

April 21, 1936.

G. J. CHAPMAN

2,037,705

DIRECTORY

Filed Dec. 5, 1934

4 Sheets-Sheet 1

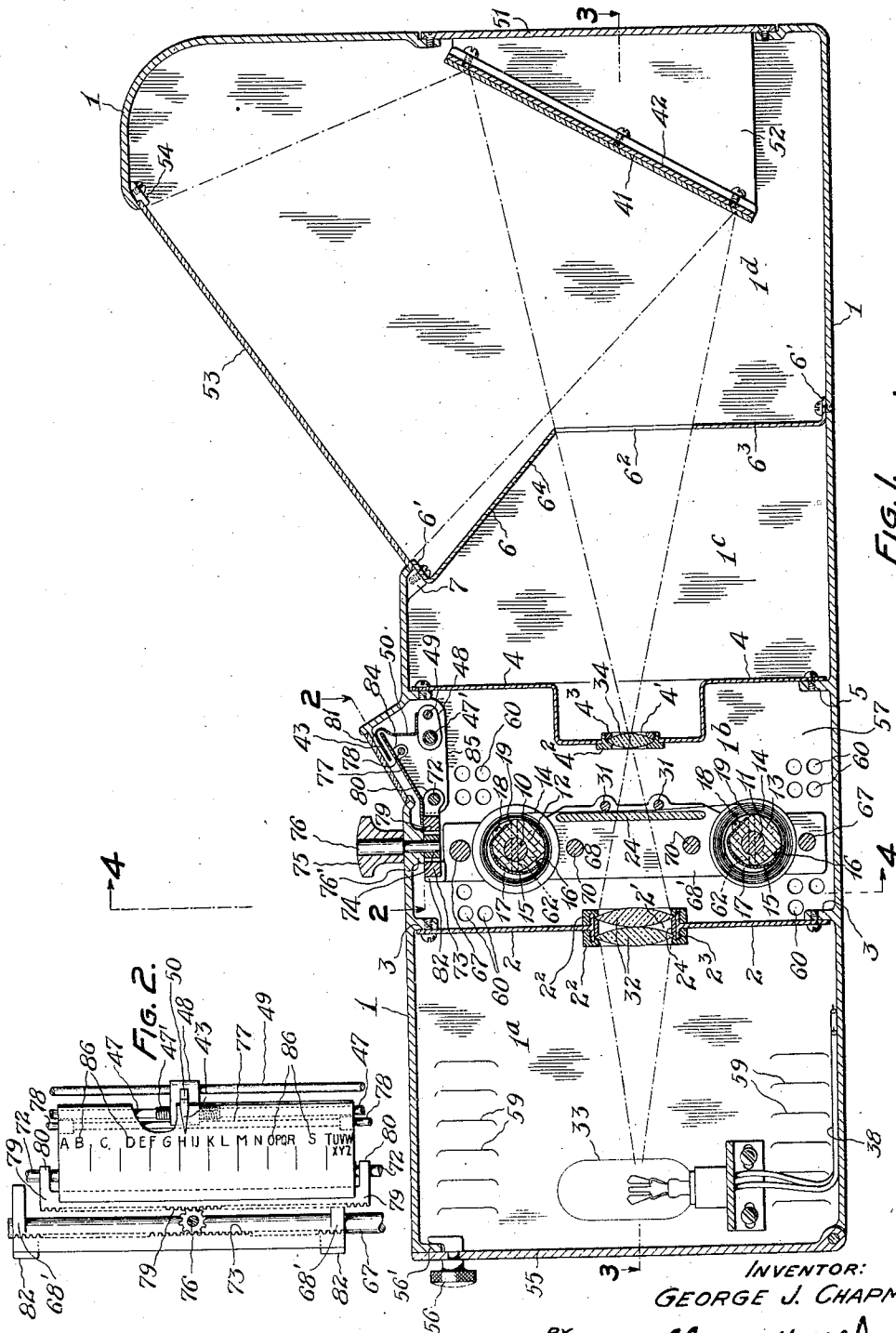


FIG. 1.

FIG. 2.

INVENTOR:
GEORGE J. CHAPMAN

BY *Saywell and Wesseler*
ATTORNEYS

April 21, 1936.

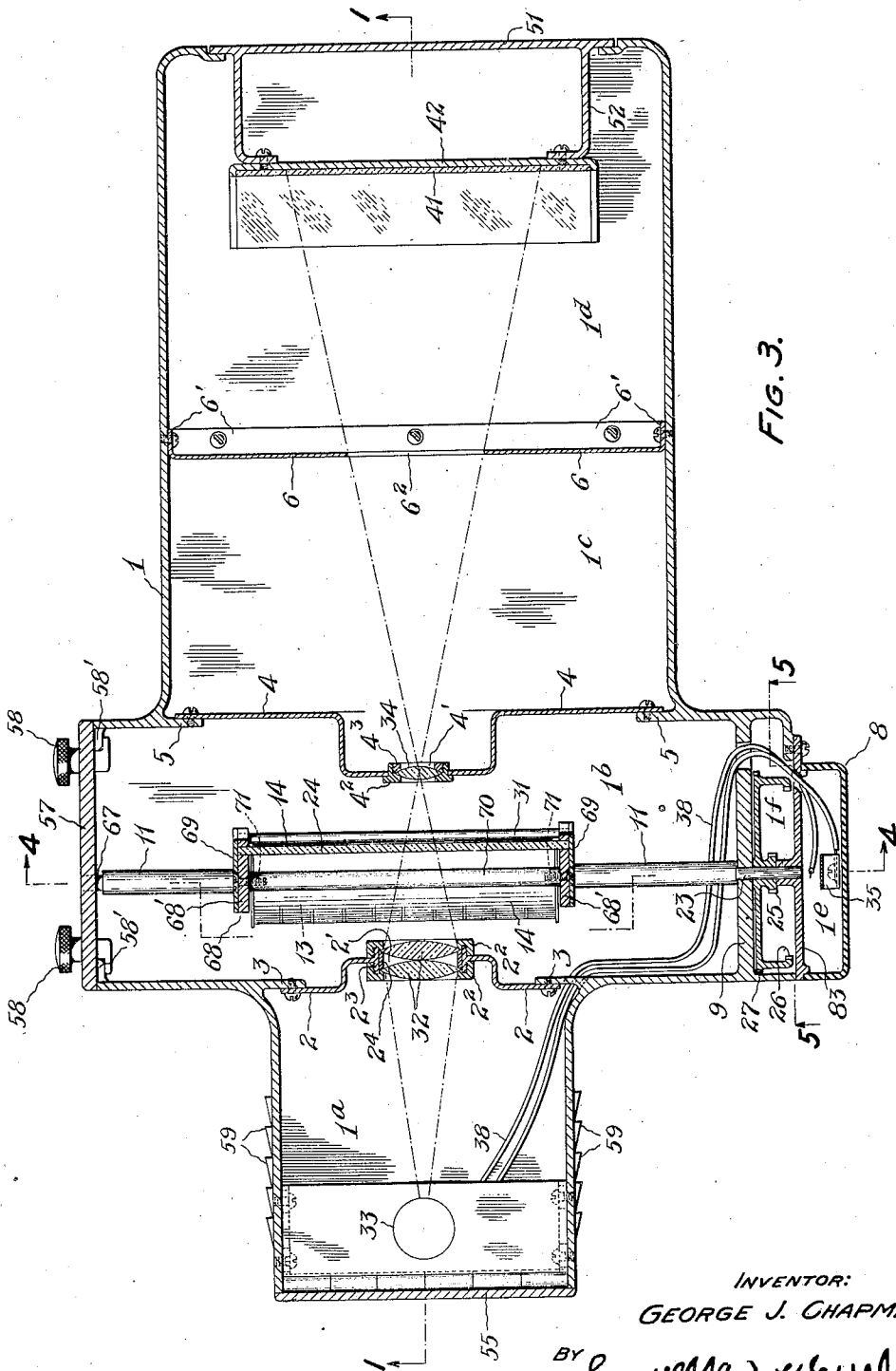
G. J. CHAPMAN

2,037,705

DIRECTORY

Filed Dec. 5, 1934

4 Sheets-Sheet 2



INVENTOR:

GEORGE J. CHAPMAN

BY

Sagwell and Wesseler
ATTORNEYS

April 21, 1936.

G. J. CHAPMAN

2,037,705

DIRECTORY

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4 Sheets-Sheet 3

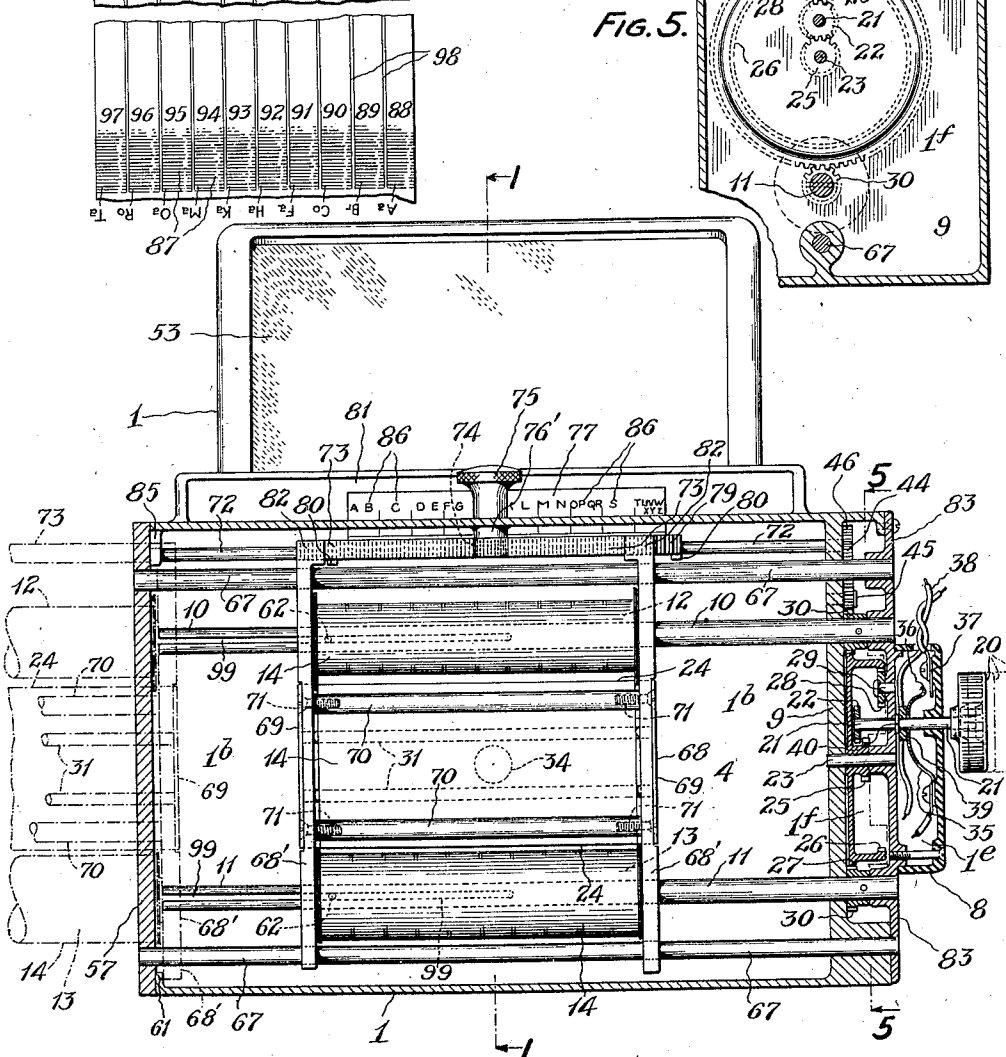
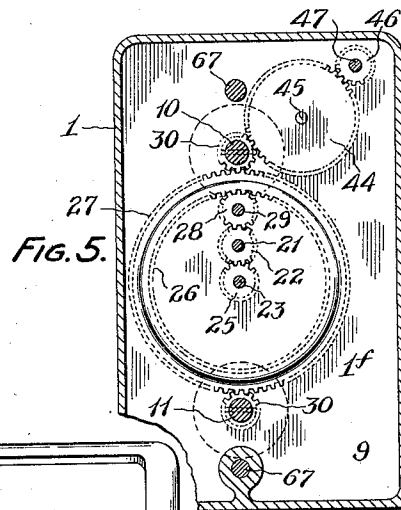
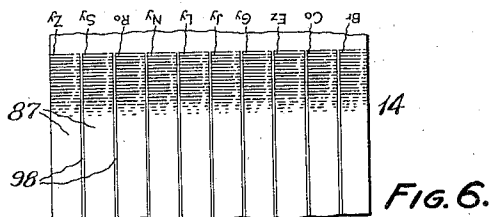


FIG. 4.

INVENTOR:

GEORGE J. CHAPMAN

BY *Saywell and Wesseler*
ATTORNEYS

April 21, 1936.

G. J. CHAPMAN

2,037,705

DIRECTORY

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4 Sheets-Sheet 4

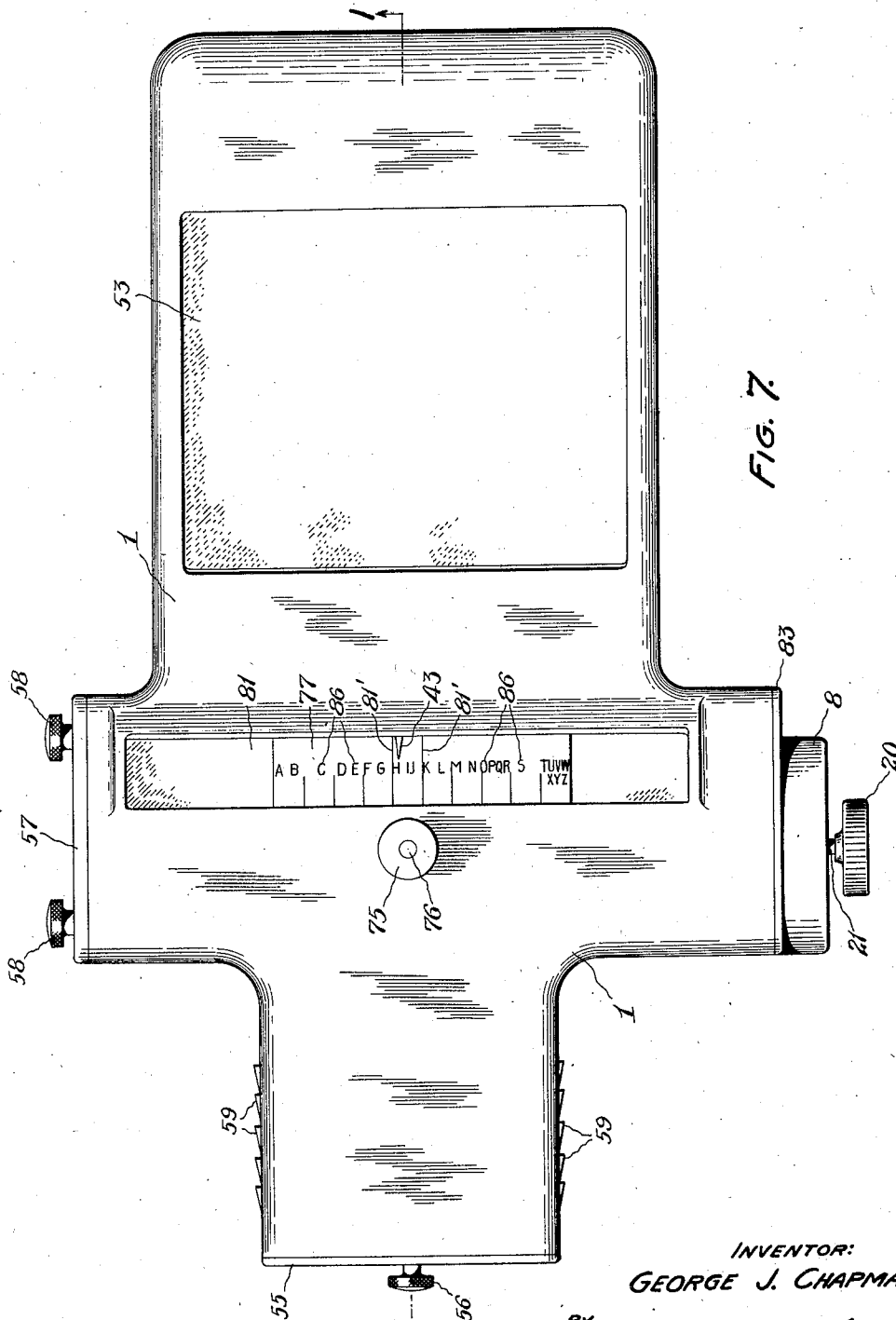


FIG. 7.

INVENTOR:
GEORGE J. CHAPMAN
BY *Saywell & Kessler*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,037,705

DIRECTORY

George J. Chapman, Shaker Heights, Ohio

Application December 5, 1934, Serial No. 756,161

11 Claims. (Cl. 40-95)

My invention particularly relates to directories of the character shown and described in my application for United States Letters Patent Serial No. 703,746, which issued as Patent No. 1,988,162.

5 These directories have the tabulated and classified data thereof displayed on flexible films in small characters so as to permit the inclusion of a large amount of such data in small compass. Preferably, the data is displayed in such small
10 characters as to require lenses of high magnifying power readily to locate and accurately to read the desired information. Part of the improvements of the instant application comprise a different arrangement of magnifying means than
15 that shown in said application. Other improvements in directories of this character presented by the instant application, over and above those shown and described in said application, relate to the adjustment of the small characters for the
20 purpose of bringing into the proper field the particular characters which are sought at any one time; the arrangement of the small characters upon the film or ribbon upon which they are displayed; the construction of the casing in which
25 the several supporting and operating elements are mounted; and the mechanism for indicating the position of the film or ribbon upon which the small characters are displayed.

My invention lends itself for use in many fields
30 which require directories or indices, but I have found my invention particularly adaptable for use as a telephone directory, so that the principle of my invention is illustrated in this application by reference to such a directory.

35 The annexed drawings and the following description set forth in detail certain means embodying my invention, such means disclosing, however, but one of the various forms in which the principle of the invention may be embodied.

40 In said annexed drawings:

Figure 1 is a vertical longitudinal section of my improved directory, taken in the plane indicated by the line 1-1, Figures 3, 4, and 7;

45 Figure 2 is a fragmentary plan section, taken in the planes indicated by the line 2-2, Figure 1, the upper wall of the casing being omitted;

Figure 3 is a plan section, taken in the plane indicated by the line 3-3, Figure 1;

50 Figure 4 is a transverse vertical section, taken in the plane indicated by the line 4-4, Figures 1 and 3, the film-loading position of certain elements being indicated in dot-and-dash lines, three positions of a certain hand wheel for actuating certain film-moving mechanisms being
55 shown in this figure;

Figure 5 is a fragmentary vertical longitudinal section, showing drive gearing for film rolls, the section being taken in the plane indicated by the line 5-5, Figures 3 and 4;

Figure 6 is a broken developed elevation of the 5 film or ribbon upon which the minute-sized tabulated data, such as the names of the telephone users, and their respective telephone numbers, is displayed, the view showing the data on the film in that arrangement which it has when in film-
10 feeding position in the directory, this arrangement being opposite to that, both lengthwise and crosswise, which is seen in the magnified image by the directory operator; and

Figure 7 is a plan view of the casing in which 15 the supporting and operating mechanisms of my directory are mounted.

Referring to the annexed drawings, in which the same parts are indicated by the same respective numbers in the several views, a casing 1, of 20 the general outline in plan indicated in Figure 7, is provided with a transverse partition 2, Figures 1 and 3, secured adjacent its outer edge to a flange 3 formed interiorly of the casing 1, said partition 2 having a central circular opening 25 2' bounded by a two-part ring 2² of which the parts have screw-threaded engagement with a flange 2³ formed on the partition 2 at the edge of the opening 2', the assembly, in combination with a lens-spacing ring 2⁴, forming a support 30 for a pair of double convex lenses 32, whose purpose will be hereinafter fully described. The transverse partition 2 defines a chamber 1^a at the front end of the casing 1.

A second transverse partition 4 defines a casing 35 chamber 1^b, said partition 4 being secured adjacent its outer edge to a flange 5 formed interiorly of the casing 1, said partition 4 having a central opening 4' within which is mounted a double convex lens 34, through the medium of a 40 ring 4², of T-shaped cross-section, the exterior surface of the stem of which abuts that wall of the partition 4 which bounds the opening 4', and the interior surface of which stem is threaded to accommodate an externally-threaded annular 45 washer 4³, as clearly indicated in Figures 1 and 3.

Another transverse partition 6 secured at its outer edge by a flange 6' to the interior face of the casing 1 defines a third casing chamber 1^c; 50 as also, a fourth chamber 1^d at the rear end of the casing 1. Said partition 6 is formed with a central opening 6², and is an angular member, as clearly indicated in Figure 1, of which one part 6³ extends at substantially right angles to the 55

planes of the side members of the casing 1, and another part 6⁴ extends at substantially a 45° angle to the portion 6³ and is secured by the flange 6' to the inner surface of the casing 1 through the medium of a lug or lugs 7 secured to and extended inwardly of the top of the casing 1.

Extended outwardly from one side of the casing 1 is a cap-like wall 8, Figures 3 and 4, forming a chamber 1^a, and extended lengthwise of the casing chamber 1^b is a partition 9 adjacent to but inwardly spaced from the chamber 1^a and forming a parallel adjacent chamber 1^c. The cap 8 is mounted upon a removable casing side wall 83 which covers the chamber 1^c and also provides access thereto.

Mounted upon a pair of vertically-spaced transverse shafts 10 and 11 rotatably mounted at one end in one side wall of the casing 1 and disposed in the chamber 1^b, are a pair of rollers 12 and 13 upon one of which, when the rollers 12 and 13 are rotated, a flexible film or ribbon 14 is adapted to be wound, and from the other of which rollers the ribbon 14 is adapted to be unwound, this ribbon 14 displaying in small characters the names of the telephone users and their respective telephone members, or any other suitable indicia for the location and inspection of which my improved directory is used. The roll shafts 10 and 11 are rotatably supported in a traveling carriage 68 within which the rolls 12 and 13 are located, the roll shaft 10 and 11 having free ends extended laterally from one side of the carriage 68 in the operative position of the rollers 12 and 13, as will be hereinafter fully described. The rolls 12 and 13 are rotated by means hereinafter fully described, and are turnable in either direction up to the limits of the ribbon length, to unwind the ribbon 14 from one roll and to wind it upon the other. The respective ends of the ribbon 14 are secured to the rolls 12 and 13 by means of spring plate fasteners 15, Figure 1, having claws 16 at the free ends thereof which grip the respective ribbon ends and thus resiliently hold the ribbon, the spring fasteners 15 being secured at their other ends by screws 18 to plane chord-like portions 19 formed upon the rolls 12 and 13, these spring fasteners 15 being contained within narrow recesses 17 formed in the rolls 12 and 13.

Exterior manual control of the rotation of the rolls 12 and 13 is afforded by a hand wheel 20, Figure 4, secured to the outer end of a shaft 21 mounted in the cap member 8 and in the adjacent side wall 83 of the casing 1, and extended through the chamber 1^a and into the chamber 1^c. The shaft 21 is laterally movable inwardly and outwardly of the chambers 1^a and 1^c by pulling upon or pushing the hand wheel 20, in addition to being rotatable by the hand wheel 20, and in three of its lateral positions, the shaft 21 is effective for certain operations in the manipulation of the directory, as hereinafter fully described. A pinion 22 is secured to the inner end of the shaft 21. Mounted upon a pin 23 secured in the partition 9 and the adjacent casing side wall 83 is a unitary transmission unit consisting of a central pinion 25 and laterally opposed internal and external gears 26 and 27, respectively. Engaging the internal gear 26 is an idler pinion 28 mounted upon a pin 29 supported in the side wall 83. The three lateral positions of the shaft 21, hereinbefore mentioned, effective for the use of the directory, are as follows: First, the hand wheel 20 secured to the shaft 21 is shown in full lines in Figure 4 in an idle position which is effective for main-

taining a lamp 33 turned off, as hereinafter fully described; secondly, an intermediate position of the shaft 21, shown by dotted lines in Figure 4, engages the driven pinion 22 with the pinion 25 to effect the rotation of the internal and external gears 26 and 27 at a certain speed; and thirdly, an outer position of the shaft 21, shown in Figure 4 by dot-and-dash lines, effects the engagement of the driven pinion 22 with the idler pinion 28 to effect a rotation of the internal and external gears 26 and 27 at a certain speed materially slower than that effected by the intermediate position of the shaft 21 shown in dotted lines in Figure 4. It is evident that both the internal gear 26 and the external gear 27 rotate together at both speeds, since they are both parts of a unitary transmission element which also includes the pinion 25. That the rotation of the internal and external gears 26 and 27 effected by the intermediate position of the shaft 21, when the driven pinion 22 and the pinion 25 are engaged, is materially faster than the rotation of said gears effected by the outer position of the shaft 21, when the driven pinion 22 and the idler pinion 28 are engaged, is clearly evident from the showing of the drive gearing indicated in Figure 5. The purpose of these differential speeds will be hereinafter fully described. These different speeds are communicated to the rolls 12 and 13 through the medium of pinions 30 engaged by the external gear 27 and secured respectively to the shafts 10 and 11 to which the respective rolls 12 and 13 are secured.

The purpose of the driving mechanism just described is to effect winding upon, and unwinding of the ribbon 14 from, the rolls 12 and 13, the ribbon 14 traveling in a vertical direction, in the arrangement of apparatus shown in the accompanying drawings. Only the indicia shown upon a narrow vertical division of the ribbon travels by the lens 34, during the movements of the ribbon 14 effected by the hand wheel 20, in any one lateral position of the ribbon 14, the arrangement and purpose of many such narrow vertical divisions of which the whole ribbon 14 is composed, and which are relatively laterally arranged, being hereinafter fully described; as also are described the means for laterally shifting the ribbon 14, so as to effect a longitudinal alignment of any selective one of the ribbon divisions with the lens 34, in order that the indicia upon said selective ribbon division may be moved upwardly and downwardly of the lens 34 by the actuation of the hand wheel 20.

The means for so laterally shifting the ribbon 14 are controlled by a thumb piece 75, Figures 1 and 4, which is secured to an outwardly-extending pin 76 mounted in a boss 76' extended inwardly from the top of the casing 1. Secured to the inner end of the pin 76 is a pinion 74 disposed between and engaging two opposed transversely-movable rack members 73 and 79. The rack member 73 at its two ends is secured to angles 82 which in turn are secured to downwardly-extended plates 68' adapted to slide upon a pair of upper and lower transverse rods 67, Figure 4, mounted at one end in the partition 9 and side wall 83 of the casing 1 and at the other end in a casing side door 57. The rack member 73 and the vertical plates 68' form a carriage 68 which can be laterally shifted upon the rods 67 by the actuation of the thumb piece 75. The film rolls 12 and 13 are mounted in the traveling carriage 68 inasmuch as the roll shafts 10 and 11 pass through the vertical side members 68' of the carriage and the

rolls 12 and 13 are mounted upon the shafts 10 and 11 between the side members 68'. The ends of the rolls 12 and 13 are closely adjacent the inner faces of the plates 68'.

5 A traveling pointer 43 cooperates with the movement of the ribbon 14 effected by the actuation of the hand wheel 20, and also with the lateral shifting of the ribbon 14 effected by the actuation of the thumb piece 75. This coopera-
10 tion by the pointer 43 is effected by its moving over an indicator plate 77, when the rolls 12 and 13 are turned by the hand wheel 20, and by the movement of the indicator plate 77 relatively to the pointer 43, when the rolls 12 and 13 are shifted
15 laterally through the medium of the thumb piece 75.

Describing first the movement of the pointer 43, when the hand wheel 20 is actuated, reference is made to an idler pinion 44, Figure 5, engaged by that pinion 30 which is secured to the roll shaft 10, said idler pinion 44 being mounted upon a pin 45 supported in the partition 9 and
20 engaging a pinion 46 secured to a shaft 47, Figure 1, having a screw portion 47' engaging a traveling block 48 slidable upon a rod 49 and secured to an angular depending body portion 50 of the pointer 43.

The cooperation of the pointer 43 with the lateral shifting of the ribbon 14 results from the engagement of the pinion 74, Figures 1 and 2, with the rack member 79, which latter is formed with end ears 80 slidable upon a rod 72 mounted at one end in an ear 85, Figure 4, depending from the top of the casing 1, and at the other end in
30 the partition 9, there being secured to the rack member 79 the rearwardly and upwardly projecting indicator plate 77, Figure 2, over which the pointer 43 travels. The indicator plate 77 is supported and aligned at its outer projecting end by downwardly-extending ears 84 which are supported by and slidable upon a rod 78, Figures 1
35 and 2. The indicator plate 77 displays indicia 86, Figures 2, 4, and 7, arranged in a single lateral series of characters forming an index for the data 87 displayed upon the ribbon 14, Figure 6.

By the means already described, it is evident that the rolls 12 and 13 can be turned so as to cause the ribbon 14 to travel up and down between the pair of lenses 32 and the single lens 34, and that the carriage 68, and hence the rolls 12 and 13 and the ribbon 14, can be laterally shifted relative to the lenses 32 and the lens 34, and that thus any selective portion of the ribbon 14, either longitudinally or crosswise of the ribbon, can
40 be spotted between the lenses 32 and the lens 34 so as to focus the light from said ribbon portion in the lens 34. Also, it is evident that the particular portion of the ribbon which is spotted between the lenses 32 and the lens 34 can be indicated by the pointer 43 upon the indicator plate 77 and that the indication can be readily seen by the operator since the indicator plate 77 is upon the top of the directory and is readily visible through a glass plate 81 which covers and protects the plate 77.
45

When using the directory, the small characters printed or otherwise displayed upon the ribbon 14 are viewed through a ground glass top plate 53, Figures 1 and 7, mounted in the top of the casing 1 by means of the flange 6' of the partition 6, the rib 7, and an angular clamp 54 secured to the under surface of the casing top. The enlarged image of the particular ribbon portion being inspected is seen in a mirror 41 which is
50 mounted in the chamber 14 upon an inclined base

42 supported by a bracket 52 formed with and projected inwardly from a rear removable casing door 51. The light from the ribbon portion under inspection is focused in the lens 34 and diverges therefrom to throw the enlarged image on
5 the mirror 41. Inasmuch as the indicia displayed upon the ribbon 14 is made small, for the purpose of compressing a great amount of data into small compass, as has hereinbefore been mentioned as an object of the invention, there is
10 utilized, as an aid to the discernment of the characters in the mirror 41, in addition to the expanding lens 34, arranged as shown in Figures 1 and 3, a lamp 33 substantially horizontally aligned with the axis of the lens 34 and
15 with the center of the mirror 41. Also, two converging lenses 32 are utilized between the lamp 33 and the film 14 so as to focus the rays from the lamp 33 within a comparatively short distance and thus the lens 34 can be positioned relatively close to the lenses 32, as indicated in Figures 1 and 3.
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Inasmuch as it is desired that the lamp 33 shall burn only when the directory is being used, I provide an automatic switch 35, Figure 4, located in the chamber 14, and forming part of the light circuit and closed only when the hand wheel 20 has been moved outwardly somewhat from its idle position shown in full lines in Figure 4. This switch 35 is of spring material and of plate formation and is secured at one end to the inner surface of the outer wall of the cap extension 8. Intermediate of its ends the switch plate 35 is intersected by the shaft 21, and, at its free end, it forms a make or break terminal 36 adapted
25 to be moved into contact with, or, if unrestrained, to spring away from, a plate contact member 37 secured to the inner surface of the outer wall of the cap extension 8. The plate contact member 37 is in circuit with a lamp conductor 38. The spring switch 35 is inwardly bowed intermediate its ends and tends to move its free end terminal 36 away from the terminal plate 37. In so doing, the spring switch 35 also tends to move the shaft 21 to its inner or idle position shown in full lines in Figure 4, due to the fact that the intermediate portion of the spring plate 35 which surrounds the shaft 21 bears against an insulating block 39 mounted on the shaft 21 and disposed against a collar 40 secured to the shaft 21. Thus, when the shaft 21 is pulled outwardly by the hand wheel 20, the stop 40 and insulating block 39 compress the spring switch 35 and bring the terminals 36 and 37 into contact, thus closing the light circuit through the conductor 38. Upon the hand wheel 20 being pulled further outwardly until the driven pinion 22 engages the pinion 25, the external gear 27 is rotated integrally with the pinion 25, when the hand wheel 20 is turned, resulting in turning the rolls 12 and 13 at high speed through the medium of the pinions 30. Upon pulling the shaft 21 still further outwardly, until the driven pinion 22 engages the idler pinion 28, the latter turns the internal gear 26, when the hand wheel 20 is turned, and thus turns the external gear 27 which is integral with the internal gear 26, resulting in the turning of the rolls 12 and 13 at slow speed through the medium of the pinions 30. Upon releasing the hand wheel 20, the shaft 21 is moved inwardly to its idle position, under the action of the spring plate 35, and the terminals 36 and 37 are separated, resulting in an opening of the light circuit.
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The purpose for which the rolls 12 and 13 are

rotated; as also, the purpose of the different speeds of rotation, and the purpose of the lateral shifting of the ribbon 14, as well as a preferable arrangement of the characters 87 upon the ribbon 14, will now be described. An inspection of Figure 6 will show that I have subdivided the grouping of the characters upon the ribbon 14 into ten smaller relatively lateral groups each arranged vertically of the film 14, such groups being indicated by the characters 88, 89, 90, 91, 92, 93, 94, 95, 96, and 97, respectively, each laterally adjacent pair of vertical divisions being separated by a spacing such as 98, each of the vertical divisions 88-97, inclusive, containing words commencing with one or more of the letters of the alphabet in sequence, for instance, the division 88 would, in the complete make-up of the film 14, contain the names, addresses, telephone numbers, and/or such other data as is suitable, for all telephone listings from the beginning of the alphabet up to and including part of the listings commencing with "Br".

When it is desired to obtain an enlarged image in the mirror 41 of a certain listing upon the film 14, the thumb piece 75 is turned so as to bring that vertical division of the film 14, within which the listing is contained, within the field of light passing from the lenses 32 through the lens 34, a substantially exact approximation of which can be obtained by registering the spacings 98, Figure 6, with two suitably spaced lines 81', Figure 7, upon the glass 81. An analysis of the apparent upside down and reverse lateral arrangement of the characters 87 upon the film 14 shown in Figure 6, together with an analysis of the direction of travel of the light from the lamp 33 through the lenses 32 and 34 to the mirror 41, will disclose that the enlarged image shown in the mirror 41 will be right side up and read properly laterally from left to right. Also, it will be observed that the turning of the thumb piece 75 to actuate the carriage 68 in either direction through the medium of the rack 73, will shift the vertical divisions 88-97, inclusive, upon the ribbon 14 in the proper direction for correct registration upon the indicating plate 77, inasmuch as the characters upon the plate 77 are arranged from left to right, and this plate 77, through the instrumentality of the pinion 74 and rack 79, travels in a direction opposite to that in which the film 14 is moved laterally.

After the proper vertical division of the film 14 has been brought within the field between the lenses 32 and the lens 34, the hand wheel 20 is pulled outwardly so as to cause the driven pinion 22 to engage the pinion 25, the circuit of the lamp 33 being closed just previously to such engagement, as hereinbefore described, and then the turning of the hand wheel 20 causes the rolls 12 and 13 to rotate rapidly, and the ribbon 14 to travel rapidly vertically, either upwardly or downwardly, according to the position upon the selected vertical division of the ribbon 14 of the particular listing sought. An approximation of the position of this listing can be obtained by watching the travel of the pointer 43 over the indicator plate 77. When the position of the desired listing is approximated, the hand wheel 20 is pulled still further outwardly so as to cause the driven pinion 22 to engage the idler pinion 28, resulting in a slower rate of travel of the ribbon 14, by reason of the rotation of the rolls 12 and 13 from the idler pinion 28 and the internal gear 26, thus permitting the ready "spotting" of the desired listing.

The ribbon 14 is caused to travel smoothly vertically by reason of the provision of a glass base plate 24 and a pair of vertically spaced guide rods 31, between which plate 24 and guide rods 31 the ribbon 14 travels, Figures 1 and 3, the guide rods being located, respectively, just above and just below that portion of the film 14 which is subject to inspection in the mirror 41.

The base plate 24 and the guide rods 31 are mounted in the vertical carriage plates 68', Figure 3, and held against lateral displacement by cap plates 69 secured to the outside faces of the carriage plates 68' by screws 71 which pass through the plates 68' and engage both ends of vertically spaced rods 70 disposed between the rolls 12 and 13 and parallel therewith, Figure 4, the rods 70 serving to hold the two plates 68' rigidly in spaced and aligned relation.

I provide means for readily replacing the rolls 12 and 13 and the film 14, as well as insuring quick and convenient and proper alignment of the new rolls in the carriage 68. To this end, I provide a casing side door 57, Figures 3 and 4, removably held in position by rotatable clamps 58 which cooperate with inwardly-extending casing lugs 58', the door opening being sufficiently large to permit the carriage frame 68 and the contained rolls and film to pass therethrough. In dot-and-dash lines, Figure 4, is fragmentarily shown the movable carriage 68 and the film in loading position when the door 57 has been removed. Assuming that the carriage 68 has been moved by the thumb piece 75 so as to cause the rack 73 to become disengaged from the pinion 74, the carriage is then moved by hand further to the left so as to cause it to pass through the opening covered by the door 57 until the lower end of the right-hand carriage plate 68' is intercepted by a stop member consisting of a casing lug 61, Figure 4. However, this outward position of the carriage is not so extreme as to cause the right-hand carriage plate 68' to move off the rods 67 or the shafts 10 and 11. The carriage 68 has, however, moved so far to the left that the rolls 12 and 13 with the ribbon 14 can be taken out of the carriage between the two side plates 68'. Then fresh rolls 12 and 13 with a film 14 can be slipped in between the carriage plates 68' and aligned with the respective shafts 10 and 11, and the carriage then moved to the right within the casing, the rack 73 engaged with the pinion 74, the door 57 put in place, and the new film is ready for use. It will be noted that in loading the directory with new rolls and a new film, both the rods 67 and the shafts 10 and 11 serve to provide proper alignment of the rolls within the carriage 68, inasmuch as the right-hand side of the carriage is not separated from the rods 67 or the shafts 10 and 11 during the reloading operation. It should be noted that the left-hand ends of the roll shafts 10 and 11 are formed with slots 99, Figure 4, and within these slots are accommodated pins 62 seated at their ends in the inner wall of the annular rolls 12 and 13 and thus effecting the turning of the rolls from the rotation of the shafts 10 and 11. When the carriage 68 and the fresh rolls 12 and 13 and new film 14 are being moved to the right upon the rods 67 and the shafts 10 and 11, the rolls 12 and 13 must be turned properly to align the pins 62 with the respective rod slots 99, when the pins 62 intercept the free ends of the shafts 10 and 11, in order that the pins 62 may enter the slots 99.

I provide a hinged front door 55, Figure 1, for

the casing 1, which is clamped in closing position by a rotatable clamp 56 adapted to engage an inwardly-extended casing lug 56', this door 55 affording access to the lamp chamber 1^a.

5 I also provide suitable ventilating means for my improved directory, the same comprising upper and lower side louvres 59 at the front end of the casing, and ventilating openings 60 adjacent the top and bottom of the film chamber 1^b.

10 What I claim is:

1. A directory comprising a casing, rolls mounted therein, a flexible ribbon threaded on the rolls and adapted to be wound upon and unwound therefrom by the rotation of the rolls, said ribbon
15 having a multiplicity of varying characters displayed thereon, movable means for turning the rolls, movable means for shifting the rolls as a unit, and indicating means including a chart and a pointer of which the pointer is secured to the roll-turning means and the chart is secured to the roll-shifting means.

2. A directory comprising a casing member, rolls mounted therein, a flexible ribbon threaded on the rolls and adapted to be wound upon and unwound therefrom by the rotation of the rolls, said ribbon having a multiplicity of varying characters displayed thereon and arranged in a plurality of relatively laterally arranged ribbon divisions, each division having a multiplicity of
30 longitudinally arranged characters, a movable chart having a single series of laterally arranged index characters, a pointer adjacent said chart, means for turning the rolls, means for laterally shifting the rolls, means actuated by the roll-turning means for moving the pointer relatively to the chart, and means actuated by the roll-shifting means for moving the chart relatively to the pointer.

3. A directory comprising a casing, rolls mounted therein, a flexible ribbon adapted to be wound upon and unwound from the rolls by the rotation of the latter, said ribbon having a multiplicity of varying characters displayed thereon, movable means for turning the rolls, movable means for shifting the rolls as a unit, and indicating means including a chart and a pointer of which one is secured to the roll-turning means and the other is secured to the roll-shifting means.

4. A directory comprising a casing, rolls mounted therein, a flexible ribbon adapted to be wound upon and unwound from the rolls by the rotation of the latter, said ribbon having a multiplicity of varying characters displayed thereon, movable means for turning the rolls, independent movable means for shifting the rolls as a unit, and indicating means including a chart and a pointer of which one is secured to the roll-turning means and the other is secured to the roll-shifting means.

5. A directory comprising a casing, a carriage slidably supported therein, rolls mounted in the carriage, means for turning the rolls, a flexible ribbon adapted to be wound upon, and unwound from, the rolls by the rotation thereof, the ribbon
65 having a multiplicity of varying characters displayed thereon, a rack adapted to actuate the carriage, a pinion engaging the rack, means for rotating the pinion, a movable chart actuated by the pinion-rotating means, and a pointer mounted to indicate the position of the chart.

6. A directory comprising a casing, a carriage slidably supported therein, rolls mounted in the carriage, means for turning the rolls, a flexible ribbon adapted to be wound upon, and unwound
75 from, the rolls by the rotation thereof, the ribbon

having a multiplicity of varying characters displayed thereon, a rack secured to the carriage, a pinion engaging the rack, means for rotating the pinion, a movable chart actuated by the pinion-rotating means, and a pointer movable over the chart and actuated by the roll-turning means.

7. A directory comprising a casing, a carriage slidably supported therein, rolls mounted in the carriage, means for turning the rolls including a plurality of selective varying speed mechanisms, a flexible ribbon adapted to be wound upon, and unwound from, the rolls by the rotation thereof, the ribbon having a multiplicity of varying characters displayed thereon, a pointer actuated by the roll-turning means, a movable chart over which the pointer is adapted to travel, a pair of racks one of which actuates the chart and the other of which moves the carriage, and a common actuating member for the two racks.

8. A directory comprising a casing, a carriage slidably supported therein, rolls mounted in the carriage, means for turning the rolls including a plurality of selective varying speed mechanisms, a flexible ribbon adapted to be wound upon, and unwound from, the rolls by the rotation thereof, the ribbon having a multiplicity of varying characters displayed thereon, a pointer actuated by the roll-turning means, a movable chart over which the pointer is adapted to travel, a pair of opposed spaced racks one of which is secured to the chart and the other of which is secured to the carriage, a pinion intermediate of and engaging the two racks, and means for rotating the pinion.

9. In a directory, a casing, rods supported therein, said casing including a movable door within which one end of each of said rods is removably mounted, shafts mounted in the casing and each having a free end disposed adjacent the inner surface of said door, and a carriage supported by and slidable upon the rods, the carriage also being slidable on the shafts, the carriage having side openings through which rolls may be passed for their mounting within the carriage upon the respective shafts, and for their removal from the carriage, the door being large enough to permit the carriage to pass through the opening formed by the removal of the door.

10. In a directory, a casing, rods supported therein, said casing including a movable door within which one end of each of said rods is removably mounted, shafts mounted in the casing and each having a free end disposed adjacent the inner surface of said door, a carriage supported by and slidable upon the rods, the carriage also being slidable on said shafts, the carriage having end plates between which rolls can be located, the door being large enough to permit the carriage to pass through the opening formed by the removal of the door, and a stop member limiting the outward carriage movement through the door opening at a point just short of the complete withdrawal of the carriage from the free ends of the shafts, the carriage having side openings through which rolls may be passed for their removal from the respective shaft portions within the carriage and for the bringing of rolls into axial alignment with the shafts for mounting on the latter within the carriage.

11. In a directory, a casing, rods supported therein, said casing including a movable door within which one end of each of said rods is removably mounted, a carriage slidably mounted on said rods, shafts mounted at one end in the casing, said shafts each having a free end disposed

adjacent the inner surface of said door, the carriage being slidable upon the shafts, the carriage having end plates between which rolls can be located, the door being large enough to permit the carriage to pass through the opening formed by the removal of the door, rolls rotatably secured within the carriage to the respective shafts, the free ends of the latter being formed with elongated slots and the rolls being formed with pins adapted to engage said slots to effect the rotation of the rolls, and a stop member limiting the out-

ward carriage movement through the door opening at a point just short of the complete withdrawal of the carriage from the free ends of the shafts, the carriage having side openings through which the rolls may be passed for the removal thereof from the respective shaft portions within the carriage and for the bringing of rolls into axial alignment with said shafts and the engaging of said pins with said slots.

GEORGE J. CHAPMAN.