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Kring et al.

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[54] COPYING APPARATUS

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[58] Field of Search355/74; 226/141, 160;
95/31 DS

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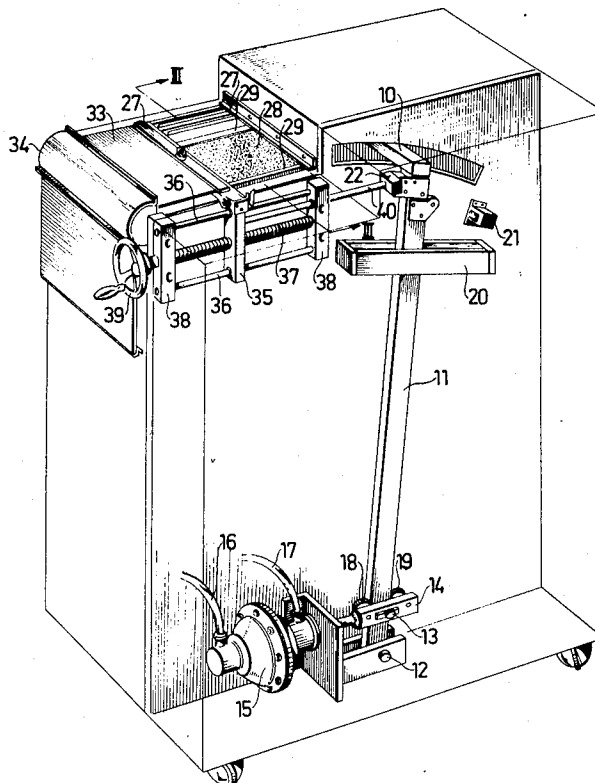
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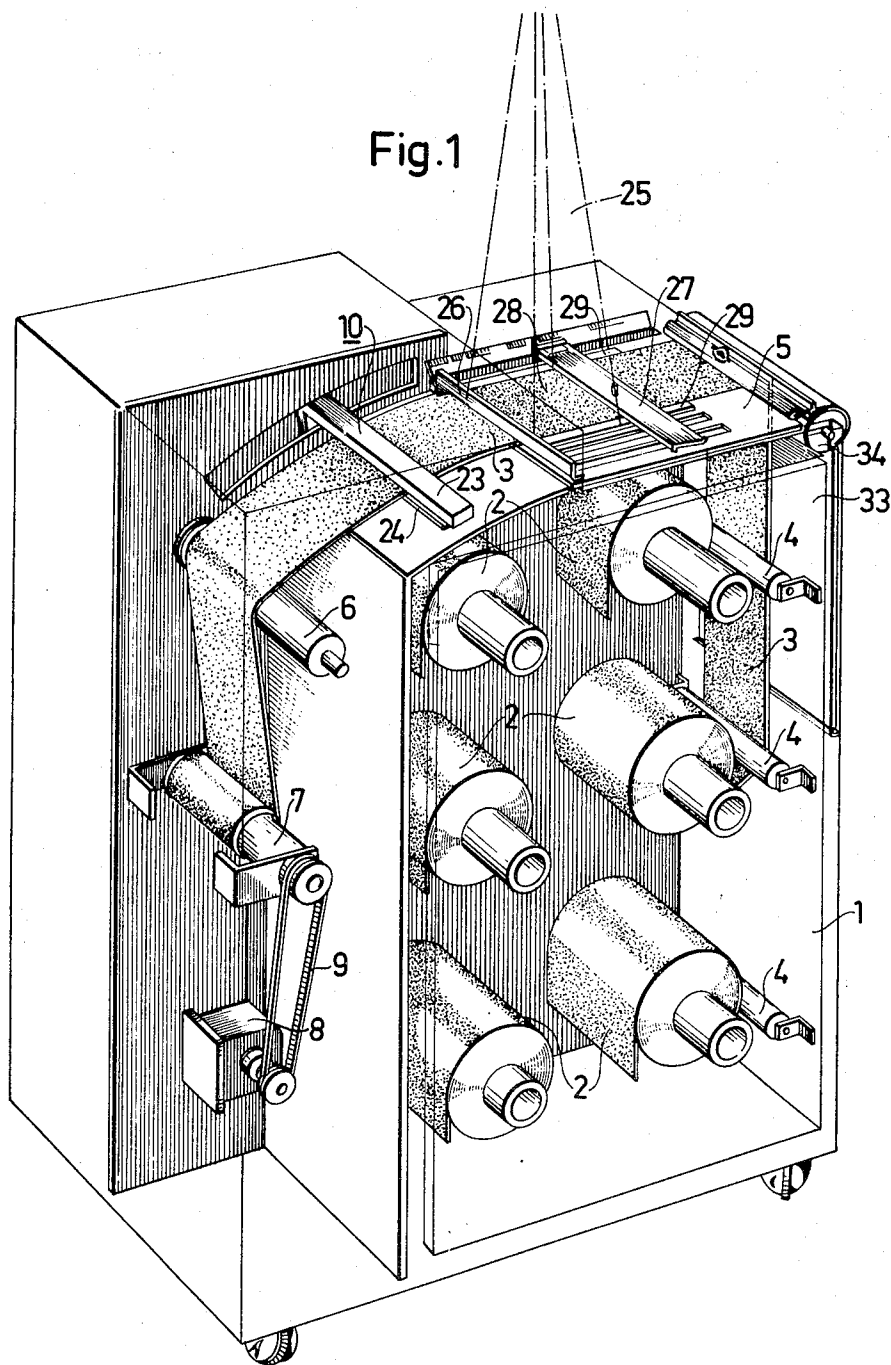
[57]

ABSTRACT

A copying apparatus for continuously reproducing images on a web of copying paper is described. The apparatus is characterized by a web feed means which includes a carrier member adapted to engage the web in the feed direction. The carrier is capable of being moved backwards and forwards at an amplitude which may be changed by the setting of a means for determining the size of the image field on the web so that the feeding distance, during each cycle of movement of the carrier, is equal to the length of the image last exposed in the longitudinal direction of the web and, if desired, also a length of unexposed web for outwardly projecting edge portions.

7 Claims, 3 Drawing Figures





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Fig. 2

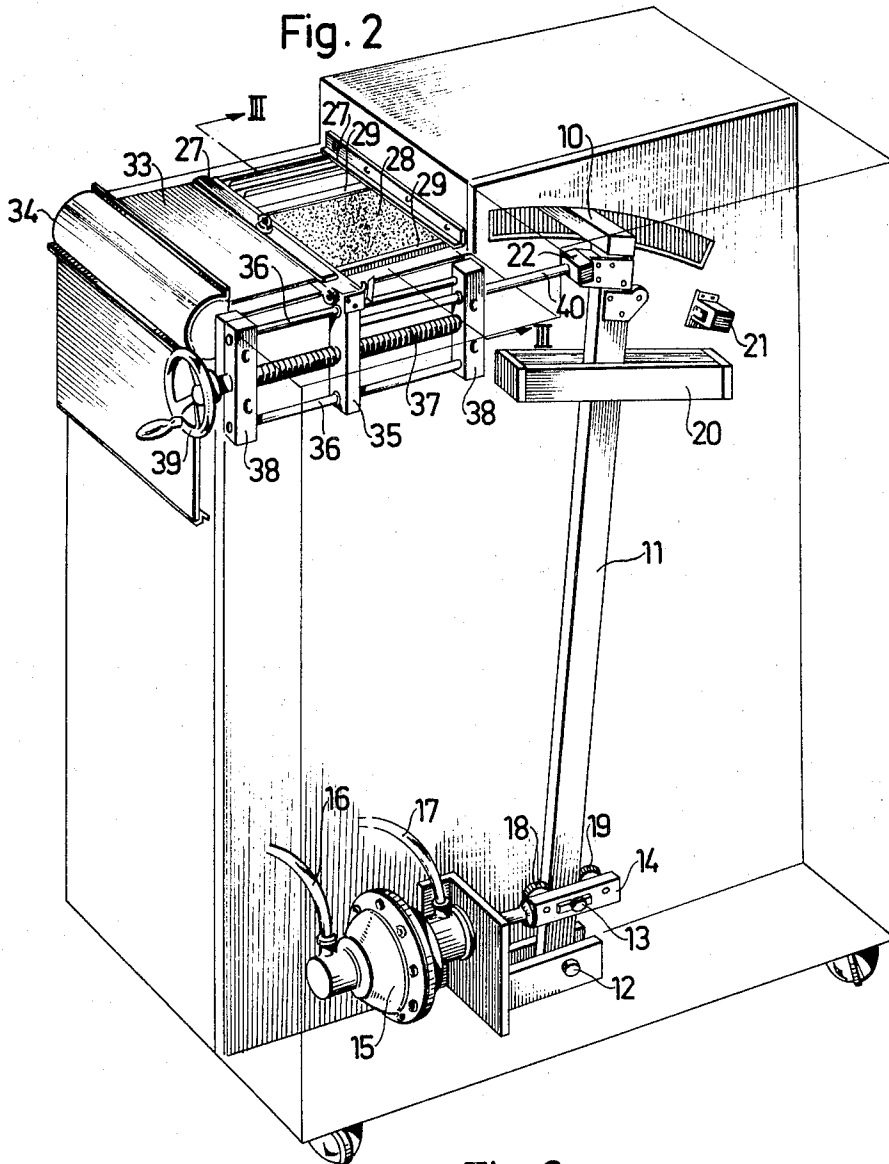
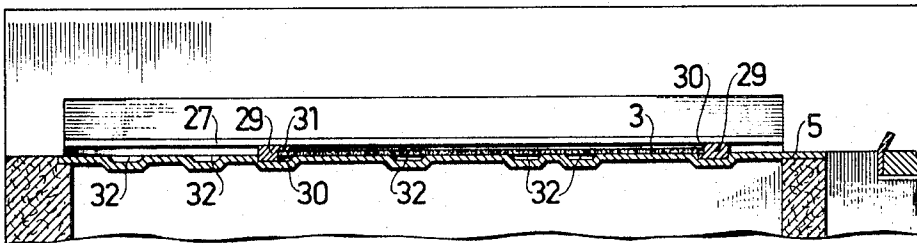


Fig. 3



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COPYING APPARATUS

The present invention relates to a copying apparatus for continuously reproducing images on a web of copying paper or the like. Copying apparatus of this type known hitherto are adapted for sequentially reproducing images in the same format, and hence the paper is advanced through the apparatus in steps of constant magnitude. When copies of varying size are required, apparatus must be used which work with loose, cut sheets of paper and which require a higher contribution of manual labor. In recent times, however, the need of photographic copies in varying sizes has considerably increased. One example is found in newspapers, where the photographs intended for publication are required in the intended size of the printing block. This requirement calls for a copying apparatus through which the paper is advanced in steps of varying magnitude, in which the size of the copy can be changed readily and often and by which the amount of copying paper which goes to waste can be reduced to an absolute minimum.

The object of the present invention is to fulfill the aforementioned requirement and in accordance therewith there is provided an apparatus which is mainly characterized by a web advance means which includes a carrier member adapted to engage the web in the feed direction and which is capable of being moved backwards and forwards at an amplitude capable of being changed by the setting of a means adapted to determine the size of the image field on the web in such a way that the feeding distance during each cycle movement of the carrier is equal to the length of the image last exposed in the longitudinal direction of the web and possibly also a length of unexposed web for necessary outwardly projecting edge portions.

The invention will now be described with reference to accompanying drawings, in which

FIGS. 1 and 2 are so called X-ray front and rear views in perspective of a copying apparatus according to the invention and

FIG. 3 is a section taken through the line III—III in FIG. 2.

The exemplary embodiment of the copying apparatus of the invention is provided with a magazine 1 for storage rolls 2 of copying paper or other copying material. The storage reels 2 have different widths and are mounted on shafts (not shown) so that a web 3 of copying paper can be passed from anyone of the reels 2, over a guide roller 4 up to a copying platen 5. The web 3 is then passed over a guide roller 6 and is taken up on a winding spool 7, which is driven by an electric motor 8 via a V-belt 9. The electric motor is only capable of winding in advanced lengths of the web and maintaining the tension therein.

The web is fed through the apparatus by means of an intermittently functioning feed means, which comprises a carrier or transport device 10 mounted on one end of a single-arm lever 11 journaled on a shaft 12. The drive bar 14 of a double-action hydrostatic diaphragm motor 15 is supported on a stud 13 arranged on the lever arm and forming part of a stud- and -slot connection arrangement. Each side of the diaphragm is connected alternately over conduits 16 and 17 to the pressure in the water line, the rod or bar 14, which is connected with the center point of the diaphragm, being imparted a reciprocatory movement which is

transmitted to the lever arm 11 by means of rollers 18 and 19. The conduits 16 and 17 are connected to a valve (not shown), which can be adjusted automatically after each exposure of the image to be copied. Lateral movement of the lever arm is guided by a guide structure 20. The amplitude of the movement is restricted by an abutment member 21 which has two positions of adjustment and an abutment member 22 which can be adjusted to arbitrary positions between its two end positions. The carrier 10 comprises two elements 23 and 24 which are movable in relation to each other, of which elements one, 23, is arranged above the web and the other, 24, is located beneath the web. During feeding movement of the carrier 10, the element 24 is held urged against the element 23 by means of a magnetic force, in a conventional manner so as to engage the web and thereby move the same. For example, U.S. Pat. No. 2,827,291 to Wilson et al. shows a conventional manner of causing a sheet member to be transported by electromagnetic means which, in effect, clamps the sheet between an electromagnet and a shoe or plate attracted to the electromagnet. Such an electromagnet-plate arrangement is well adapted for use in the present environment. Thus, the electromagnet member 23 attracts the plate 24 to it and thereby firmly grips the web 3. Then, when the lever is moved in feeding direction, the web is carried along. On return movement of the web, the electromagnet is deenergized. During the return movement of the carrier 10, the element 24 is released and disengaged from the web.

Illustrated in FIG. 1 by chain lines is a beam of light 25 which emanates from an amplifying apparatus or other suitable projector (not shown). The light image projected onto the web 3 is masked in the longitudinal direction of the web to the desired image field by a stationary masking strip 26 and a movable masking strip 27. The image field 28 is restricted laterally by movable guide strips 29 adapted to guide the edges of the web 3, and for which purpose the guide strips are provided with vertical guide surfaces 30. In order to mask an edge portion so that a white edge is obtained, the strips may be provided with a horizontal flange 31. The guide strips 29 rest in recesses 32 in the platen 5. These recesses are so arranged in relation to each other that the guide strips can adopt a mutual spacing which corresponds to the widths of the different supply reels 2. To protect the web 3 from exposure before it is located in the image field 28 there is provided a curtain 33 capable of being attached to the strip 27 and which runs over a roller 34 so as to constantly accompany the strip as it is adjusted.

The adjustable masking strip 27 is pivotally connected to a slide 35, which is mounted on two guides 36 disposed parallel with the web 3. The slide is in threaded engagement with a lead screw 37 which is mounted in two attachments 38 and provided with a wheel 39 by which it can be rotated. The slide 35 carries a rod 40 extending parallel with the direction of movement and mounted in one attachment 38 and supporting the abutment 22. The abutment 22 accompanies the masking strip 27 when said strip is adjusted, thereby changing the amplitude of the carrier 10, so that said amplitude coincides with the length of the image last exposed. In this way there is obtained a feed rate which constantly coincides with the amount of

paper consumed. In order to obtain an unexposed portion, i.e. white edges, between each image the abutment 21 can be adjusted in two separate positions, in one position of which a white edge is obtained on the copy while in the other position no white edge is obtained. When wishing to make adjustments to the field transversally of the feed direction the web is taken instead from one of the remaining reels in the magazine 1 and the guide strips 29 moved accordingly.

The invention is not restricted to the illustrated embodiment. Thus, the feed means may comprise any reciprocating carrier means, the amplitude of which can be altered by the size of the image field. Similarly adjustment of the image field can be transmitted to the feed means in a manner different to that described.

We claim:

1. A copying apparatus for continuously reproducing images on a web of copying paper or the like comprising a carrier for engaging a web only in its forward feed direction, means for moving said carrier backwards and forwards; means for determining size of image field on said web, abutment means coupled to said means for determining the size of image field for providing a carrier feeding distance during each cycle of movement of the carrier equal at least to the size of image last exposed in the longitudinal direction of said web; an adjustable masking strip, forming a portion of said means for determining the size of image field, for masking a light image projected on the web transversely thereof; said means for moving comprising a reciprocating member on which said carrier is arranged; said abutment means comprising two abutment members for restricting movement of said reciprocating member in either direction, one of said abutment members being movable and connected with said adjustable masking strip, the other of said abutment members being adjustable between certain preselected stationary positions; a slide, to which said adjustable masking strip is secured, mounted on at least one guide structure, said guide structure being disposed parallel with said web; a lead screw, forming part of said means for determining

size of image field, in engagement with said guide structure for adjusting the image field in the longitudinal direction of said web; and a rod having a free end carried by said slide, said rod extending parallel with the direction of movement of said web and carrying at its free end said one abutment member.

2. The apparatus according to claim 1, wherein said other abutment member can be adjusted between a forward position, in which the amplitude of the carrier is equal to the length of set image field in the longitudinal direction of the web, and a withdrawn position in which the amplitude of the carrier is greater than the length of the image field by an amount necessary to provide an outwardly projecting unexposed edge portion on the copy.

3. The apparatus according to claim 1, wherein the means for moving comprises a lever arm having a free end mounted at a distance from the web, the free end carrying the carrier, the lever arm being connected with a motor which delivers an alternating movement.

4. The apparatus according to claim 1, wherein the image field transversely of the web is restricted by two movable guide strips which rest in recesses in a surface located beneath the web and which form edge guide means for the web, for which purpose the guide strips are provided with vertical guide surfaces.

5. The apparatus according to claim 4, wherein the guide strips are provided with a horizontal flange above a vertical guide surface, said flange projecting in over the surface of the web to mask an edge portion of the web.

6. The apparatus according to claim 4, including a number of recesses disposed in such spaced relationship with each other that the guide strips can adopt mutual positions which correspond to the widths of separate webs which can be alternatively fed through the apparatus.

7. The apparatus according to claim 6, including a magazine having a plurality of storage means for storage reels supporting webs of different widths which can be fed as alternative webs through the apparatus.

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