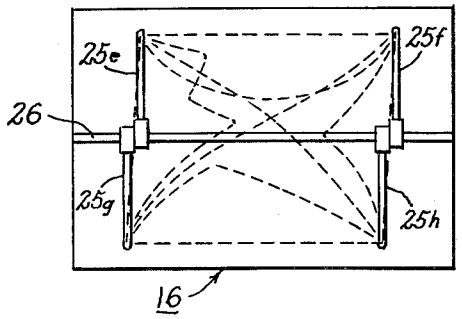


Fig. 5



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AUTOMATIC PUPPETEER

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Fig. 6

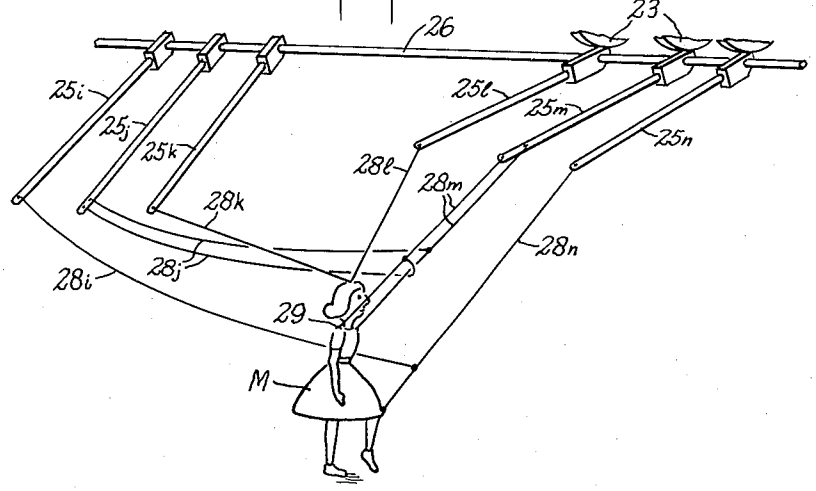
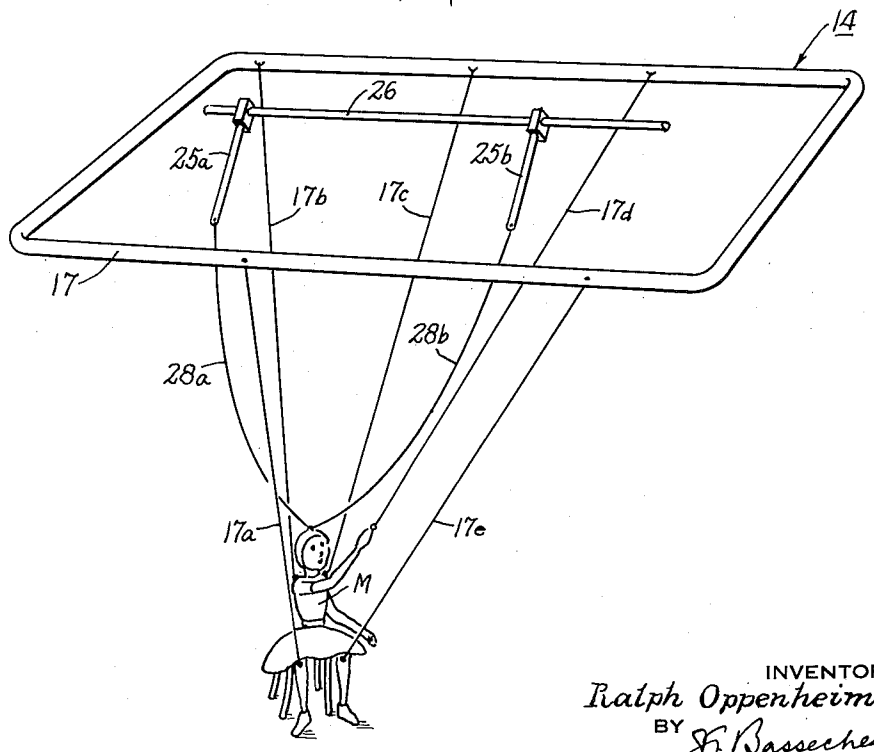


Fig. 7



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AUTOMATIC PUPPETEER

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Fig. 8

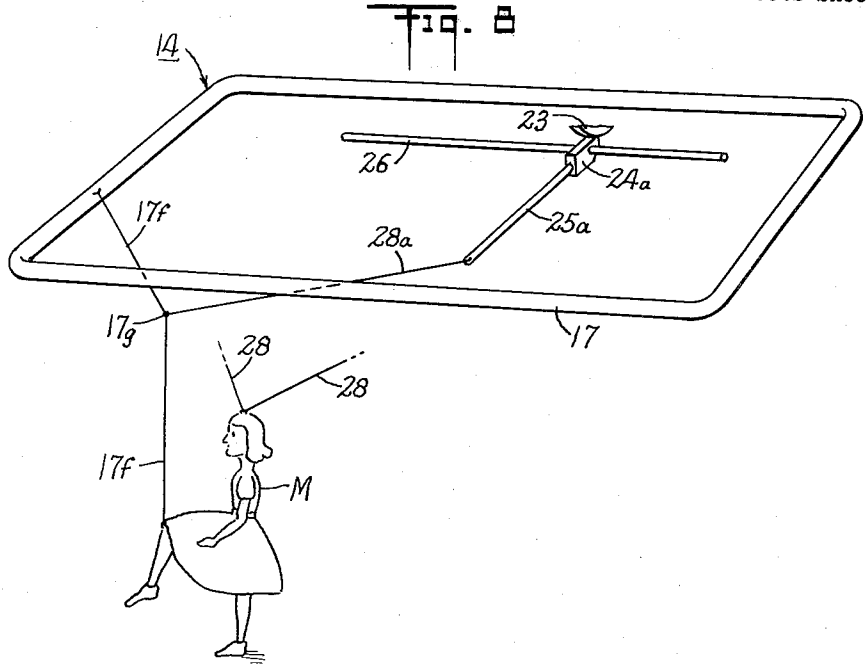
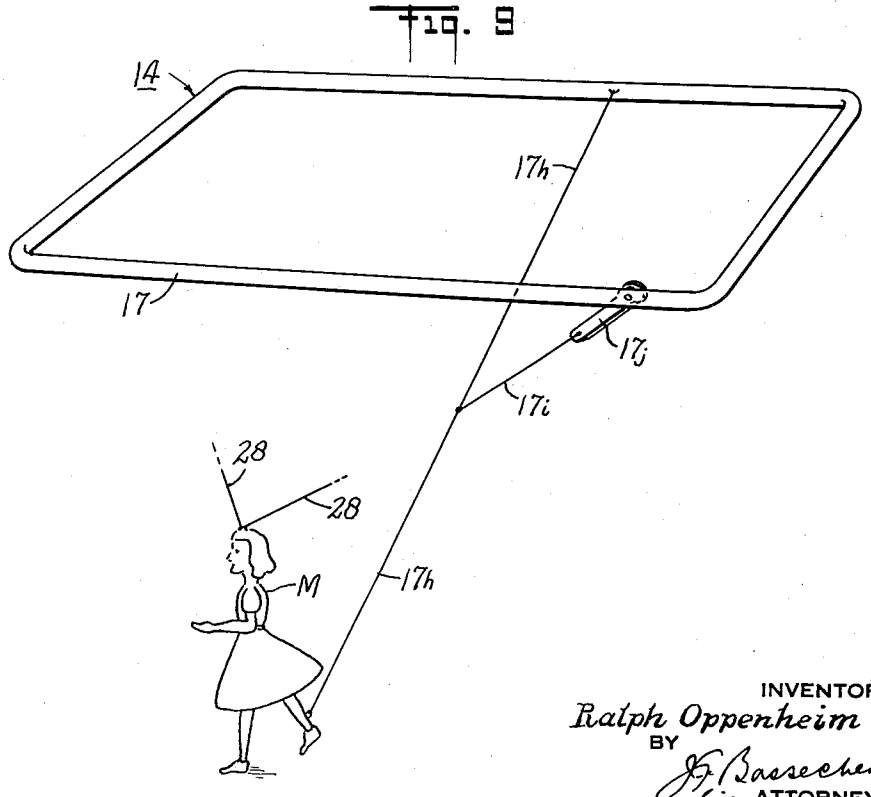


Fig. 9



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AUTOMATIC PUPPETEER

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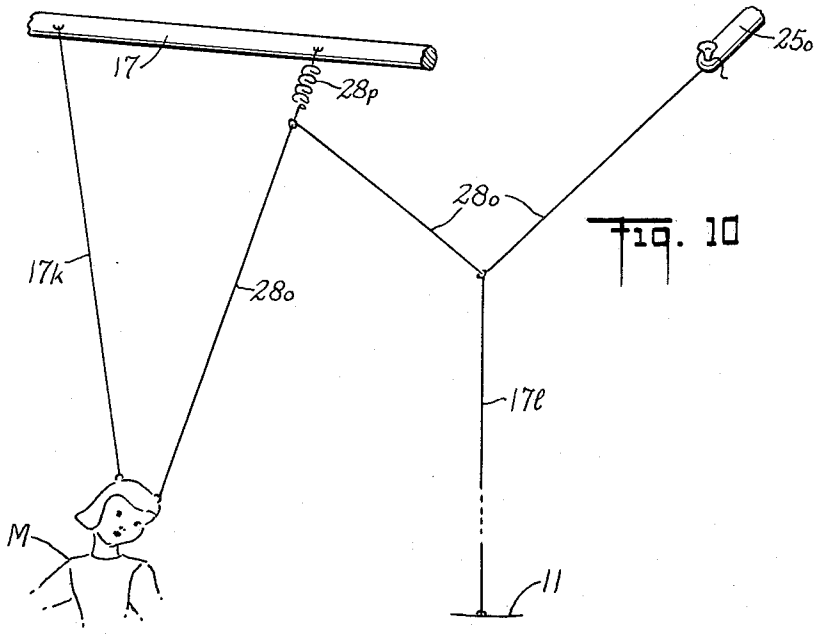

Fig. 10

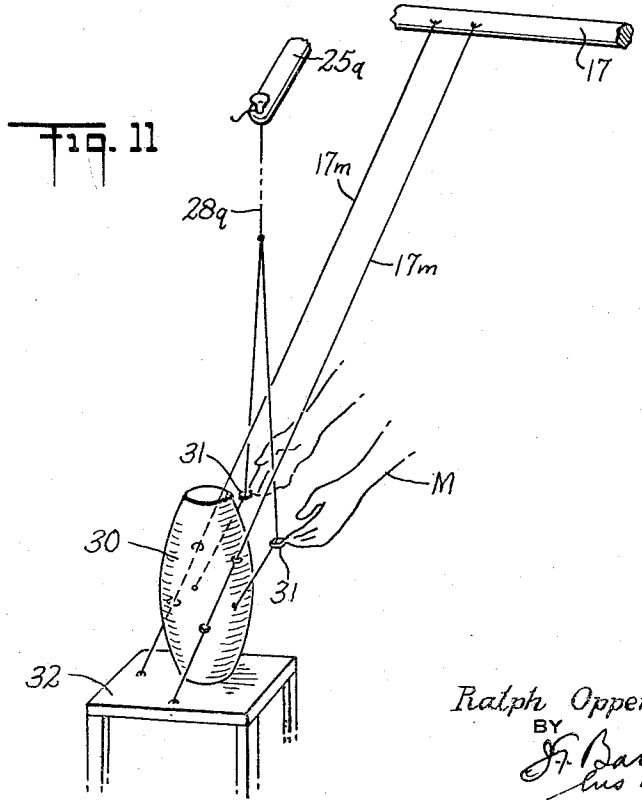

Fig. 11

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3,024,551

AUTOMATIC PUPPETEER

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Filed Jan. 22, 1959, Ser. No. 788,391
5 Claims. (Cl. 40—106.34)

This invention relates to an automatic puppeteer, and more particularly to a powerized marionette operating assembly, and still more particularly to an automatic assembly for string control of marionette figurines.

Known to me is the attempt to simulate animation in figurines or marionettes to effect movement thereof by motorized expedients, such as spring motors or electric motors, to eliminate the necessity for the constant presence of a human puppeteer, and to endeavor cyclically and continuously thereby to present a staging of a sequential activity. Resort to operations of stringing couplings has heretofore limited attempts in automatic puppeteering to simple simulated animation primarily involving vertically directed components to the gravitationally suspended marionettes, which minimized the extent of the performance movement, in no way providing the flexibility and fluidity and naturalness of movement and gyrations possible with human operation of marionettes.

Known to me also is the attempt to provide powerized puppeteering or animation of marionettes to secure the combined components of vertical, horizontal, transverse or rotative movement employing push-pull rigid actuating components. These endeavors have involved such complex mechanical expedients as to limit the figurines in that the actuating linkage was obviously detectible and caused obstructive interference in the use of a range of puppeteering performers customarily within the realm possible in the hands of a skilled human puppeteer.

Accordingly, this invention has for its object the provision of a puppeteering assembly which may be automatically and cyclically operated under the motivation of powerized means, in which the flexibility and fluidity of performance employing string means, with its known benefits, to actuate the marionettes is retained, and to provide upon a stage, a desired sequence and repetitive cycles thereof, characterized by the flexibility, fluidity of movement, versatility of performance to secure horizontal, vertical, oblique and rotative directional movements or combinations thereof of the puppets, heretofore achieved only by live puppeteers, but which, when performed automatically and cyclically, makes the assembly useful in mechanical displays or in presenting the puppet performance as part of a program of filming the puppet show for motion picture or television performance.

More specifically, it is an object of this invention to provide, in combination with powerized means, of stringing controls for the marionettes which are directed to achieve a high degree of flexibility and fluidity of movement of the marionettes strung on a stage, by subjecting the strings animating the marionettes to components of forces effective under the influence of timed powerized means, in relation to relatively stationary anchoring strings, whereby to give to the marionettes horizontal, vertical, rotative and oblique and other directional motion, and to simulate animation of the limbs or other portions of the figures, with a high degree of realism, all of which may be performed continuously and cyclically by powerized means, in the absence of control of live puppeteers.

In more specific phases of this invention, it is an object thereof to provide a system of stringing under the automatic influence of powerized means whereby a high degree of flexibility of the marionettes is secured by time controlled, cam actuated levers to which the stringing components are affixed, which effect a stringing control

counter gravity to the marionettes gravitationally, and with the resultant action of two or more stringing controls relative to each other or to anchoring expedients which may be so variably altered to provide a high degree of flexibility, a finished and versatile movement performance of intricate nature, such as ballet steps, movement about the stage to simulate walking, running, sitting, jumping, bowing, including movement on and off the stage, in a manner heretofore not achieved except by skilled live puppeteers.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, reference is made to the accompanying drawings, forming a part hereof, in which—

FIGURE 1 is a perspective view of an assembly illustrating the invention;

FIGURE 2 is a fragmentary detail to illustrate a form of stringing;

FIGURES 3, 4 and 5 are diagrammatic illustrations of details to illustrate stringing actuation to secure transverse movement by resultant stringing components influencing the marionette;

FIGURE 6 is a diagrammatic perspective view illustrating a stringing assembly under the influence of manipulating levers to show a plurality of movements which may be imparted to the marionette;

FIGURE 7 is a perspective diagrammatic detail to illustrate a stringing manipulation by the resultant components of lever actuation in relation to each other and to fixed anchoring means;

FIGURE 8 is a diagrammatic perspective view illustrating a stringing system under lever actuation which is influenced by an anchor stringing component;

FIGURE 9 is a diagrammatic perspective view for a stringing control where the resultant components are an anchored and gravitational slack take-up anchor bar;

FIGURE 10 is a diagrammatic illustration of stringing control for effecting a resultant component under the influence of manipulative strings to each other and to anchor strings for securing another body manipulation;

FIGURE 11 is a diagrammatic illustration of the stringing assembly for securing a simulation of lifting of one object in relation to another.

Reference is made to the drawing wherein an automatic puppeteering assembly **10** is shown comprising a skeleton frame having a base **11**, from which vertical uprights **12** are extended to support the horizontal head frame **13**. An anchoring frame **14** divides the skeleton frame into a mechanism zone **15** and a stage **16**. The vertical upright members **12** may be covered on the sides and rear, to leave only the curtain controlled front open for viewing below the anchor frame front bar **17**, the area **15** above the anchor frame **14** being devoted to mounting and suspending mechanical actuating mechanism and which may comprise a motor unit **18** which, through appropriate gear reduction transmission **19**, is arranged to rotate a time controlled cam shaft **20** extending across the width of the head frame and over the width of the stage **16** between the bearing blocks **21** and **22**.

The electric motor **18** may be actuated by a switch or cyclically by time controlled switch controlling mechanism, the details whereof will be readily apparent, to secure a cycle of movement intermittently, of predetermined duration.

The cam shaft **20** is provided with a plurality of cams **23**, in number and position as will appear hereafter. Each of the cams **23** has positioned with relation thereto followers **24**, extending from adjacently positioned levers **25** pivoted on the lever shaft **26**. Each of the levers **25** may have its terminal portions **27** coupled to a manipulating string **28**.

Each of the cams is so shaped, as determined empirically, to give to the levers a displacement factor in lifting or lowering in relation to the gravitational influence of the figurine to which the string **28**, at a terminal portion **29** or otherwise, is affixed. It will be understood that the cam outlines and the fulcrum point of the levers on the pivot shaft **26** may take on so many variables in determining time and displacement of movement that the design thereof for effecting different magnitudes of movement will now become clear.

While in live puppeteering, bodily transposition of the figures is possible upstage, downstage and crosswise against the gravitational influence of the figurines, or of the movable elements of the figures to each other, there is known prior procedure for automatic puppeteering which secures the new effect wherein three dimensional movement is accomplished.

Accordingly, in the invention, stringing is effected to secure not only direct motion transmission, but resultant transmission of one stringing component to another stringing component upon the figurine, preferably as secured by stringing components which will now be described in progressive degree of complexity, which may be used in a general assembly as described in FIGURE 1.

Referring to FIGURE 2, there is shown diagrammatically the fragment of the cam shaft **20**, with cams **23***a* and **23***b* positioned to activate the followers **24***a* and **24***b*, and illustrative lever arms **25***a* and **25***b*, from which strinks **28***a* and **28***b* are extended to a point such as the head of the marionette M. By an angular disposition of the lever arms **25***a* and **25***b* to each other, a movement of the cams **23***a* and **23***b* to relax the levers **25***a* while raising the lever **25***b* to the position shown in dotted lines will cause the marionette M to be under the influence of the resultant of the stringing movements and move the puppet horizontally in the direction of the arrows. If both levers are raised or lowered together, there will be only vertical motion, or if moved in other relationship to each other, tilting, swinging and even turning can be effected.

In FIGURE 3, a plan view is shown of the levers **25***a* and **25***b*. By coordinated relationship of these levers to each other and upon the strings **28***a* and **28***b* running therefrom to the marionette M, the latter will be moved diagonally back and forth on the stage, as indicated by the dotted lines.

In FIGURE 4, a selection of levers **25***c* and **25***d* in tandem is shown, the forward one having its maximum displacement toward the rear of the stage and the latter its maximum displacement toward the front of the stage, with strings from the terminal portions **27***c* and **27***d* of the puppet (not shown), the puppet being moved from backstage to front stage and vice versa by the resultant of a slackening of one lever and a lifting of the other lever.

In FIGURE 5 there is exemplified an arrangement with four levers **25***e*, **25***f*, **25***g* and **25***h*. Levers **25***e* and **25***g* are set up in tandem back and front on the left of the stage; levers **25***f* and **25***h* are set up in tandem back and front on the right side of the stage. From each of the terminal ends, or at an intermediate point in accordance with the magnitude of displacement desired, stringing is extended to the puppet (not shown). The dotted lines show some of the directional motions which can be accomplished by combining the angular displacement and movements of the levers to each other, enabling the puppet to be moved anywhere on the stage, with a change in direction in the horizontal by reason of the component of two stringing forces on the puppet.

In FIGURE 6 there is exemplified the means of effecting a more complex movement and for this purpose the pivot shaft **26** is exemplified as having a series of levers **25***i*, **25***j*, **25***k*, **25***l*, **25***m* and **25***n*. From the lever **25***i* there is extended a string **28***i*; from lever **25***j*, a pair of strings **28***j*; from lever **25***k*, a string **28***k*; from lever **25***l*, a string **28***l*; from lever **25***m*, a pair of strings **28***m*; from lever **25***n*, a string **28***n*.

In the illustration, string **28***i* terminates along the string **28***n*; strings **28***j* are each terminated along the length of the strings **28***m*. The other strings described may terminate upon the puppet M. It will be seen that as the lever **25***l* pulls the puppet M to the right, lever **25***k* lowering in compensating release of its string, the lever **25***m* is pulling on two shoulder strings **28***m*. Lever **25***n*, at the same time, is pulling on string **28***n* to the knee of the puppet M, to make one leg move in walking motion to the right. As the puppet approaches the right side of the stage, lever **25***m* is raised higher and lever **25***i* is lowered, to keep the walking motion uniform. It will be understood that by a variation it is possible to make big steps, small steps or speed up the horizontal motion, as desired.

Assuming that it is desired to turn the puppet and have it walk to the left, lever **25***l* is started to its lowering position, raising lever **25***k* and simultaneously lowering lever **25***m* and raising lever **25***j*. It will be observed that the stringing branches from the shoulder strings on lever **25***m* at the point of connection along the length of the strings **28***m* are thus given a compensatory movement by the levers and the marionette is now turned to face left and move in that direction. It may be turned back to the right by reversing the procedure.

It will be seen that by the resultant movement of strings upon each other to the figurine and the relationship of the strings in their attachment to the limbs of the puppet, varied walking or running motion can be imparted, movement of the arms, waist, head, in relation to the body being effected to simulate animation, all of which may be accomplished predeterminedly.

In order to simplify and minimize the number of actuating levers, I may, as described, manipulate the stringing movement of the actuating levers in relation to anchored strings also connected to the marionette means, and depend upon the eccentric location of the terminal portions of the anchoring strings to secure advantageous transverse movement horizontally in a plurality of directions.

In FIGURE 7, the relationship of the pivot shaft **26** to the anchor frame **14** is illustrated. In this construction, a pair of levers, such as **25***a* and **25***b*, are provided with strings **28***a* and **28***b*, as in connection with the embodiment illustrated in FIGURE 2. In this embodiment, anchor strings **17***a*, **17***b*, **17***c*, **17***d* and **17***e* are static strings, in relation to which the strings **28***a* and **28***b* are active components. The marionette M in this assembly is animated by the movement of the levers **25***a* and **25***b* in relation to the static but tensioning strings **17***a*, **17***b*, **17***c*, **17***d* and **17***e*. A wide variety of relative movement of the limbs to the body of the marionette is thereby secured. For example, as the marionette is given a movement to the left by the composite effect of the strings **28***a* and **28***b*, the arms and limbs are anchored by the strings **17***a* and **17***d* and **17***e*, giving a resultant movement to the body of the marionette in a lifting direction, such as would be be involved in seating the marionette M.

In FIGURE 8 there is exemplified how a simple walking motion may be transmitted to the puppet M. In this example, the pivot shaft **26** has a lever **25***a* coupled with a string **28***a* for activating the knee of the puppet. A string **17***f* is extended at one end to the anchor frame at the front bar **17** and at the other end to the knee of the puppet. Actuation is effected at the intermediate point **17***g* to which the string **28***a* is connected. When the lever **25***a* is raised to pull the string **28***a*, it does so in relation to the string **17***f* and thereby this latter lifts the leg from the vertical toward the left front of the stage because of the limiting movement which the anchor string **17***f* exerts to the upward pull of the string **28***a*.

While there has been exemplified in the foregoing embodiment the manner in which stringing influence is the result of a plurality of components, one or more of which

may be a string extended to the anchor frame, the effectiveness of this latter component may be further altered so that when it is inactive and hangs slack, the slack may be taken up or its influence yieldably exerted. For this purpose reference is made to FIGURE 9 wherein the marionette M, apart from the lever actuated strings **28** which may be employed as in the prior embodiment, may be provided with a limb actuating string **17***h*, anchored to the front bar **17**. Intermediate the length of the string **17***h* there is affixed a resilient anchoring string **17***i* by affixing one end to a free hanging lever **17***j*. This lever is sufficiently free-pivoting to let out the slack of the string **17***h* when the marionette moves to the left but is of sufficient weight to take up the slack as the marionette moves to the right. This arrangement permits of an elaborate set-up of a performance on the stage, with a large variety of motions possible with a great number of strings, assuring however that the strings are kept neatly in position, yet are promptly responsive to activity of the actuating component on other strings under the influence of the motorized actuating means. While there has been described a slack take-up component in the nature of a free hanging anchor bar, it will be understood that weights along the anchor strings **17***h* may be substituted.

In another embodiment, where it is desired to restrict the number of actuating levers, the anchor strings need not be affixed to the anchor bar but may be affixed to other portions of the stage and supports thereof. Additionally, such anchors may be employed to release tension as well as to add the component of tension. Such form of anchoring for the strings is illustrated in FIGURE 10 wherein the marionette M has its components, such as the head, under the influence of an anchoring string **17***k* attached to the anchoring frame front bar **17** and also under the influence of the actuating string **28***o*, actuated by the actuating lever **25***o*. Intermediate the length of the string **28***o* there may be interposed a resilient anchor spring **28***p*, the opposed end of which is affixed to the anchor frame front bar **17**. At another intermediate portion of the string, an anchor string **17***l* is interposed and affixed to the floor. This set-up exemplifies the actuating influence of an actuating string and resilient strings to each other and to the marionette. When the lever **25***o* is low, the spring **28***p* holds the head string **28***o* taut. When the lever **25***o* is raised, it will be seen that here is a downward and slightly sidewise pull on the spring **28***p*, which will cause the string **28***o* to slacken. This will cause the string **28***o* running to the anchor to hang taut, holding its side of the head to which the string is affixed, while the other side of the head slackens. This will then throw the head off balance, to give the effect of tilting.

Another example of the use of anchor strings on different portions of the stage, as well as with respect to the anchor bar, is shown in FIGURE 11 where the marionette may serve to give the illustion of lifting an object. This effect is accomplished under the action of an actuating string **28***q* extending from an actuating lever **25***q* which is affixed to a prop which, in this particular case, is a vase **30**, after being threaded through eyelets **31** on the hands of the marionette M. Another strings **17***m* extend from the anchor frame front bar **17**, through the vase **30**, and are affixed to a stage prop **32**. When the actuating lever **25***q* is predeterminedly moved by the motorized unit, the initial movement will tend to bring the arms of the marionette to the vase **30**. Continued movement against the gravitational influence of the vase itself will raise the vase and the more closely drawn together hands, to give the effect of the marionette lifting the vase.

This relative resultant movement of a lever actuated string to an anchor string may serve to produce a variety of off stage animated effects, as shown in FIGURE 1 where lever actuated strings **28***r* to the marionettes MA influence the movement of these staging components where, in the exemplified form, guards are illustrated having spears **33**, the terminal ends of which are provided with anchor strings **17***r* running to the floor of the bracket in the off stage position. As the shoulders of the marionettes MA are lifted by a lever actuated string, the spears are tilted upward to the position of "attention" by the anchoring influence of the anchor string **17***r*.

Other features as a result of combining with the gravitational influence of the marionette string coupling, of actuating means or a plurality thereof and a transverse component, such as another mechanically actuated string or anchor string, may result in securing transverse movement for horizontal displacement obliquely or pivotally, to transpose mere mechanical vertical movement of the actuating members to transverse horizontal movement, widthwise or crosswise of the stage.

It will be understood that in FIGURE 1 the general assembly is shown without endeavoring specifically to correlate ench of the marionettes there shown with the corresponding actuating strings or anchor strings, the combination being intended to illustrate the assembly which may utilize one or more of the expedients referred to in connection with details in FIGURES 2 to 11.

There is also shown in FIGURE 1 a rotatable shaft **34**, carrying a plurality of dampers **35**, which may be manually pressed against one or more of the levers **25**, to dampen their free movement. This may be found desirable for transportation of the puppeteering assembly.

Having thus described the invention and illustrated its use, what is claimed as new and is desired to be secured by Letters Patent is—

1. In an automatic puppeteering assembly including a fixed support having motorized means and a plurality of spaced-apart actuating means cyclically operated by said motorized means to impart spacial displacement of predetermined magnitude in timed relation to each other only in a vertical plane, the combination therewith of marionette means, a plurality of strings coupled to said marionette means, at least one of said strings being coupled to said actuating means and other strings being coupled to anchoring means on said fixed support to impart movement to the marionette means by the resultant component of the strings, whereby gravitational resistance of the marionette means to the components of movement of the strings imparts relative horizontal displacement to the marionette means.

2. In an automatic puppeteering assembly having a frame, a stage, motorized means over said stage, a plurality of spaced-apart actuating lever means, each confined in a vertical plane of movement supported over said stage, cam means cyclically operated for actuating said lever means in accordance with a predetermined pattern of movement in timed relation in a vertical plane, an anchoring frame over said stage, the combination therewith of marionette means having strings coupled to said lever means and anchor means whereby to impart the resultant component of the conjoint movement of said actuating lever means in relation to said anchoring means to the gravitational resistance of the marionette means to said lever means and anchoring means, thereby to transmit relative horizontal movement to said marionette means.

3. In an automatic puppeteering assembly in accordance with claim 2 wherein said strings joined to said anchoring means are weighted.

4. In an automatic puppeteering assembly in accordance with claim 2 wherein said strings joined to said anchoring means are resiliently weighted.

5. In an automatic puppeteering assembly having motorized means and a plurality of actuating means in spaced-apart vertical planes cyclically operable thereby, each to impart in each respective plane vertical spacial displacement of predetermined magnitude in cyclically timed relation to relatively fixed anchoring means, the combination therewith of marionette means gravitationally supported by a plurality of string means, at least

one leading to each of said actuating means, and at least one of said string means coupled to said marionette means being connected to said anchoring means whereby to impart movement by the resultant component of the conjoint movement of said actuating means and anchoring means on said strings coupled to said marionette, whereby to impart relative horizontal displacement of the marionette by the vertical movement of said actuating means.

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