Jan. 6, 1959 W. R. WESTFALL 2,867,050

MOVING MESSAGE PROJECTOR

Filed Nov. 5, 1953 2 Sheets-Sheet 1

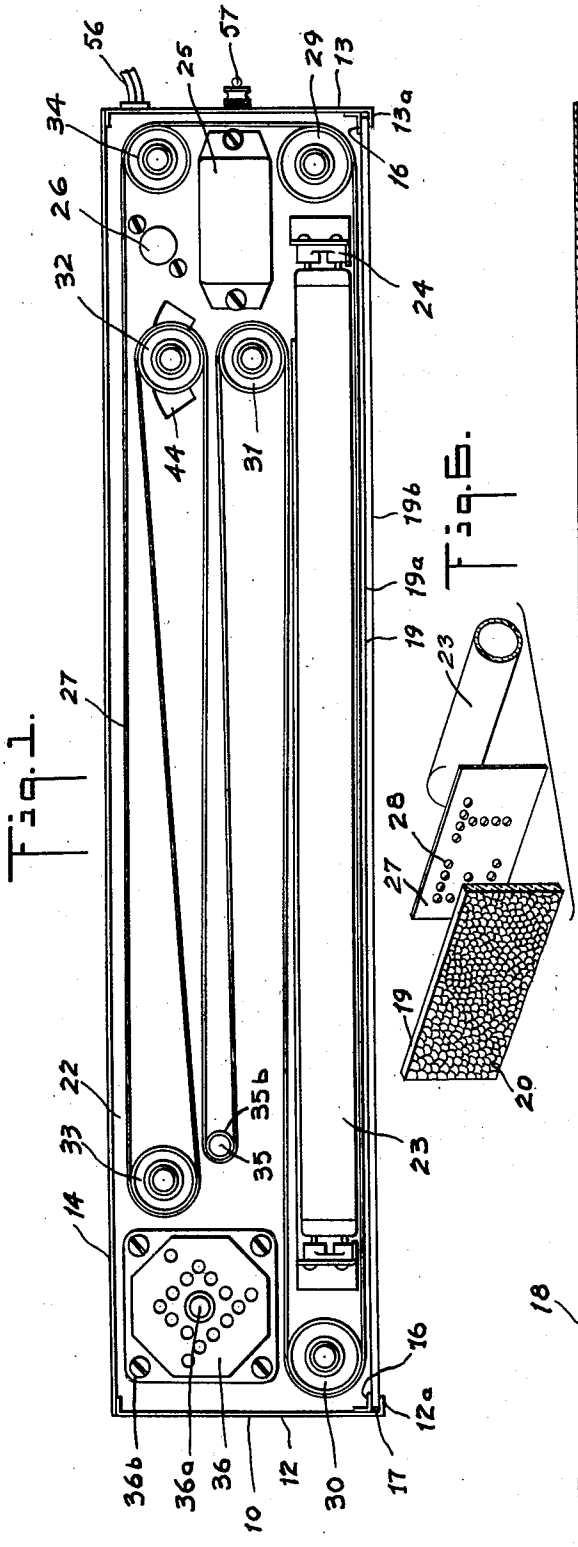


Fig. 1.

Fig. 5.

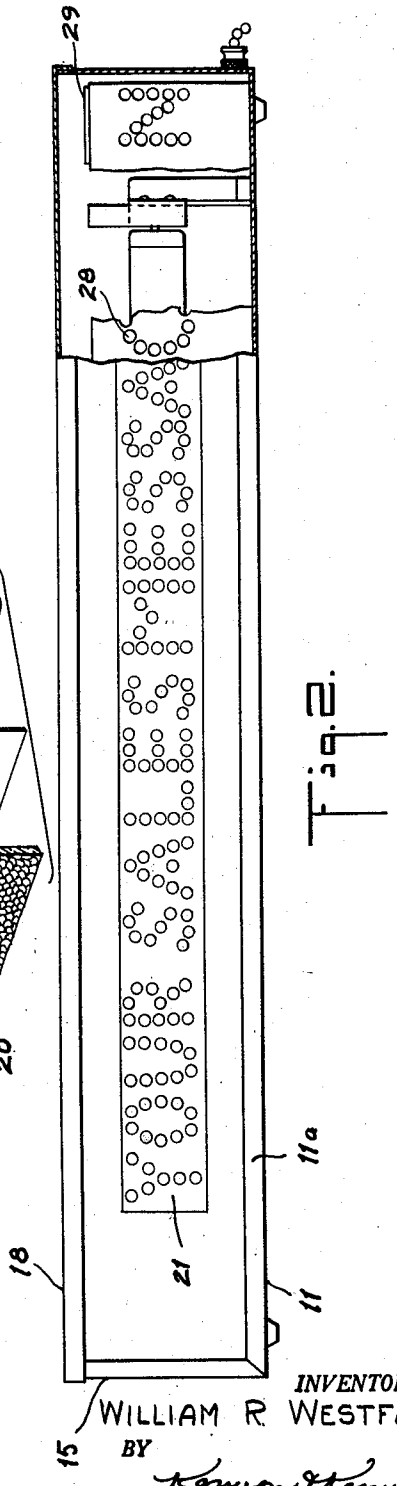


Fig. 2.

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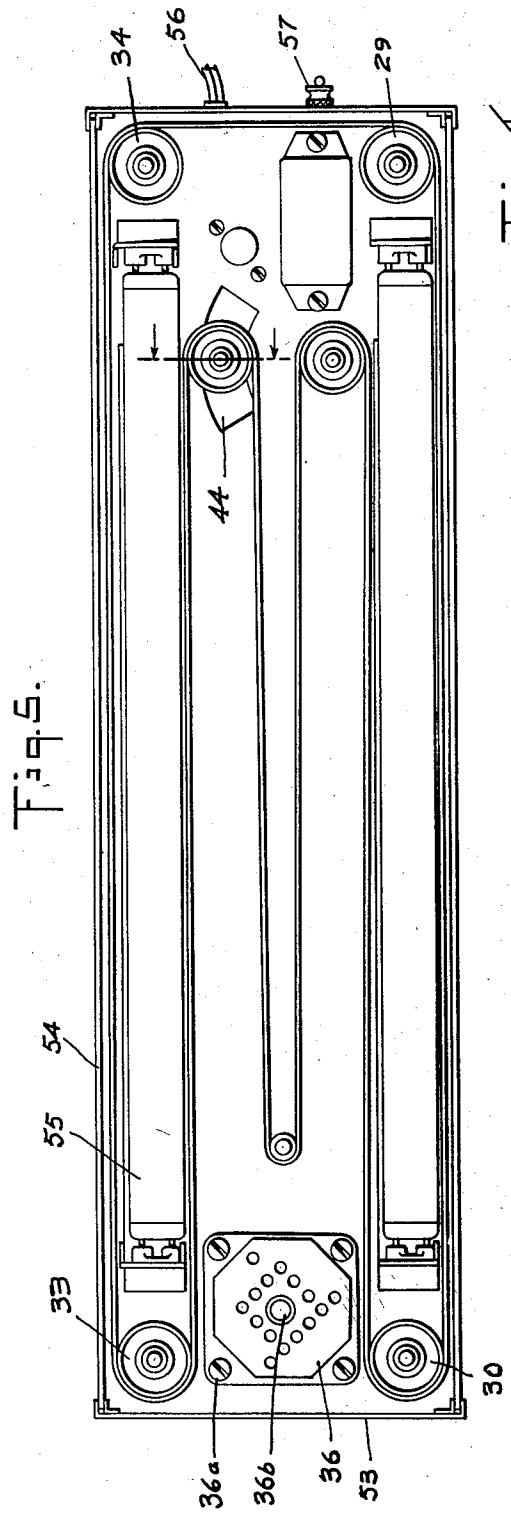


Fig. 5.

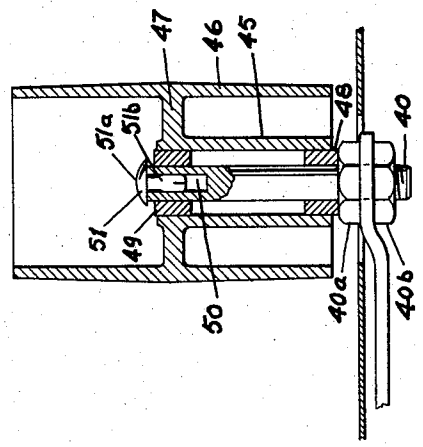


Fig. 4.

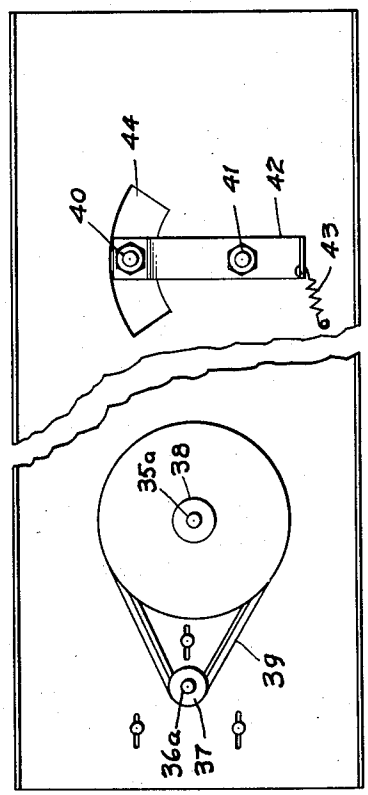


Fig. 3.

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MOVING MESSAGE PROJECTOR

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Application November 5, 1953, Serial No. 390,397

3 Claims. (Cl. 40—32)

This invention relates to an improved device for projecting a moving and animated message on a screen.

Devices of this general character have been known in the art, but all have been subject to serious defects rendering them unsalable. Inasmuch as the tape from which the message is transmitted is relatively short, the message itself is necessarily short, and as a consequnce, and because it may otherwise be desirable to vary the messages, frequent changes of tapes are made. One of the difficulties of the prior art was that the messages to be projected were not easily interchangeable without damage to the tape or to the device. Further, the prior devices could not be depended upon to give trouble-free unattended performance for the long periods of time during which they must be operated. Another difficulty was that although an animated effect in the message was desirable, it could not be obtained without complex apparatus of relatively high cost and maintenance.

The principal object of this invention is to provide a low cost device of simple operation for projecting a legible moving message across a screen, which device can be operated for long periods of time with little or no maintenance. Another object is to provide such a device in which the message may be projected on a plurality of screens.

A further object of the invention is to provide such a device relatively inexpensive to manufacture and easily operated in which the projected message takes on an animated yet legible appearance.

Another object is to provide such a device in which the messages may be simply and quickly interchanged by one unfamiliar with the device without damage to the device or to the messages.

A still further object of the invention is to provide such a device in which the message may be read from almost any angle.

Further objects and advantages of the invention will appear from the following description, in which

Fig. 1 is a plan view of the device with the cover removed;

Fig. 2 is a front elevation of the device, having one end broken away to show the interior;

Fig. 3 is a horizontal sectional view of the device showing the driving means and the tensioning means;

Fig. 4 is a vertical sectional view of the tensioning spool taken on the line 4—4 of Fig. 5;

Fig. 5 is a plan view of an alternate form of the device with the cover removed;

Fig. 6 is a perspective view of the screen, tape and light source.

One form of this device will now be described, but it should be understood that variations may be made therein without departing from the scope of my invention. Referring particularly to Figures 1 and 2 of the drawings, reference numeral **10** refers to a casing, preferably constructed of sheet metal. Casing **10** is comprised of a rectangular base **11**, vertical side panels **12** and **13** and vertical rear panel **14**.

The front edges of side panels **12** and **13** and base **11**

are lipped inwardly at **12***a*, **13***a* and **11***a*, said lips being joined together to form frame **15**.

Angle members **16** are joined to the inside surface of side panels **12** and **13** adjacent lips **12***a* and **13***a* to form vertical channels **17** therebetween. A third channel may be provided by a third angle member joined to the inside surface of said base **11** adjacent lip **11***a*. A cover **18** is securely but removably mounted by the upper ends of panels **12**, **13** and **14** and lips **12***a* and **13***a*.

Front panel **19** is about the same height as panels **12**, **13** and **14** and is horizontally dimensioned to be slidably mounted in the channel formed by lips **12***a*, **13***a* and angle members **16** to thereby form a fourth vertical panel or screen panel of casing **10**. Panel **19**, as shown, is made of solid translucent glass, but a fire resistant thermosetting plastic material, or sheet metal may be used. One side **19***a* of panel **19** is smooth and the other side **19***b* is covered by an agglomerate formation of beaded protuberances **20** abutting one another in irregular design (Figs. 1 and 6). Panel **19** is inserted in channels **17** in such a manner that the smooth side **19***a* is on the inside of casing **10**. All of surface **19***a* is opaqued, such as by painting, except a centrally located rectangular portion **21** which is the projection screen of the device.

The casing **10** may be made with an integral front portion when the casing is made of sheet metal. In such case, an opening dimensioned similarly to screen **21** may be provided, and a translucent screen plate may be removably mounted therein, for example it may be dimensioned to be slidably inserted in channels. The plate screen is constructed similarly to plate **19** in that one side thereof is smooth and the other side is covered by an agglomerate formation of beaded protuberances, similar to beads **20**, abutting one another in irregular design, the plate screen being inserted in its channels in a manner that the smooth side thereof is on the inside of casing **10**.

Platform **22**, corresponding in dimensions to base **11** and preferably made of sheet metal in inverted U-shape is attached to base **11**.

A source of continuous light emanating from inside casing **10** towards and through screen **21** is provided by fluorescent lamp **23**, removably engaged in lamp sockets **24** mounted by platform **22**. A suitable ballast **25** and starter **26** for lamp **23** are also secured to platform **22**. Lamp **23** is preferably of a diameter and length approximately equal to the vertical and horizontal dimensions respectively of screen **21** and is disposed horizontally opposite projection screen **21**. Lamp **23** may be white or in any color desired. It has been found that when lamp **23** is painted with a variety of colors, an unusual effect is created in the message projected.

The message to be projected is placed on an endless tape **27** of flexible, opaque, fire-resistant, relatively non-elastic material, by perforations **28** therein arranged in the form of letters and words. Polyvinyl chloride film has been found to be an excellent material of the tape.

The message or wording appearing on tape **27** is projected on screen **21** by passing tape **27** between lamp **23** and screen **21**, the light only passing through the perforated portions of said tape. Pulleys or spools **29**—**34** are mounted by platform **22**, all of said spools being of similar construction. Spools **29** and **30**, located at either end of sockets **24** should be of a diameter greater than the diameter of lamp **23**. Driver roller **35**, also mounted by platform **22**, is displaced relative to spools **29** to **34** to provide straight-line passage of tape **27** under tension when tape **27** is wound about portions of the peripheries of spools **29** to **34** and roller **35** in such a manner that said tape will pass between lamp **23** and panel **19**, i. e. from spool **29** to spool **30**, thence to spool **31**, roller **35**, spool **32**, spool **33** and spool **34**.

Inasmuch as spools **29** to **34** are of basically similar con-

struction, a description of one spool will suffice for all. It should be noted, however, that all of said spools except spool **32** are rotatably fitted on spindles mounted directly by platform **22**. Figure 4 is a vertical section of spool **32** which is adapted to be removably and rotatably fitted on spindle **40**. All of the other spools are of similar construction but their respective spindles corresponding to spindle **40** are vertically mounted on and through platform **22**, the lower ends of said spindles having threaded portions, and a pair of nuts being threaded thereon in such a manner that one nut will exert force against the upper surface of platform **22** and the other nut will exert force against the lower surface of platform **22**. This construction is generally shown in the broken section of Figure 2.

Reverting to Figure 4, spindle **40** is fixedly mounted by one end of lever arm **42**, the lower end of spindle **40** being threaded, and the upper and lower nuts **40***a* and **40***b* securing said spindle in place. Spool **32** is comprised of two cylindrical concentric shells, inner shell **45** being about one-half the vertical dimension of outer shell **46**, and said shells are joined by horizontal web **47** of similar material. Shells **45** and **46** and web **47** may be formed in any suitable manner but they preferably should be made of a heat resistant material such as nylon. Cylindrical oilite bearings **48** and **49** may be mounted by the inner surface of shell **45** adjacent the ends thereof, said bearings being dimensioned to permit spool **32** to be slidably fitted on spindle **40**, or inner shell **45** may have inner flanges functioning as bearings (not shown).

Spindle **40** has a cylindrical opening **50** formed in its upper end. Fastener **51**, comprised of head **51***a* of a diameter larger than the diameter of spindle **40** and compressible shank **51***b* of a diameter normally greater than the diameter opening **50**, is forcibly inserted in said opening. The height of inner shell **45** should also be slightly less than the height of spindle **40** from platform **22** in order that head **51***a* will not interfere with the free rotation of spool **32** thereabout.

Spool **31** is rotatably mounted by spindle **41** which is secured to platform **22** as above described, the lower end of said spindle projecting through platform **22**. Lever arm **42** is pivotally connected to the lower end of spindle **41** and spring **43** is attached to the other end of arm **42**, the other end of said spring being anchored to casing **10**. In operation, the force of spring **43** will cause spindle **40** and spool **32** to be moved arcuately in a clockwise direction by the action of lever arm **42**. To permit this rotation, an arcuate channel **44** is provided in platform **22**, spindle **40** passing therethrough to be secured to arm **42**. When tape **27** is to be replaced, spool **32** may be moved in a counterclockwise direction to eliminate tension on said tape during such removal and replacement. Further, the continuous force of spring **43** will cause spool **32** to exert continuous pressure against the tape passing about a portion of its periphery, thereby creating tension in the entire tape.

Roller **35** comprises a shaft **35***a* having a rubber covering **35***b* over the upper portion thereof, the lower end of said shaft being journalled by annular bearings secured to platform **22**, an opening in said platform being provided for the purpose.

Motive power is supplied by a small motor, indicated generally at **36**, secured by posts **36***b* to platform **22**. Shaft **36***a* of motor **36** passes through platform **22** and pulley **37** is secured to the lower end thereof. Pulley **38** is mounted by the lower end of shaft **35***a* of roller **35** and belt **39** is trained about pulleys **37** and **38**, whereby power from motor **36** drives roller **35**. The rubber covering **35***b* on said roller provides frictional engagement with tape **27** when tension is exerted on said tape by spool **32**. Means may be provided to adjust the distance between pulleys **37** and **38** to thereby increase or decrease tension on belt **39**. A conventional arrangement of slots and set screws for such purpose is shown in Figure 3.

This particular construction of the spool possesses certain definite advantages over the spools of the prior art. In the first place, inasmuch as it is desirable that tape **27** travel in a continuous horizontal plane, it is necessary to prevent tape **27** from riding up on the spools around which it passes. Tape **27**, being of flexible and relatively non-elastic material, is subject to considerable wear and tear by flanged rims and other similar guides used to prevent the tapes from riding out of their predetermined course. The spool of my invention restricts the travel of the tape to a relatively continuous horizontal plane, but avoids the disadvantages of flanges and guides by the provision of a crowned peripheral surface on the spool. I have found that the crown angle may vary from about 0.75° to 1.75° in order that tape **27** will be compelled to stay in substantially the same horizontal position during its travel, yet such an angle will not distort tape **27** at its central portion where the perforations have been made.

The perforations **28**, being centrally disposed in tape **27**, create a weakened central portion. When the crown angle exceeds 1.75° I have found that the tape will travel in a substantially horizontal plane, but the central portion of the tape becomes stretched or bellied by reason of the fact that continuous tension is exerted on said tape as previously described, thus creating distortions in the message appearing on screen **21**. An angle less than 0.75°, although not creating a distorted message, will not maintain the travel of said tape on a substantially horizontal plane. I have further found that the best performance is obtained when the crown angle is about 1.0°, this being the point of maximum control of vertical travel of said tape and minimum distortion thereof.

Further, it has been found that in changing tapes, and in the general maintenance of spools having relatively long spindles, the spindles are very often bent or twisted in such a fashion that they cause distortions in the travel of the tape. Inasmuch as devices of this character are normally sold to people unskilled in the art, it is desirable to provide a spool which will withstand the rigors of harsh handling and yet maintain its necessary performance. This has been accomplished by the provision of a relatively short spindle about which the spool rotates, on the general principle that the shorter the spindle, the less the distortion if the spool should be displaced. A second structural improvement is fastener **51**, the shank **51***b* of which exerts sufficient force against the walls of opening **50** to resist removal therefrom, thus making it most difficult for the spool to be removed or replaced. Further, inasmuch as fastener **51** is located relatively deep inside outer shell **46**, fastener **51** is not readily removed and replaced without the proper tools. This construction discourages tampering with the spools by persons having little knowledge of their principles of operation and thereby minimizes distortions in the spindles about which they rotate, thus materially contributing to the performance of the device.

There has thus been provided a device in which an endless tape **27** is passed, by a series of spools and a roller, between lamp **23** and screen **21** in a direction from right to left, tension being exerted on said tape during its travel. The message to be projected on screen **21** is placed on the tape by perforations **28** therein arranged in the form of letters, at least two of said perforations being used for each horizontal or vertical line of each letter. Perforations **28** are circular in shape, and are of a diameter about the same or slightly less than the diameter of protuberances **20**, as may be more clearly seen in Figures 2 and 6. Inasmuch as protuberances **20** are formed on surface **19***b* in an agglomerate formation with no regularity thereabout, an unusual effect is created by light passing through perforations **28** and being projected on screen **21**. As shown in Figure 6, light comes from the source **23** and passes through a single perforation as the tape is driven from right to left, said stream of light being normally projected through at least two of said protuberances, and

possibly more. The effect to be gained thereby on screen **21** is a dancing stream of light having both horizontal and vertical movement in accordance with the contour over which the light passes. As this effect is created by a single perforation, a number of perforations arranged in the form of letters gives the effect of letters dancing about the screen while passing from right to left. This dancing effect is sufficient to be eye-catching, a most important advantage when the device is utilized for advertising purposes, but it is not enough to impair the visibility and legibility of the letters and words as they appear on screen **21**.

In order that there may be maximum clarity of said animated letters on screen **21**, I have found that spools **29** and **30** should be so disposed that the portion of tape **27** passing therebetween will be spaced from screen **21** a distance not substantially greater than ¼ inch, and preferably equidistant from said screen and light source **23**, although the position of said light source will be largely governed by the disposition of the other elements mounted in casing **10**.

This device is intended to be used in a variety of places and in a variety of positions, and it has been found especially useful when placed at relatively great heights, such as second floor display windows. In such cases it is necessary that the message may be read from below at extreme angles. In order that extremely angular viewing may be had, the vertical dimension of the letters formed by perforations **28** is somewhat less than the vertical height of screen **21**.

There has thus been described a complete moving message projector adapted to project a moving message on a single screen. This device is inexpensive to manufacture, is compact, sturdy, and will give relatively continuous performance for long periods of time completely unattended by the owner thereof. In this device, messages to be projected may be quickly and easily changed without damage to the tape carrying the message or to the spools about which the tape runs. The appearance of the message will at all times be essentially the same, the letters traveling on a substantially horizontal line, but giving off a dancing appearance by the vertical and horizontal movement of the points of light of which the letters are composed.

Another and larger form of this device is shown in Figure 5 in which the same message may be projected on two oppositely disposed screens. This device is constructed similarly to the projector of Figure 1, except that casing **53** is slightly larger than casing **10**, a second screen panel **54** similar to panel **19** is substituted for rear panel **14** of Figure 1 and a second source of light **55** is mounted by platform **22** adjacent said second screen panel **54**. The second source of light **55** may be a second fluorescent lamp or a tubular incandescent lamp not requiring a starter and ballast. This form of device is particularly useful when it may be placed in positions where both screens are visible, such as the top of centrally located shelving, etc., but inasmuch as such locations may not always be available and inasmuch as the owner may desire to operate only one screen at a time, separate switches may be provided for each lamp. As presently shown in Figures 1 and 5, both forms of the device have a single source of electrical current **56** coming into casing **10** and casing **53**, and a single switch **57** for controlling the lamp or lamps and motor.

Two forms of my invention have been described, one in which a moving message is projected on a single screen and one in which the message is projected on two screens, but in both of which the letters and wording of the message take on an animated appearance by such projection. It must be understood, however, that it is not intended that the scope of this invention be limited thereby, but only by the following claims.

I claim:

1. A moving message projector comprising a casing having at least one window, a translucent screen mounted in each window, a source of light within said casing, an endless opaque tape, perforations in said tape arranged in the form of letters and words, a driver roller mounted by said casing, a motor drivably connected therewith, a plurality of spindles mounted by said casing and a plurality of spools mounted by said spindles for rotation about their own axes, said spindles extending into said spools a distance of about one-half the height of said spools the peripheral surface of said spools having a crown of from 0.75° to 1.75°, and means for removably locking said spools on said spindles, said means comprising a press fit fastener adapted for insertion in the top of said spindles, said tape being wound about portions of the peripheries of said roller and said spools and thereby driven between said light source and said screen.

2. A moving message projector comprising a casing having at least one window, a translucent screen mounted in such window, a source of light within said casing, an endless opaque tape, perforations in said tape arranged in the form of letters and words, a driver roller mounted by said casing, a motor drivably connected therewith, and a plurality of spools mounted by said casing for rotation about their own axes, each of said spools having a central portion depressed to a point midway of the height of said spools, and means associated with each of said spools for removably locking said spools on said casing, each of the latter said means comprising a press fit fastener located relatively deep inside the outer shell of the respective of said spools at the depressed central portion, said tape being wound about portions of the peripheries of said roller and said spools and thereby driven between said light source and said screen, the peripheral surfaces of said spools having a crown sufficient to maintain said tape in its travel in substantial horizontal alignment with respect to said screen.

3. In a moving message projector comprised of a casing having at least one window, a translucent screen mounted in each window, a source of light within said casing, and an endless opaque tape having perforations therein arranged in the form of letters and words, means for driving said tape between said light source and said screen, said means comprising a roller, a motor drivably connected therewith, a plurality of spools mounted by spindles for rotation about their own axes, said spools having a central portion depressed to a point midway of the height of said spool and the peripheral surface of said spools having a crown of from 0.75° to 1.75°, and means for removably locking said spools on said spindles, each of the latter said means comprising a press fit fastener located relatively deep inside the outer shell of the respective of said spools at the said depressed central portion, said tape being wound about portions of the peripheries of said roller and said spools and thereby driven on a substantially horizontal plane between said light source and said screen.

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