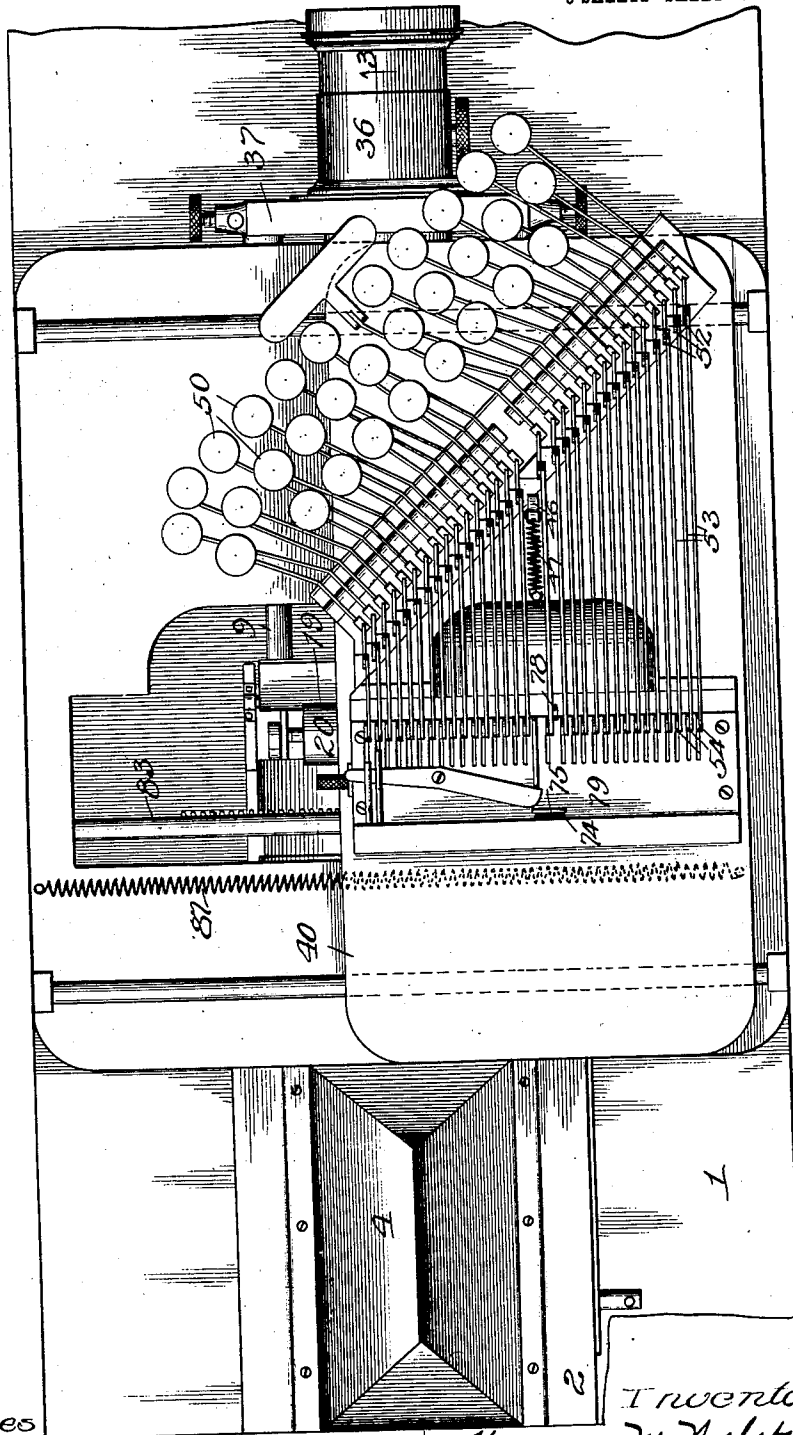


H. M. WEBSTER.
 DISPLAY APPARATUS.
 APPLICATION FILED OCT. 4, 1907.

Patented Oct. 12, 1909.
 6 SHEETS—SHEET 1.

936,497.

FIG. 1



Witnesses
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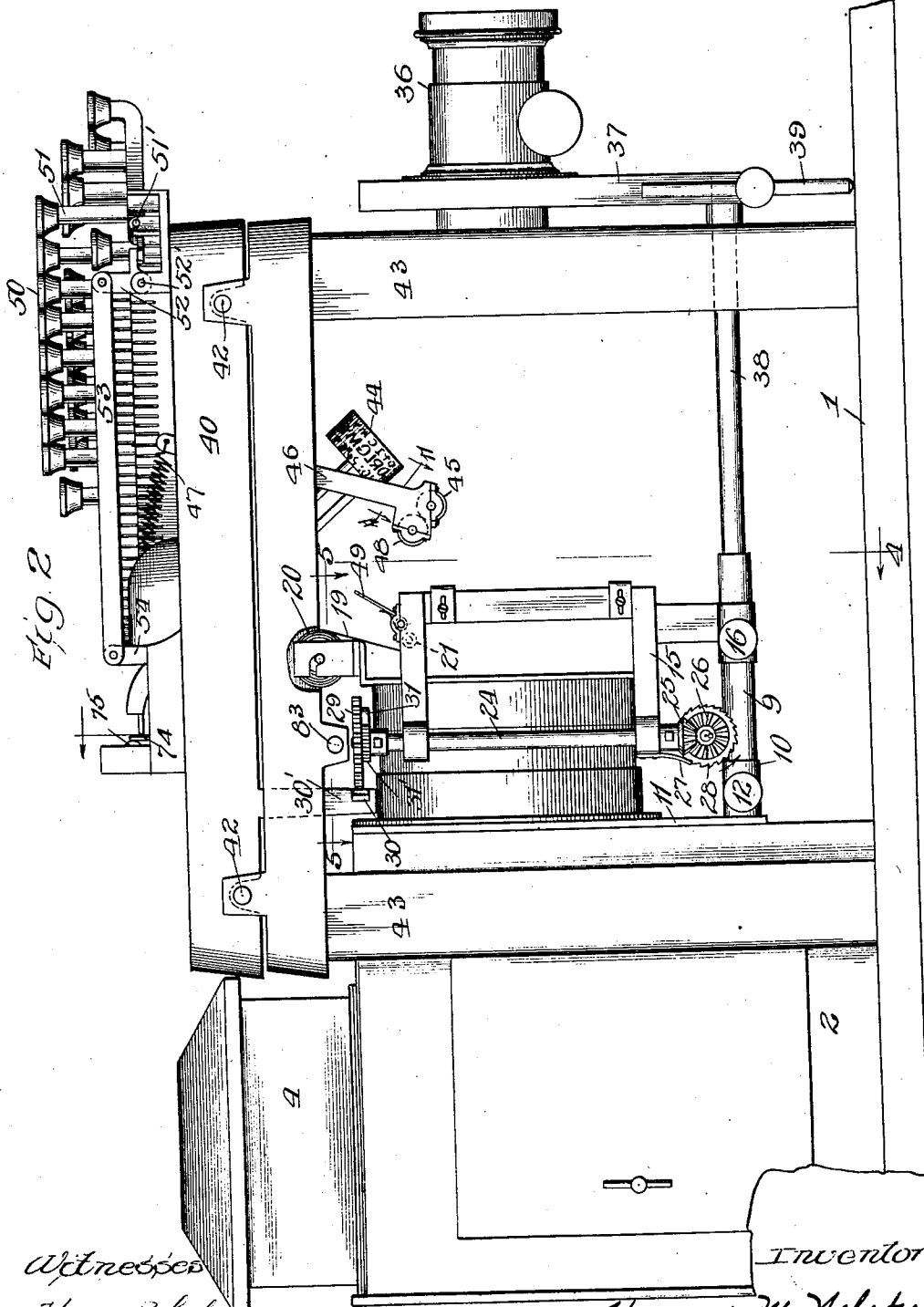
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5 SHEETS—SHEET 2.

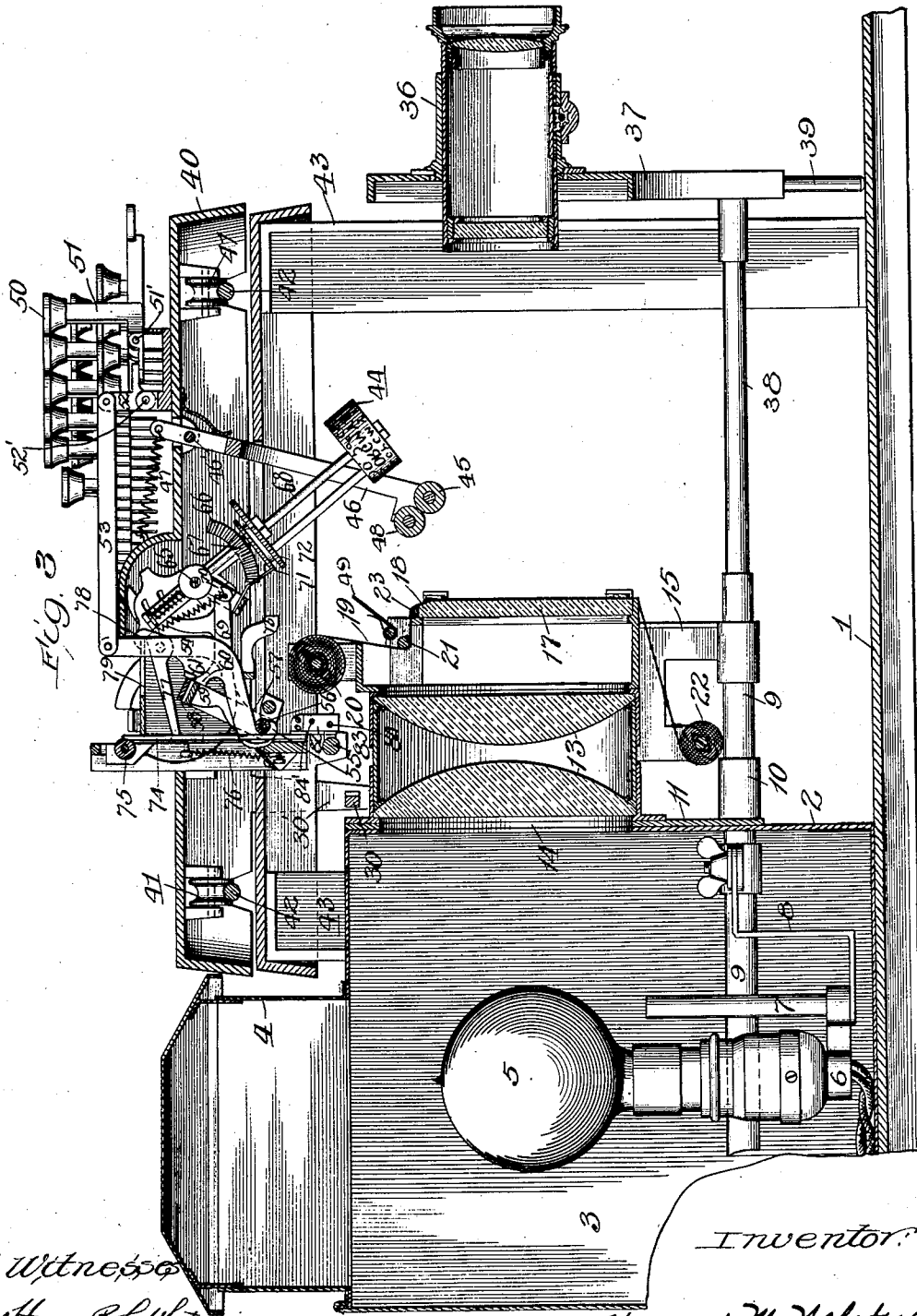
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936,497.



Witness
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 By Wm. H. Bell

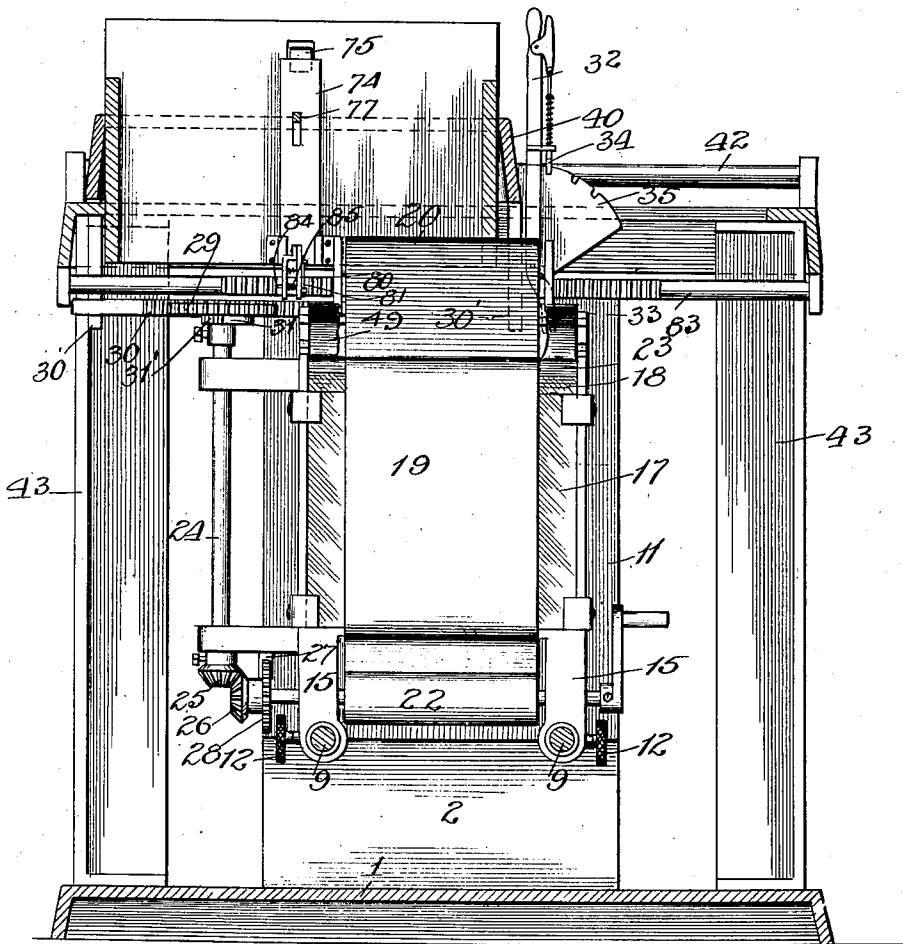
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6 SHEETS—SHEET 4.

Fig. 4



Witnesses
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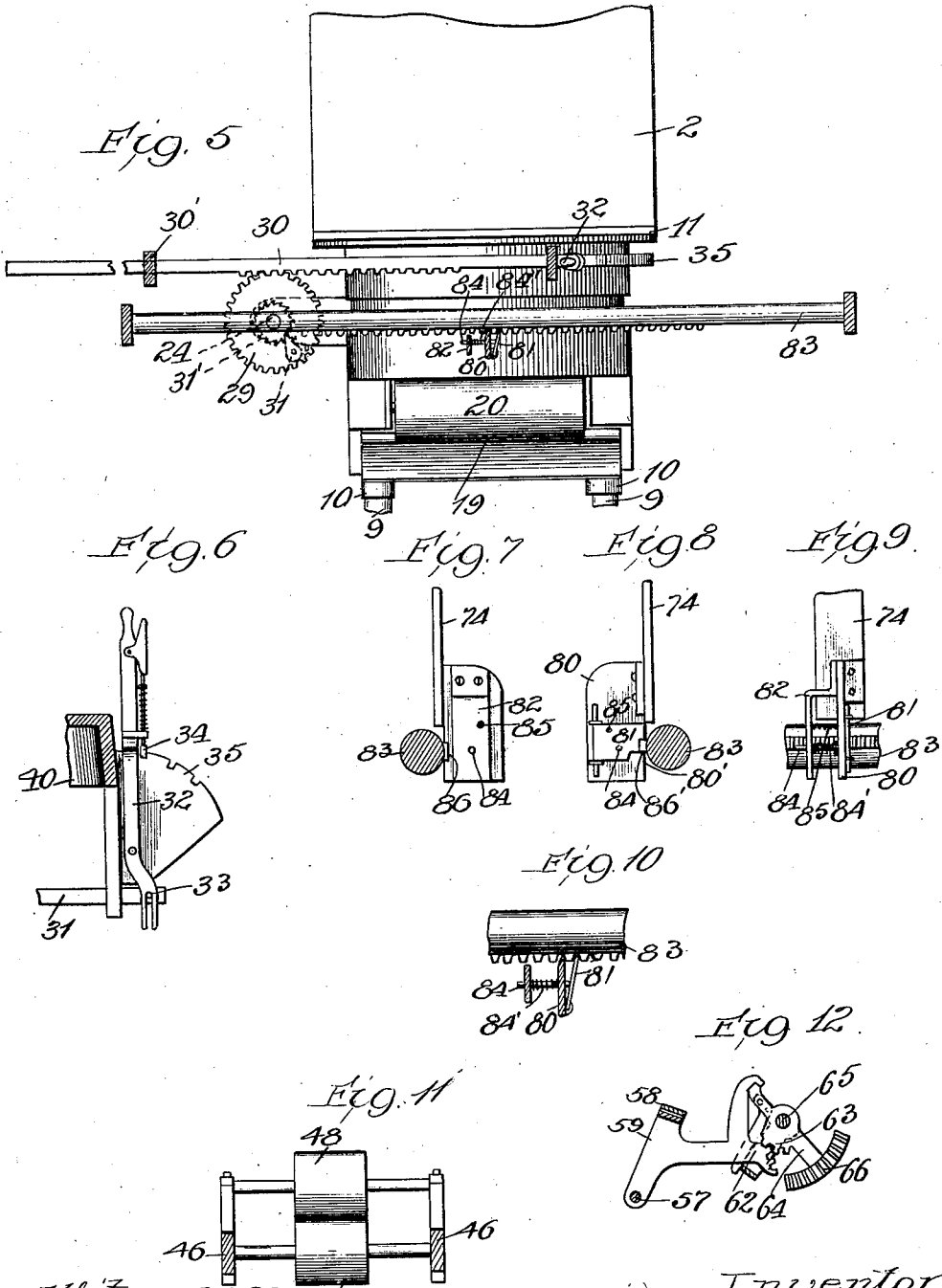
H. M. WEBSTER.
DISPLAY APPARATUS.

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Patented Oct. 12, 1909.

5 SHEETS—SHEET 5.

936,497.



Witnesses
Harry R. L. White
M. A. Kiddie

By

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UNITED STATES PATENT OFFICE.

HOWARD M. WEBSTER, OF CHICAGO, ILLINOIS.

DISPLAY APPARATUS.

936,497.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed October 4, 1907. Serial No. 395,887.

To all whom it may concern:

Be it known that I, HOWARD M. WEBSTER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Display Apparatus, of which the following is a specification.

The primary object of this invention is to display characters on a display surface at a distance as they are printed or otherwise produced.

More specifically, the invention has for its object to provide a machine for printing, stamping, stenciling or otherwise applying characters on a sheet and displaying said characters on a screen or other display surface at a distance, whereby the characters become visible on the display surface as they are produced on the sheet.

The invention may be employed for displaying advertisements, election returns, reports of ball games and other sports, speeches or any other information, and the same can be displayed on any surface on which a picture may be displayed by a magic lantern.

The invention contemplates, generically, the impression of the characters by printing on a transparent sheet or by stamping, stenciling or otherwise applying the characters on an opaque sheet, and displaying the characters on a screen as they are produced. For the purpose of this application I have shown and will describe a machine in which the characters are printed on a transparent sheet, and in the accompanying drawings Figure 1 is a top plan view of the machine. Fig. 2 is a side elevation. Fig. 3 is a longitudinal sectional view on the line 3-3 of Fig. 1. Fig. 4 is a transverse sectional view on the line 4-4 of Fig. 2. Fig. 5 is a detail sectional view on the line 5-5 of Fig. 2, showing the parts in initial position. Fig. 6 is a detail view, partly in section, showing the line spacing adjusting device. Figs. 7 to 10, inclusive, are detail views of the letter spacing devices. Fig. 11 is a sectional view on the line 11-11 of Fig. 2. Fig. 12 is a detail view of a portion of the printing mechanism.

Referring to the drawings, 1 is a base of any suitable character on which is supported a box 2 which contains a light chamber 3 and is provided with a suitably vented dome 4. A lamp 5, such as an arc light, or

an incandescent light, is arranged within the light chamber 3 on a support 6 which is adjustable vertically on a standard 7 carried by a bracket 8 adjustable longitudinally on the tubular supporting rods 9. The rods 9 project through the front of the box 2 and also through guides 10 on a face plate 11 which is fastened to the front of the box. Thumb screws 12 are provided on the guides 10 to engage the rods 9 for securing them in adjusted position. A condensing lens 13 is supported in any suitable manner adjacent to the face plate 11 and opposite the light opening 14 in said face plate and the front of the box.

A platen frame 15 is adjustably mounted on the rods 9 and secured in adjusted position by thumb screws 16. This frame supports a transparent glass plate 17 having a beveled portion 18 at its upper edge which constitutes the impression platen of the machine.

The sheet 19, on which the characters are to be printed in this embodiment of the invention, travels from a supply roll 20, under a guide roller 21, over the platen and across the face of the plate 17 to take-up roller 22. The roller 21 is mounted in the frame 15 and the rolls 20 and 22 may be mounted in said frame or in any other suitable manner. A strip of felt 23 may be located just above the platen if desired (Fig. 3) to prevent the edge of the platen from scratching the sheet as the latter is drawn thereover. After a line of characters has been printed the sheet is automatically fed from the supply roll 20 to the take-up roller 22 by a feed mechanism which comprises an upright shaft 24 (Figs. 2, 4) supported in bearings in the frame 15 and having at its lower end a bevel gear 25 which meshes with a similar gear 26 on the take-up roller. A spring pawl 27 engages a ratchet wheel 28 on the take-up roller to prevent reverse movement thereof and to hold the strip at tension. A gear 29 loosely mounted on the upper end of the shaft 24 meshes with a rack bar 30 (Figs. 4, 5) and this bar is supported in arms 30' on the carriage 40 of the printing mechanism and travels with the printing mechanism transversely across the machine from left to right in Fig. 5 and step by step as hereafter described. A spring pawl 31 on gear 29 engages a ratchet wheel 31' rigid on shaft 24 to turn said shaft when

the gear 29 is turned by the rack bar on the return movement of the printing mechanism to initial position. While the printing mechanism is moving from left to right in Fig. 5 the gear 29 turns loosely on shaft 24, but as the printing mechanism returns to initial position the spring pawl locks the gear 29 to the ratchet wheel 31' to turn the shaft 24 and feed the sheet from the supply roll to the take-up roller. The gear 29 meshes with the rack bar 30 during a portion only of the movement of the bar 31 preferably near the end of the return movement of the bar with the printing mechanism to initial position (Fig. 5), so that the sheet will be fed automatically after each line of characters is applied thereon, into position to receive another line. If it is desired to make a wider space between the lines the bar 30 may be shifted longitudinally to bring a greater number of teeth of the rack bar 30 into position for engagement with the gear 29 to turn the take-up roller a greater distance at each operation. For this purpose I provide a lever 32 (Fig. 6) which engages a pin 33 on the bar 30, and by moving the lever this bar can be adjusted longitudinally. The lever is provided with a detent 34 which engages a notched plate 35 to hold the lever in adjusted position. For ordinary purposes it will be sufficient to provide for a single space between lines and a double space to separate paragraphs, but obviously provision can be made for a greater variety of spacing if desired.

A projecting lens 36 is carried by a frame 37 which is mounted on rods 38 telescoping in the rods 9 (Fig. 3). The frame 37 is also provided with legs 39 which rest on the base 1 and these legs are adjustable vertically to secure the proper alinement of the projecting lens with the condensing lens.

As heretofore suggested, the characters may be applied to the sheet 19 in any manner which will permit them to be displayed at a distance by means of the light and the lenses. For example, a sheet of unsensitized photographic film may be employed and the characters printed thereon, preferably, with printer's ink; or the characters may be applied in the form of stencils or perforations cut or punctured in a sheet of opaque material. I will refer herein to the mechanism for applying the characters as the "printing mechanism", meaning thereby to cover any form of mechanism for applying characters to the sheet by impression or otherwise for the purpose intended. This printing mechanism may be of any suitable form but for simplicity and convenience I prefer to provide some suitable typewriter mechanism for this purpose and so far as the generic invention is concerned it is immaterial what particular kind of printing mechanism is employed. In the drawings I

have illustrated, in a general way, one form of printing mechanism which may be employed but I do not deem it necessary to show or describe this mechanism in detail as its specific construction forms no part of my invention except in the particular features hereinafter pointed out, and it will appear that these features are not dependent entirely upon the particular construction of printing mechanism herein shown and described.

The printing mechanism comprises a carriage 40 provided with rollers 41 which travel on tracks 42 mounted on a frame 43 fastened to the base 1. The carriage 40 and the printing mechanism carried thereby travel step by step transversely across the machine on the tracks 42 to print a line of characters on the sheet 19, after which the carriage and printing mechanism are returned to initial position ready to print another line of characters on the sheet. The printing mechanism selected for illustration here comprises a type wheel 44 and mechanism operated by keys to revolve the type wheel until the type corresponding to the key operated is moved into printing position and to swing the wheel against the sheet 19 to print thereon. As the type wheel swings toward the sheet 19 it engages an ink roller 45 which is supported in a frame 46 pivoted at 46' to swing on the carriage 40 and normally held by a spring 47 in position with the roller 45 in the path of movement of the type wheel. A feed roller 48 is also carried by the frame 46 and it is arranged in engagement with the ink roller 45 to supply the latter with ink and spread it evenly thereon. When the type wheel engages the ink roller and pushes the frame 46 backward the feed roller 48 will be moved into engagement with a yielding plate 49 which carries a supply of ink and is mounted on the platen frame 15.

The printing mechanism may comprise any number of keys arranged in any suitable manner. In the particular construction illustrated in the drawings each key 50 is mounted on a key bar 51 pivoted at 51' on the carriage 40 and arranged to operate a lever 52 pivoted at 52' on the carriage and connected by a link 53 with a key lever 54. This key lever has a hooked end 55 engaged with a sleeve 56 on a shaft 57 supported in the carriage 40. A yoke 58 is mounted on the shaft 57 and two yokes 59 are mounted on the sleeve 56. Only one of the yokes 59 appears in the drawings but it is believed this is sufficient for the present purpose in view of the fact that the yokes are duplicates one of the other and are employed because one yoke is not sufficient for the number of type generally provided. When the key is depressed and the key lever operated a shoulder 60 on the key lever engages a yoke 59 and

swings said yoke rearward. On the continued movement of the key lever a shoulder 61 thereon engages and swings the yoke 58 (Fig. 3). The yoke 59 is provided with an arm 62 having teeth to mesh with a toothed segment 63 on a frame 64 which is loosely mounted on shaft 65 supported in bearings in the carriage 40 (Fig. 12). The frame 64 carries a segment gear 66 which meshes with a pinion 67 on the type wheel shaft 68. As before stated there are two yokes 59 and also two frames 64, and two segments 63 and 64 arranged on opposite sides of the pinion 67. Each yoke has an arm 62 to operate a segment 63 on a frame 64, this duplication of parts being provided to avoid the necessity of revolving the type wheel more than a half turn to bring any type into operative position. It will be understood that, generally speaking, one half of the keys will operate one yoke 59 and revolve the type wheel not more than a half turn in one direction and the other half of the keys will operate the other yoke 59 and revolve the type wheel not more than a half turn in the other direction. An arm 69 on the yoke 58 is toothed to mesh with a toothed segment 70 rigid with the shaft 65. When the key is depressed the yoke 59 is first operated to revolve the type wheel until the type thereon corresponding to the key depressed is in operative position. During this movement the type wheel will swing to a more or less extent but not to printing position, this being effected when the key lever operates the yoke 58 to swing the type wheel to printing position. There is a ratchet device 71 on the shaft 68 which locks the wheel after it has been revolved to bring the proper type in operative position and there is also a toothed registering wheel 72 on the shaft 68 which engages a projection 73 on the carriage 40 for properly registering the type wheel so that it will make a clear and even impression on the sheet 19.

The printing mechanism heretofore described, with the exception of the inking device, is a commercial typewriting machine in more or less general use with some of the parts reconstructed and rearranged to adapt the same for my purpose and I make no claim of invention therein. I have demonstrated that this mechanism can be used for my purpose and while other printing mechanisms may be used I consider this one embodiment of the invention a sufficient disclosure to enable others to understand, to make and to use the same. I have devised a novel letter spacing mechanism for this printing mechanism which is shown in detail in Figs. 7 to 9 and also in Figs. 3 to 5. This mechanism comprises a vertically movable slide 74 operating against a roller 75 on the carriage 40 and normally held in lowered position by a spring 76. The slide is engaged by an arm 77 pivoted on the spacing

key lever (Fig. 3). This arm has a hooked end 78 which engages the comb plate 79, the latter forming a guide for the key levers. On the lower end of the slide 74 there is a foot 80 and on one side of this foot a wing 81 is hinged (Fig. 8) and on the other side there is a bracket 82 (Fig. 9). The wing and the bracket engage the teeth of a rack bar 83 supported in fixed position on the frame 43. A spring-pressed push rod 84 is supported in the foot 80 and bracket 82 and operates through the foot 80 and bears against the wing 81. A spring 85 is connected to the wing and to the bracket 82 to pull the wing against the push rod. The spring 84' on the push rod is stronger than the spring 85, the latter being used simply to limit the outward swing of the wing. The foot has a notch 86 in its edge which permits the foot to move with the printing mechanism longitudinally of the rack bar 83 and a distance of one tooth while the wing is engaged with a tooth. A spring 87 is fastened to the frame 43 and to the carriage 40 to pull the printing mechanism transversely across the machine. The arm 77 is pivoted on the spacing key lever so that the spacing mechanism may be operated independently and whenever a type key lever is operated for the frame 58 will swing backward in engagement with the arm and swing the latter upward thus moving the slide 74 upward. In normal position the wing 81 lies against the foot 80 and overlaps the notch 86 in the foot, as shown in Figs. 8 and 9. When the slide carries the foot upward the wing will clear the teeth of the rack bar 83 and the push rod will push it out from the position shown in Fig. 9 to the position shown in Fig. 10. At this time that portion 80' of the foot is engaged with a tooth of the rack bar 83 to prevent the printing mechanism from moving. When the spring 76 pulls the slide 74 down to its lowered position the wing will engage the tooth next to the tooth engaged by the foot, as shown in Fig. 10, and when the notch in the foot registers with the tooth of the rack bar 83 the spring 87 will pull the printing mechanism transversely of the machine and move it the distance of one tooth of the rack bar so that the spacing mechanism will move from the position shown in Fig. 10 to the position shown in Fig. 9, the foot and the wing lying close together and engaging the same tooth of the rack bar.

The invention embodies a magic lantern and a printing mechanism combined and arranged in association with an element on which the mechanism applies printing characters so that the characters may be displayed at a distance on a display surface as they are applied. It is believed that in practice it will be found more satisfactory to print the characters with opaque ink on a

transparent unsensitized photographic film as heretofore described rather than to employ an opaque material to receive the characters and apply them by cutting or stamping or puncturing the characters therein. However, it is obvious that the invention may be carried into effect in both ways and by any means which will apply the characters to the sheet in a manner which will enable them to be projected by the magic lantern on to the display surface at a distance and as the characters are applied. I therefore use the term "printing" in a somewhat broader sense than is generally understood and to mean the production of characters on a sheet either by an impression or by cutting or stamping or otherwise for the purpose herein intended. For obvious reasons it is believed to be better to provide the sheet in the form of a roll rather than a cut sheet, for with suitable feeding means the machine can be used for a longer period without changing the sheet. I refer, however, to the sheet in a broad sense as including the roll or cut sheets of transparent or opaque material. In the embodiment of the invention herein shown and described the key board is arranged in an angular position at the top of the machine and the entire printing mechanism travels across the machine as the line of characters is applied to the material but the key board may be arranged in any convenient position, and, as before stated, any kind of a key board may be employed.

In general practice the characters printed on the sheet will be projected at a distance on a screen or other suitable surface. The characters are printed upside down, in reverse position sidewise, and from left to right at the top of the sheet, that is to say at the top of that part of a sheet roll which lies within the range of the magic lantern. The characters will be displayed in correct position at the bottom of the display surface and read from left to right. After a line of characters is printed the sheet will be fed downward from the supply roll to the take-up roller but on the display surface the projected line of characters will move upward when the sheet is fed downward. Thus the last line printed will appear on the display surface at the bottom of the printed matter displayed, where it should appear, and the last word or character printed will appear at the end of the characters displayed. Each character becomes visible on the display surface at the instant it is printed, as in the visible writing type-writing machines, and this is calculated to greatly enhance the popular interest in the display. The type are normally out of the path of the light from the lamp and the printing operation is completed so quickly that the movement of the type against the sheet will

hardly be noticeable. The characters may be magnified to any desired size so that they can be easily read.

The type wheel shown in the drawings swings in an arc and I bevel the platen to provide a plane surface for the type to strike upon. The type wheel has three rows of type on its periphery and the platen is made narrow so that the type in the other rows in line with the type in printing position will not print during the printing operation.

What I claim and desire to secure by Letters Patent is:

1. In a display apparatus, the combination of a blank sheet, means for displaying type characters at a distance and as they are applied to the sheet, and means for printing said type characters on the sheet within the range of said displaying means and movable in and out of the range of said displaying means during the printing operation.

2. In a display apparatus, the combination of a blank transparent sheet, means for displaying type characters at a distance and as they are applied to the sheet, and means for printing said type characters on the sheet within the range of said displaying means and movable in and out of the range of said displaying means during the printing operation.

3. In a display apparatus, the combination of a blank sheet, a magic lantern for displaying type characters at a distance and as they are applied to the sheet, and means for printing said type characters on the sheet within the range of said displaying means and movable in and out of the range of said displaying means during the printing operation.

4. In a display apparatus, the combination of a blank transparent sheet, a magic lantern for displaying type characters at a distance and as they are applied to the sheet, and means for printing said type characters on the sheet within the range of said displaying means and movable in and out of the range of said displaying means during the printing operation.

5. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet between the lamp and the lens, and means movable in and out of the range of said lens during the printing operation for printing type characters on that part of the sheet between the lamp and the lens and while illuminated by the lamp so that said characters will be displayed as they are printed and at a distance.

6. In a display apparatus, the combination of a lamp, a projecting lens, a blank transparent sheet between the lamp and the lens, and means movable in and out of the range of said lens during the printing operation for printing type characters on that

part of the sheet between the lamp and the lens and while illuminated by the lamp so that said characters will be displayed as they are printed and at a distance.

7. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, printing means for applying characters to that part of the sheet between the lamp and the lens to read from left to right when projected by the lens on a display surface at a distance, and means for feeding the sheet so that each successive line of characters will be displayed below the preceding line.

8. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, and means movable in and out of the range of said lens for printing type characters upside down and in reverse position sidewise on that part of the sheet between the lamp and the lens and at the top thereof from left to right so that said type characters will be displayed by the lens on a display surface at a distance in proper reading position.

9. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, means located to operate within the range of the lamp and lens for printing characters upside down and in reverse position sidewise on the sheet at the top thereof from left to right so that they will be displayed by the lens on a display surface at a distance in proper reading position, and means for feeding the sheet so that each successive line of characters will be displayed below the preceding line.

10. In a display apparatus, the combination of a lamp, a projecting lens, an impression platen between the lamp and the lens, and type printing means for printing against the platen within the range of said lens.

11. In a display apparatus, the combination of a lamp, a projecting lens, a transparent plate between the lamp and the lens, a platen, and type printing means for printing against the platen within the range of said lens.

12. In a display apparatus, the combination of a lamp, a projecting lens, a transparent plate between the lamp and the lens, a platen on said plate at one edge thereof, a blank sheet on said platen, and type printing means for printing on the sheet against the platen within the range of said lens.

13. In a display apparatus, the combination of a lamp, a projecting lens, a transparent platen between the lamp and the lens, said platen having a beveled impression surface at one edge thereof, a blank sheet on said platen, and type printing means for printing on the sheet against the platen within the range of said lens.

14. In a display apparatus, the combination of a lamp, a projecting lens, an impression platen between the lamp and the lens, a blank sheet lying against said platen on the lens side thereof, and type printing means for printing on the sheet against the platen within the range of said lens.

15. In a display apparatus, the combination of a lamp, a condensing lens and a projecting lens arranged in tandem, a platen between said lenses, a sheet on the platen on the projecting lens side thereof, and type printing means movable in and out of the range of said projecting lens during each operation for printing against the sheet on the platen within the range of said lenses.

16. In a display apparatus, the combination of a lamp, a projecting lens, a platen between the lamp and lens, said platen having a beveled impression surface, and means for printing against said impression surface.

17. In a display apparatus, the combination of a lamp, a projecting lens, a transparent platen between the lamp and lens, said platen having a beveled impression surface, and means for printing against said impression surface.

18. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet between the lamp and the lens, and means for printing type characters on the sheet in lines running transversely thereof within the range of said lens and movable in and out of the range of said lens during the printing operation.

19. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet between the lamp and the lens, means located to operate within the range of the lamp and lens for printing on the sheet in lines running transversely thereof, and means for feeding the sheet lengthwise after each line is printed.

20. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet to receive the characters to be displayed, an impression platen for the sheet, mechanism for printing characters on the sheet, means for feeding the printing mechanism, a supply roll and a take-up roller for the sheet, and devices operated by said feeding means for feeding the sheet from the supply roll to the take-up roller.

21. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet to receive the characters to be displayed, an impression platen for the sheet, mechanism for printing characters on the sheet, means for feeding the printing mechanism, a rack bar traveling with the printing mechanism, a supply roll for the sheet, a take-up roller, a shaft geared to said take-up roller, and a gear on said shaft arranged to be operated by said rack bar to turn the shaft.

22. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet between the lamp and lens, and type-writer mechanism comprising a part movable in and out of the range of said lens during each printing operation for printing characters on the sheet for display by the lens at a distance.

23. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet between the lamp and lens, and type-writer mechanism comprising a part movable in and out of the range of said lens and transversely across said range to print characters on the sheet for display by the lens at a distance.

24. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet between the lamp and lens, and type-writer mechanism located above the sheet and comprising a part movable in and out of the range of said lens to print characters on the sheet for display by the lens at a distance.

25. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, and type-writer mechanism comprising printing devices normally out of the path of the light

and adapted to print characters on the sheet for display by the lens at a distance as they are printed.

26. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, a type wheel normally out of the path of the light between the sheet and the lens, and means for moving said type wheel to print on the sheet.

27. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, a type wheel normally out of the path of the light between the sheet and the lens, means for moving said type wheel to print on the sheet, and an inking device arranged in the path of movement of the type wheel to ink the type.

28. In a display apparatus, the combination of a lamp, a projecting lens, a blank sheet illuminated by the lamp, means for printing on the sheet, said printing means comprising a movable rack bar, and a device for feeding the printing means and movable relative to said rack bar.

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