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[56]

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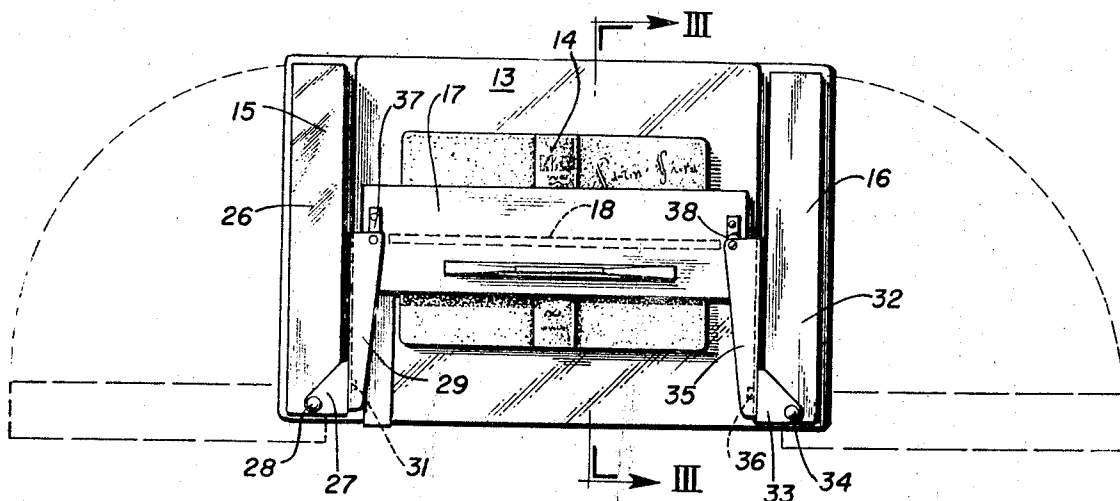
[54] **SCANNER WITH COPY-HOLDING ARMS**  
9 Claims, 4 Drawing Figs.

[52] U.S. Cl. .... 178/7.1,  
178/7.6, 355/8

[51] Int. Cl. .... H04n 1/12

[50] Field of Search ..... 178/7.6, 7.6  
X, 7.1, 7.1 E, 6.6; 355/8

**ABSTRACT:** This invention has to do with a scanner and, more particularly, to scanning apparatus having a floating pressure member supported on articulated arms.



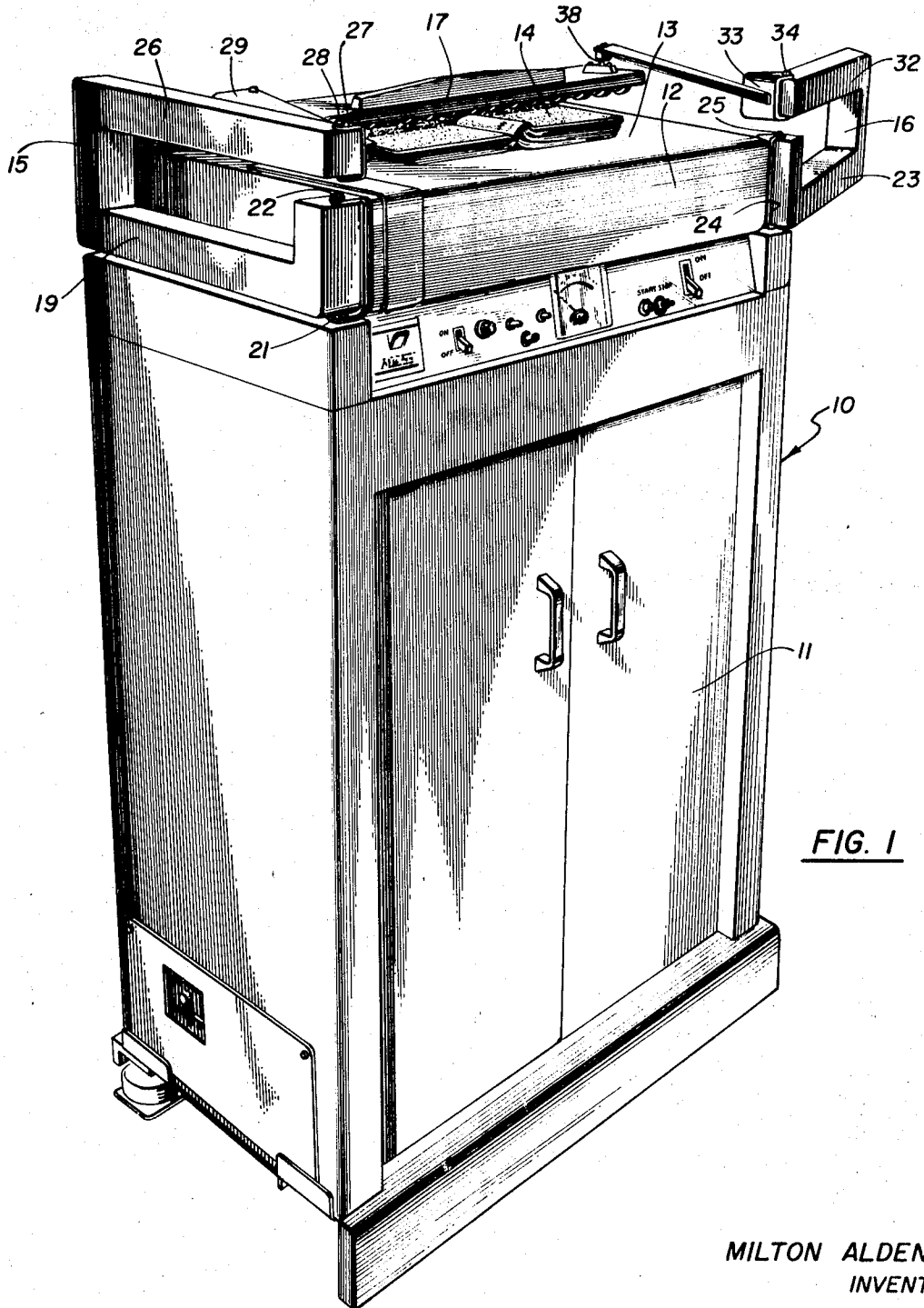


FIG. 1

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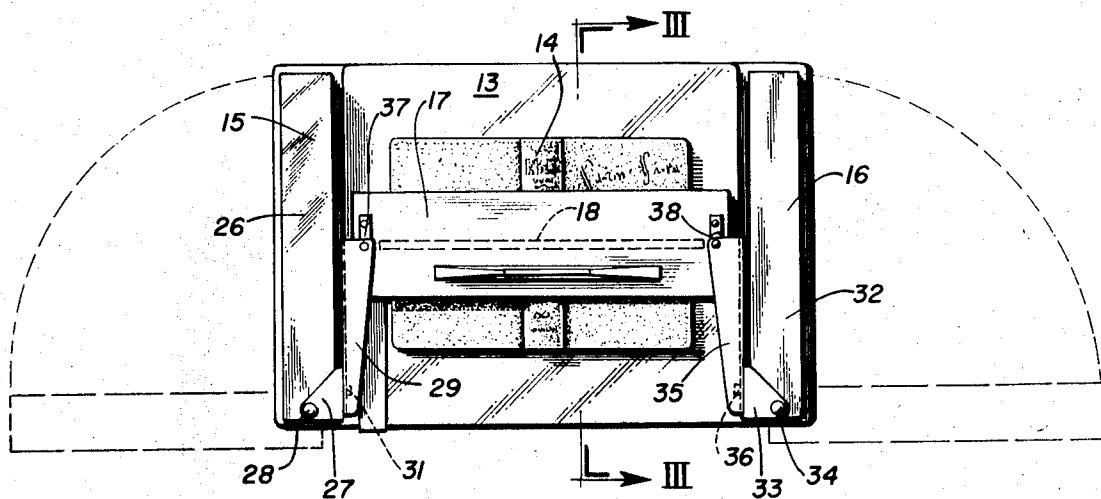


**FIG. 2**

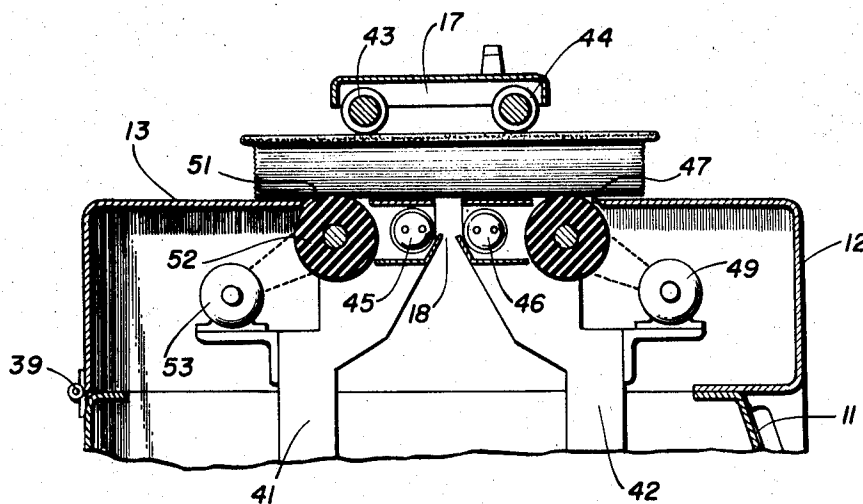


**FIG. 3**

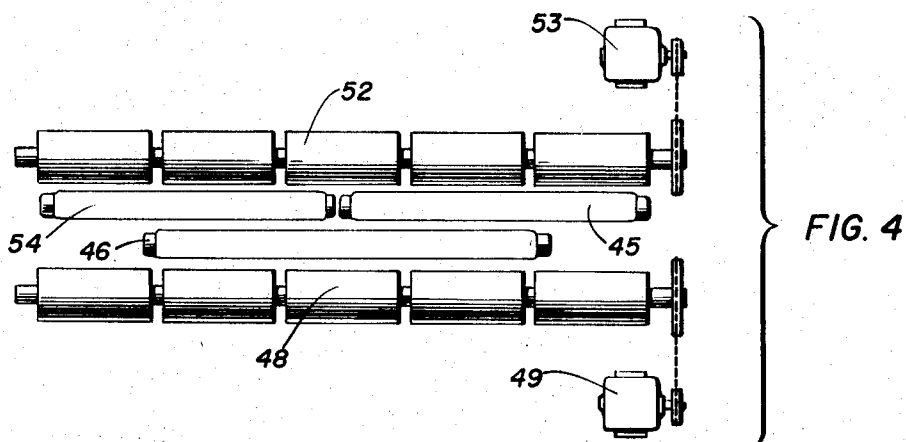


**FIG. 4**

## SCANNER WITH COPY-HOLDING ARMS

## BACKGROUND OF THE INVENTION

In the art of graphic communication, it is common practice to provide a scanning apparatus for converting visual information into an electrical signal and a recording apparatus located at a remote location for reconvertng the electrical signal into the visual image. Such scanning apparatus has been well developed over the years and typical scanners are shown in the U.S. Pats. of Nyman Nos. 2,778,873 and 2,854,509. It is necessary in operating such scanning apparatus to feed the copy past a reading slot at a slow, constant rate of speed, so that, when the scanning signals are reassembled in the recording apparatus, the line of generation takes place properly and the image is reassembled in a manner similar to the original. Scanning apparatus of this type, however, has had the limitation that the size of the copy from which the image is being read is restricted by the feeding apparatus associated with the reading slot. In practice, it has been common, when using large copy, such as a blueprint, to copy a localized area in the print by cutting a small section by folding the copy. This creases the copy, but presents other problems, under some circumstances, such as the difficulty in feeding a folded sheet. Under other circumstances, as in the case of large maps, however, it is undesirable or impossible to fold the copy and, so, the limited span of the feeding apparatus associated with a reasonably-sized scanning apparatus has limited its use. A scanning apparatus built large enough to accommodate such large copy without folding would, of course, be very expensive and bulky. In addition to its expense, it would present certain optical and mechanical drive problems that would be almost insurmountable. Furthermore, the feeding and pressing apparatus associated even with conventional scanning apparatus is quite expensive and is subject to frequent disrepair. In addition, the scanning devices of the prior art were unable to properly press and feed certain irregular objects, such as books. These and other difficulties experienced with the prior art devices have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide a scanning apparatus capable of accommodating copy which is much larger than the scanning width.

Another object of this invention is the provision of a scanner having feeding apparatus which is simple in construction and which is capable of floating to accommodate odd-shaped articles, such as books.

A further object of the invention is the provision of a scanning apparatus which maintains the copy sheet perfectly flat, even though the sheet is extremely flexible.

Another object of the present invention is the provision of a scanner on which the pressure member for feeding the copy is mounted on articulated arms which can be extended to accommodate large copy.

It is another object of the invention to provide a scanning apparatus whose controls and operative elements are capable of maintaining flexible copy under tension.

A still further object of the instant invention is the provision of a scanner which is simple in construction, inexpensive to manufacture, and which is capable of a long life of useful service with a minimum of maintenance.

Another object of the invention is the provision of a scanning apparatus wherein the transmission of light through the copy sheet is limited to give better reflection and better discrimination.

It is another object of the invention to provide a scanner which will accommodate relatively thick copy, such as a book.

A further object of this invention is to provide a scanner of extreme versatility but, nevertheless, which is compact and neat in appearance.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

## SUMMARY OF THE INVENTION

In general, the present invention has to do with a scanner having a housing with a flat surface against which copy carrying a graphic display can be pressed, the surface having an elongated reading slot. A pressure member is provided for holding the copy against the surface and two arms are mounted on the housing on opposite sides of the said surface for supporting the pressure member.

More specifically, each arm is U-shaped in a plane perpendicular to the surface; and the free end of one leg of each arm is pivotally attached to the housing for hinged movement about an axis perpendicular to the surface, and the free end of the other leg of each arm is connected to the pressure member. An extension of the said flat surface would extend between the legs of the arms and they are parallel to it. The U-shaped arm can be swung from a first position perpendicular to the slot against the sides of the housing to a second position parallel to the slot and extending outwardly from the housing so that copy considerably larger than the flat surface may be accommodated without affecting the supporting function of the arms.

## BRIEF DESCRIPTION OF THE DRAWINGS

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

FIG. 1 is a perspective view of scanner incorporating the principles of the present invention,

FIG. 2 is a plan view of the scanner,

FIG. 3 is a sectional view of the scanner taken on the line III—III of FIG. 2, and

FIG. 4 is a plan view of a portion of the apparatus with a cover removed.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, wherein are best shown the general features of the invention, the scanner, indicated generally by the reference numeral 10, is shown as having a base 11 adapted to rest on the floor. On top of the base is mounted a housing 12. The housing has a flat surface 13 on which rests a copy 14 which is shown in the drawing as being a book which has been opened and placed face down on the surface. Mounted on opposite sides of the housing 12 are articulated arms 15 and 16. The arm 15 is shown in a retracted first position against the side of the housing, while the arm 16 is shown in a second open position. Supported by the arms is a pressure member 17 which rests on top of the copy 14.

Referring to FIG. 2, it can be seen that a reading slot 18 extends across the surface 13 of the housing.

In FIGS. 1 and 2 it can be seen that the arm 15 is U-shaped and has a lower leg 19 whose free end is pivotally attached to the front left-hand corner of the housing by means of a bracket 21 and a pivot pin 42 having an axis which extends at a right angle to the plane of the surface 13 and, in the preferred embodiment, is vertical. Similarly, the arm 16 is U-shaped and its lower leg 23 is connected to the right-hand forward corner of the housing by virtue of a bracket and vertical pivot pin 25. It will be understood, of course, that, although the arms 15 and 16 are described as being U-shaped other specific shapes may be used under certain circumstances, but, in any case, these shapes will all be open loops, the free ends of which are adjacent one another. Peculiar-shaped loops might be used, for instance, to accommodate copy having large rolls in the manner of a scroll.

The upper leg 26 of the arm 15 has pivotally mounted on its outer end a bracket 27 which is fastened to the leg by means of a vertical pivot pin 28. An arm 29 is attached at one end to the bracket 27 by means of a horizontal pivot pin 31. Similarly, the upper leg 32 of the U-shaped arm 16 has a bracket 33 attached to it by means of a vertical pivot pin 34. An arm 35 is attached at one end to a vertical portion of the bracket 33 by means of a horizontal pivot pin 36. Finally, the other ends of

the arms 29 and 35 are attached to opposite ends of the pressure member 17 by means of universal joints 37 and 38. The pressure member 17 is provided with rollers 43 and 44 and a flat opaque pressure plate extending between them.

Referring now to FIG. 3, it can be seen that the housing 12 is in the form of a cover attached to the top of the base 11 by means of a hinge 39. Supporting members 41 and 42 extend upwardly from the base 11 free of the housing and allow the housing 12 to pivot away from the elements which they support. Mounted at the upper ends of the supporting members 41 and 42 are lamps 45 and 46, respectively, and they lie on opposite sides of the centerline of the slot. At the forward side of the housing 12 is formed a slot 47 in which lies the upper periphery of a roller 48; this roller is driven by a small motor 49. In a similar manner, the housing 12 is provided with another slot 51 at the backside of the slot 18 and, in this slot (with its periphery extending slightly above the surface 13) is located a roller 52 driven by a motor 53. The motors 49 and 52 are synchronous motors and are driven at the same speed. However, the diameter of the roller 48 is slightly less than the diameter of the roller 52, so that the peripheral speed of the roller 52 is slightly the faster of the two.

FIG. 4 shows the arrangement of some of the elements with the housing 12 removed. The rollers 48 and 52 are provided with annular grooves at spaced intervals, and it can be seen that, in addition to the lamps 45 and 46, another lamp 54 is provided. The staggered arrangement of the lamps, shown in the drawing with the lamps 45 and 54 in line with one another and the lamp 46 bracketing their central portion, assures that the dark end areas of the lamps do not appear as a dark spot in the transmitted image.

The operation of the apparatus will now be readily understood, in view of the above description. When the apparatus has been actuated by proper setting of electrical switches in the well-known manner, the motors 49 and 53 will be energized, thus rotating the rolls 48 and 52. The lamps 45, 46, and 54 are energized and they project light upwardly through the slot 18. The other apparatus for the scanning operation, including optical apparatus, a photocell, and amplification equipment, is operative and the operator presents a copy 14 to the surface 13 and slides it forwardly. The pressure member 17 with its pressure rolls 43 and 44 is lowered onto its surface and the forward end of the copy is engaged by the roll 48. The roll 48 leads it forwardly over the slot 18 and the usual scanning operation takes place. The copy soon is engaged by the roller 52 which pulls it tight over the slot 18, especially if it is a flexible copy, such as a sheet of paper. The pressure member 17 is supported by the arms 29 and 35 which, in turn, are pivotally mounted on the arms 15 and 16. The pivot pins 31 and 36 allow the ends of the pressure member 17 to float, this being accomplished in conjunction with the universal joints 37 and 38 at the other ends of the arms. The pivot pins 28 and 34 permit the arms 15 and 16 to be rotated to a desired position without changing the support function of the arms 29 and 35. If, for instance, a very large copy is to be used, the arms 15 and 16 can be moved to secondary positions at right angles to the ends of the housing 12 (that is to say, parallel to the slot 18) without disturbing the supporting function of the pressure member 17.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the

scope claimed.

The invention having been thus described, what is claimed as new and desired to secure by Letters Patent is:

I claim:

1. A scanner, comprising

- a. a housing having a flat surface against which copy carrying a graphic display can be pressed, the surface having an elongated reading slot,
- b. a pressure member for holding the copy against the surface, and
- c. two arms mounted on the housing on opposite sides of the said surface and serving to support the pressure member, wherein each arm is U-shaped, the free end of one leg of each arm is pivotally attached to the housing for hinged movement about an axis perpendicular to the surface, and the free end of the other leg of each arm is connected to the pressure member.

2. A scanner as recited in claim 1, wherein the copy is slowly moved over the surface past the slot by two rollers located parallel to and on opposite sides of the slot, the surfaces of the rolls extending only slightly above the surface for contact with the copy, the peripheral speed of the roll on the downstream side of the slot being greater than that of the other roll.

3. A scanner as recited in claim 1, wherein the connection of the said other leg to the pressure member permits pivotal action about the same axis as the connection of the said one leg to the housing.

4. A scanner as recited in claim 1, wherein an extension of the said flat surface would extend between the legs and they are parallel to it.

5. A scanner as recited in claim 1, wherein the U-shaped arms can be swung from a first position perpendicular to the slot against the sides of the housing to a second position parallel to the slot and extending outwardly from the housing so that copy considerably larger than the flat surface can be accommodated.

6. A scanner as recited in claim 1, wherein the connection between the pressure member and the said other leg is such that the pressure member is free to swing about a first axis that is parallel to the surface and perpendicular to the slot and also about a second axis parallel to the surface and parallel to the slot.

7. A scanner as recited in claim 6, wherein the said connection includes a secondary arm that is attached at one end to the first-mentioned arm for pivotal movement about an axis parallel to and substantially spaced from the slot, and wherein the other end of the secondary arm is attached to the adjacent end of the pressure member for limited universal movement.

8. A scanner as recited in claim 7, wherein the said one end of the secondary arm is connected to the first-mentioned arm for movement about an axis perpendicular to the surface.

9. A scanner, comprising

- a. a housing having a flat surface against which copy carrying a graphic display can be pressed, the surface having an elongated reading slot,
- b. a pressure member for holding the copy against the surface,
- c. two arms mounted on the housing on opposite sides of the said surface and serving to support the pressure member, and
- d. staggered elongated lamps extending parallel to each other and parallel to the slot to illuminate the copy.