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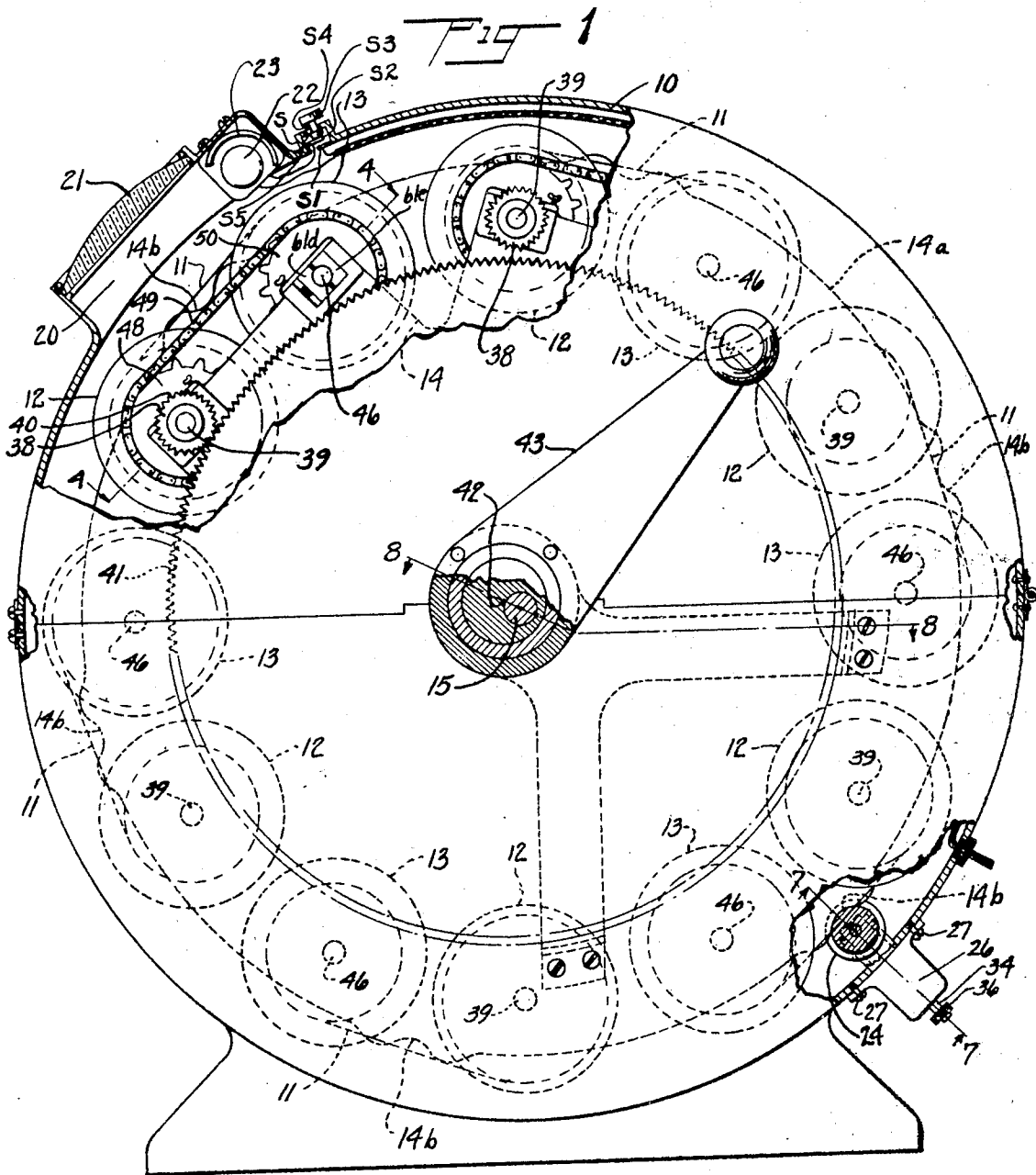
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T. A. LEWIS

DISPLAY APPARATUS

Filed April 10, 1922

3 Sheets-Sheet 1



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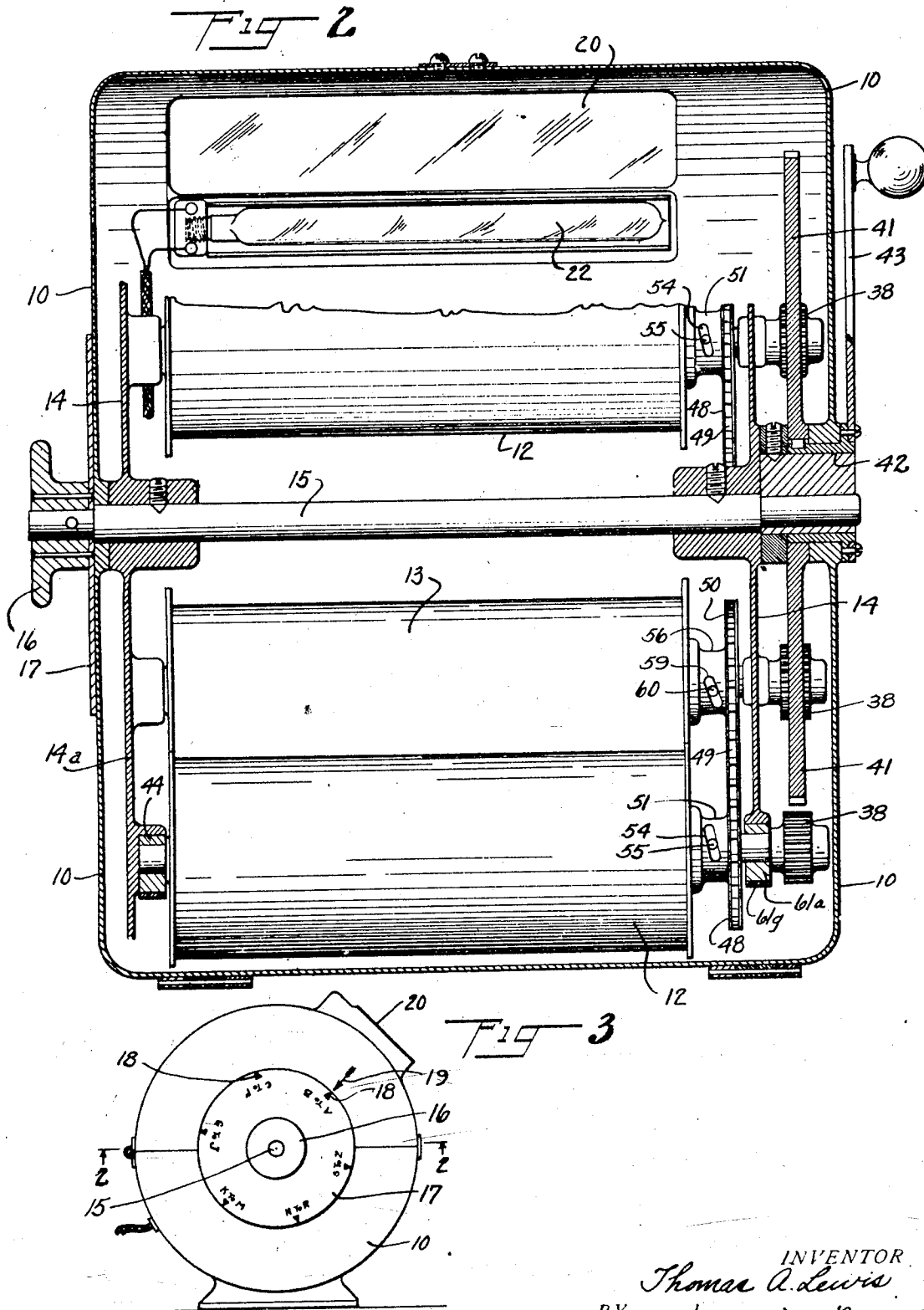
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3 Sheets-Sheet 2



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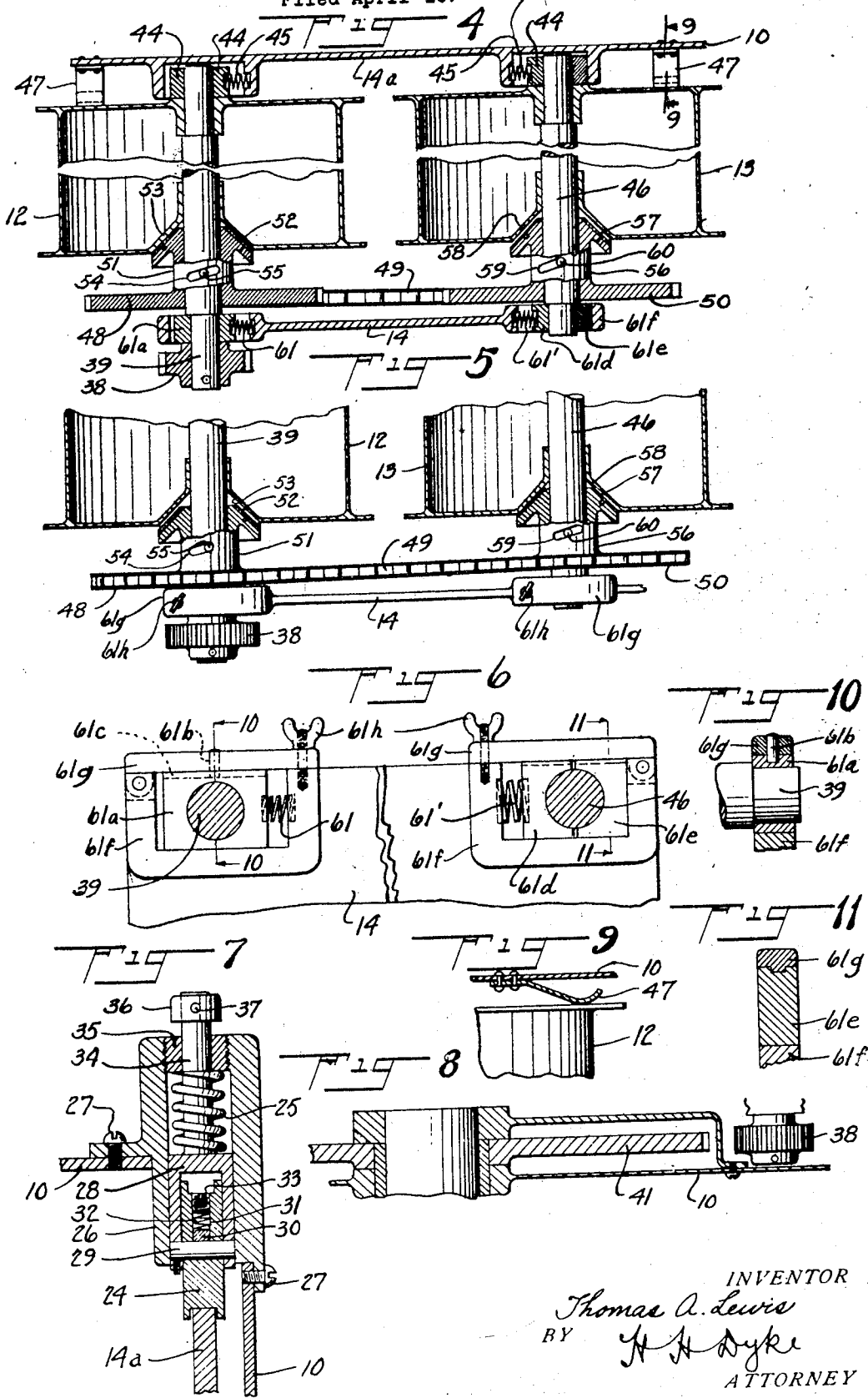
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

THOMAS A. LEWIS, OF NEW YORK, N. Y.

DISPLAY APPARATUS.

Application filed April 10, 1922. Serial No. 551,056.

My invention relates to display apparatus for readily and conveniently presenting to the eye a selected item, line or the like from a series of such items or lines. The embodiment of my invention illustrated herewith is specially adapted for the convenient location of names and telephone numbers of subscribers listed in a telephone directory, but the invention is not so limited, this particular use or embodiment being selected for illustrative purpose only. The New York city telephone directory has already outgrown the practical limits of convenient embodiment in one volume book form and, in the case of public telephone stations, for example, the telephone books, which are used indiscriminately for general directory purposes, as well as for finding telephone numbers, quickly become dirty and dog-eared, pages are torn or even removed and the finding of a telephone number therein, especially by a person of advanced years or defective sight, is often a matter of much difficulty.

In a preferred embodiment of my invention as applied to a telephone directory, the printed matter is enclosed within a casing so that it is never touched by the hand of the user, and is brought to the reading position by means of suitable mechanism operated by or under the control of the user, and at such reading position is preferably illuminated by a strong light with which suitable reflectors may be used, and is preferably viewed through a magnifying glass so that it may be read with the greatest ease, and the desired name and number obtained with complete certainty and with a minimum amount of time and trouble.

In the accompanying drawings I have illustrated a preferred form of device for use with large telephone directories. In said drawings, Fig. 1 is an end view of the apparatus, partly in section. Fig. 2 is a central vertical sectional view. Fig. 3 is a view on a reduced scale of the end opposite that shown in Fig. 1. Fig. 4 is a sectional view on the line 4—4, Fig. 1. Fig. 5 is a fragmentary view similar to Fig. 4 and showing a different relation of the parts from that shown in Fig. 4. Fig. 6 is a front view of the parts shown in Fig. 4, with the driving mechanism removed and the shafts shown in section. Fig. 7 is a sectional view taken on line 7—7, Fig. 1. Fig. 8 is a sectional view taken on the broken line 8—8, Fig. 1. Fig. 9 is a sectional detail view taken

on line 9—9, Fig. 4. Fig. 10 is a sectional detail view taken on line 10—10, Fig. 6, and Fig. 11 is a sectional detail view taken on line 11—11, Fig. 6.

Reference character 10 indicates the casing here shown as cylindrical in form. For convenience of access it may be made in two parts hinged together and locked. The printed telephone directory, usually comprising four columns, is subdivided into parts of convenient size by being printed on a number of strips 11 of paper, cloth or the like. In the form shown there are six such strips 11 upon which the directory is substantially equally distributed. For each strip 11 there is provided a pair of rollers 12, 13, and by winding the strips 11 off one of the rollers and on to the other, any line of the directory can be located as desired.

The rollers 12, 13 are mounted so as to be selectively presented at the reading point, as by being mounted in a rotatable cage 14 of the type known as a squirrel cage. The shaft 15, fixed to the squirrel cage 14 to turn therewith, extends through the casing 10 and is provided at one end of the casing with a knob 16 adapted to be grasped by the hand of the user, and whereby the cage 14 can be turned to any desired position. Fixed to rotate with the shaft 15 and knob 16 is a plate or disk 17, on which the subdivisions of the entire series or list corresponding to the various strips 11 and pairs of rollers are indicated. In the form shown in which there are six sets of rollers, the telephone directory is divided into six substantially equal parts, as A to B, C to F, etc., and by turning the cage 14 and disk 17 so that the marker 18 on the disk 17 for any particular subdivision comes opposite the arrow 19 on casing 10, the corresponding portion of the list on the particular strip 11 is brought under the window 20, so that it may be observed therethrough, a magnifying glass 21 being preferably provided to give a magnified view of the printed matter, thus permitting a corresponding reduction in size of the printed matter by photo-engraving or similar means, whereby the printed strip or roll and the apparatus may be made desirably compact and of relatively small dimension. Adjacent to the window 20 is placed a lamp 22, preferably an electric lamp, and suitable reflectors may be provided, such as indicated at 23. The lamp is preferably lighted automatically by any suitable make and break

- arrangement when the strip is brought to reading position, or other means for turning the light off and on may be resorted to. In Fig. 1 I have shown a manually operable
- 5 switch S, comprising a fixed contact member S¹ and a spring contact member S² normally separated and adapted to be brought into contact by a push button S³, which has a pin S⁴ adapted to pass through the slot S⁵.
- 10 With this arrangement the user may hold the push button down to secure a light while reading or may turn same so that the circuit may be temporarily locked closed by the pin S⁴, and released by counter rotation of the
- 15 push button.
- Means is provided for releasably holding the cage in the various adjusted positions in which the strips upon their rollers are exposed to view through the window, and in
- 20 the form shown, I have provided one of the end disks 14^a of the cage 14 with a series of notches 14^b which are adapted to engage a roller 24 mounted in the casing and adapted to be forced inwardly by means of the
- 25 spring 25. In the form shown, the roller 24 is mounted in a small casing of its own, indicated by the numeral 26, and attached as by screws 27 to the principal casing 10, and containing the slide 28 in which roller
- 30 24 is adapted to turn on a shaft 29 fixed in slide 28. Roller 24 preferably has a slight frictional engagement with such shaft 29 as, for example, a shoe 30 received in an opening 31 in the roller 24 may be held in frictional engagement with shaft 29 by the
- 35 spring 32 adjustably held in place by means of the screw plug 33. The spring 25 encircles the shank 34 of slide 28 and is adjustably held down by means of the perforated screw plug 35. Inward movement of the slide 28 is limited by the collar 36 fastened as by means of a pin 37 upon the projecting end of shank 34. Collar or head 36 is exposed at the exterior of the casing as
- 40 shown in Fig. 1, so as to be accessible, and if desired may be pulled outwardly to facilitate the turning of knob 16 and cage 14, but ordinarily this will be unnecessary and a moderate amount of force applied to the
- 45 knob 16 will be sufficient to move the roller 24 in and out as the various notches 14^b are engaged thereby. The roller 24 in the form shown is placed diametrically opposite the window 20, but it will be apparent that it could be arranged in various other positions, so long as the cage is stopped and held
- 50 thereby with the strip and pair of rollers corresponding to the marking 18 opposite arrow 19 in position beneath the window.
- 55 Means is provided for operating the rollers to display the various portions of the strips and such means is preferably automatically brought into engagement with the rollers or one of the rollers of the pair by
- 60 bringing such pair of rollers and strip 11 thereon into the reading position. In the form shown, one of the rollers of each pair, namely, the roller 12, has a pinion 38 attached to the shaft 39 upon which roller 12 turns freely, and such pinion 38 is provided
- 70 with preferably sharp pointed teeth 40 adapted to engage similar teeth upon a gear wheel 41 which is mounted eccentrically in the casing at 42 and is provided with a crank 43 extending outside of the casing where it
- 75 can be operated by the user. The eccentric displacement of gear wheel 41 is toward the side of the casing where window 20 is located, so that pinions 38 come into mesh therewith as the window is approached in
- 80 their radial movement with the cage, and out of mesh therewith upon passing beyond or away from such position.
- Means is provided whereby rotation of the crank 43 and, therefore, of the particular
- 85 pinion 38 meshed therewith, in either direction, serves to wind up the strip 11 upon one or the other of the rollers, and whereby a suitable frictional retardation is applied to the roller from which the strip is being un-
- 90 wound, so that the strip may be readily wound from either roller to the other and at the same time held from running loose or becoming slack. In the form shown, shaft 39, to which the actuating pinion 38
- 95 is secured, runs loose in the roller 12 and is mounted between friction bearing members 44, 44 which are held together by spring 45, thereby frictionally opposing to some extent the free rotation of shaft 39. The shaft
- 100 46 of roller 13 has a similar friction bearing and turns loosely in its roller 13. Means such as leaf springs 47, 47 is provided for imposing a slight frictional retardation to the rotative movement of rollers 12 and 13.
- 105 Means is provided for imparting rotation from shaft 39 to the driven shaft 46 and, in the form shown, shaft 39 has a sprocket wheel 48 mounted thereon which is connected by sprocket chain 49 to the sprocket wheel
- 110 50 on shaft 46. Clutch members are provided for clutching the sprockets 48 and 50 to the respective rollers 12 and 13, so that when the pinion 38 is turned in one direction the strip 11 will be rolled up on roller 12, for
- 115 example, and unrolled from roller 13, and when pinion 38 is turned in the opposite direction, the reverse operation will take place. In the construction illustrated, the hub 51 of sprocket wheel 48 is provided with
- 120 a preferably conical clutch surface lined with leather or the like 52 adapted to engage a similarly shaped recessed surface 53 in the roller 12, and the said hub 51 is provided with a spiral slot 54 in which is received the pin 55 secured to shaft 39, and which serves both to limit the turning movement of the sprocket on the shaft and to operate the clutch. Hub 56 of sprocket
- 125 wheel 50 has a similar clutch surface 57 en-
- 130

gaging clutch surface 58 of roller 13, and is provided with a slot 59 similar to slot 54 which receives the pin 60 fixed on the shaft 46. Chain 49 and paper strip 11 are held taut by means of springs 61, 61' interposed between the shaft 39 and 46, as shown in Fig. 4. Spring 61 exerts its action through the plain bearing 61^a which is slidable as shown in Figs. 6 and 10, the pin 61^b fitting in the slot 61^c in the bearing member 61^a. The bearing for shaft 46 is split, being made up of parts 61^d and 61^e, and spring 61' serves to impose an additional friction on shaft 46, as well as to assist in holding shafts 39 and 46 apart. The bearings are preferably mounted in holders 61' with hinged tops 61^f, which may be secured in place by means of thumb screws 61^h so that the rollers may be readily removed when strips 11 are to be replaced.

The operation of the apparatus will now be readily understood. In order to locate a particular name and telephone number or other item in the series, the proper pair of rollers is first brought opposite the window by rotation of knob 16 and held there by the roller 24 engaging the appropriate notch in the cage 14. This same movement serves to bring a toothed pinion 38 into operative engagement with the large gear 41. A glance through the window will readily show whether the strip 11 mounted on rolls 12 and 13 must be turned forward or back to locate the desired item, and the crank 43 is then turned in the appropriate direction. If the toothed pinion 38 on shaft 39 is turned in the direction to move the pin 55 to the left as shown in Fig. 4, such movement results in bringing the clutch surfaces 52, 53 into engagement and imparting rotation to the roll 12, whereby the strip 11 is rolled up on roller 12 and is unrolled from the roller 13, which turns freely on shaft 46, except for the frictional retardation of spring 47, the clutch members 57, 58 being held out of engagement by the hub 56 of sprocket 50 being turned toward the left with respect to pin 60, thereby moving the hub 56 and its clutch surface 57 away from the roll 13.

Rotation of toothed pinion 38 in the opposite direction has the reverse effect, namely, the pin 55 being moved toward the right in Fig. 4 serves to disengage clutch surfaces 52 and 53, and hub 56 of sprocket 50 being rotated in the same direction, pin 60, engaged by slot 59 and frictionally held to some extent by springs 45 and 61', serves to bring the friction surfaces 57, 58 for roller 13 into coacting engagement, thereby rolling strip 11 upon roller 13 and unrolling it from roller 12, which moves freely except for the slight frictional retardation of spring 47. Other forms of clutching devices may be resorted to, if desired. The slight disalignment of sprocket wheels 48 and 50, which

results from the clutching action described, is so inconsiderable so as not to interfere with the driving of the parts by means of the sprocket chain in the manner described.

It will be seen that with apparatus in accordance with my invention it becomes possible to readily subdivide any list or series of items as, for example, the names, addresses, etc., of a telephone directory, to any desired extent, by merely providing any number of sets of rollers 12 and 13 as may be desired; that the particular subdivisional part can be quickly brought to reading position; that by merely cranking the device the strip on which the items are printed can be rotated in either direction and the particular name or item or line brought to reading point in simple and rapid manner; that the same may be illuminated as it is read and also read under magnification as the strip is held taut and kept from becoming slack; and that the printed matter is never touched by the hands of the user, but is completely enclosed and covered up at all times so that there is no occasion for same to become dirty or for the readable character thereof to deteriorate in any way. When replacement of strips is to be made same can be easily removed and a new strip substituted therefor with a minimum of trouble, and no particular adjustment is necessary except that the space provided on the roller shall be sufficient for the accommodation of the strips secured thereon.

Modifications and changes from the particular form selected for illustration may be resorted to within the scope of my claims by which my invention is defined.

I claim:

1. A casing, a window therein, a rotatable cage in the casing, a plurality of pairs of rollers arranged substantially peripherally of the cage, means for turning the cage to bring the roller pairs selectively opposite the window, and means automatically brought into operation upon bringing a pair of rollers opposite the window for imparting rotation to the rollers of the pair.

2. A casing, a window therein, a rotatable cage in the casing, a plurality of pairs of rollers arranged substantially peripherally of the cage, means for turning the cage to bring the roller pairs selectively opposite the window, a pinion for turning the rollers of each pair, and a gear wheel mounted eccentrically to the cage axis and adapted to operatively engage the roller pinion only when the corresponding pair of rollers is opposite the window.

3. A casing, a window therein, a rotatable cage therein, a plurality of pairs of rollers arranged substantially peripherally about the cage, means for turning the cage to bring said rollers selectively opposite the window, means extending to the exterior of

the casing to rotate the cage, a series of notches in the cage, and spring held means on the casing to engage said notches and hold the cage releasably with a pair of rollers

5 opposite said window.

4. A casing, a window therein, a cage rotatably mounted in the casing, a plurality of pairs of rollers arranged substantially peripherally about the cage, a plurality of
10 notches in the cage, and a spring plunger adjacent to the cage and adapted to engage the notches to locate the pairs of rollers selectively opposite said window.

5. In display apparatus, a pair of rollers
15 for having a strip wound thereon, shafts on which the rollers may turn, means for rotating said shafts in the same rotative direction, including sprockets on said shafts, a sprocket chain running on said sprockets,
20 and clutch means comprising conical recesses in said rollers and conical hubs on said sprockets and including a pin and spiral slot connection for imparting rotation to one of said rollers with its shaft when the roller
25 shafts are rotated in one direction and for imparting rotation with its shaft to the other roller when the shafts are rotated in the opposite direction.

6. A casing, a window therein containing
30 a magnifying glass, a rotatable cage in the

casing, rollers radially arranged in the cage to carry strips or sheets of reading matter, means for turning the cage to bring the rollers selectively opposite and under the window and magnifying glass, an indicator
35 disc with operating means, cylinders to operate loosely on shafts, an eccentrically mounted gear, one shaft of each pair of cylinders carrying a pinion which automatically meshes with said eccentrically mounted
40 gear, sprocket wheels and chains connecting the cylinder shafts, shafts carrying right and left cam clutches loosely mounted and driven by pins on shafts enabling the operator at will to turn right or left, thus making
45 the cylinders alternately a driver or an idler, thereby automatically taking care of the difference of speed of strip on the cylinders as the diameters increase or decrease
50 by rolling from one to the other thus preventing a slack in strip, means for checking or braking speed of cylinders when idling, spring means for keeping the strip taut on the cylinders, and means arranged to light
55 the strip when automatic lock operates to locate strip under magnifying glass.

In testimony that I claim the foregoing, I have signed my name hereto.

THOMAS A. LEWIS.