Sept. 29, 1970 W. MOLL 3,531,200

CIRCULAR EXPOSING DEVICE

Filed Nov. 30, 1967 2 Sheets-Sheet 1

Fig. 1

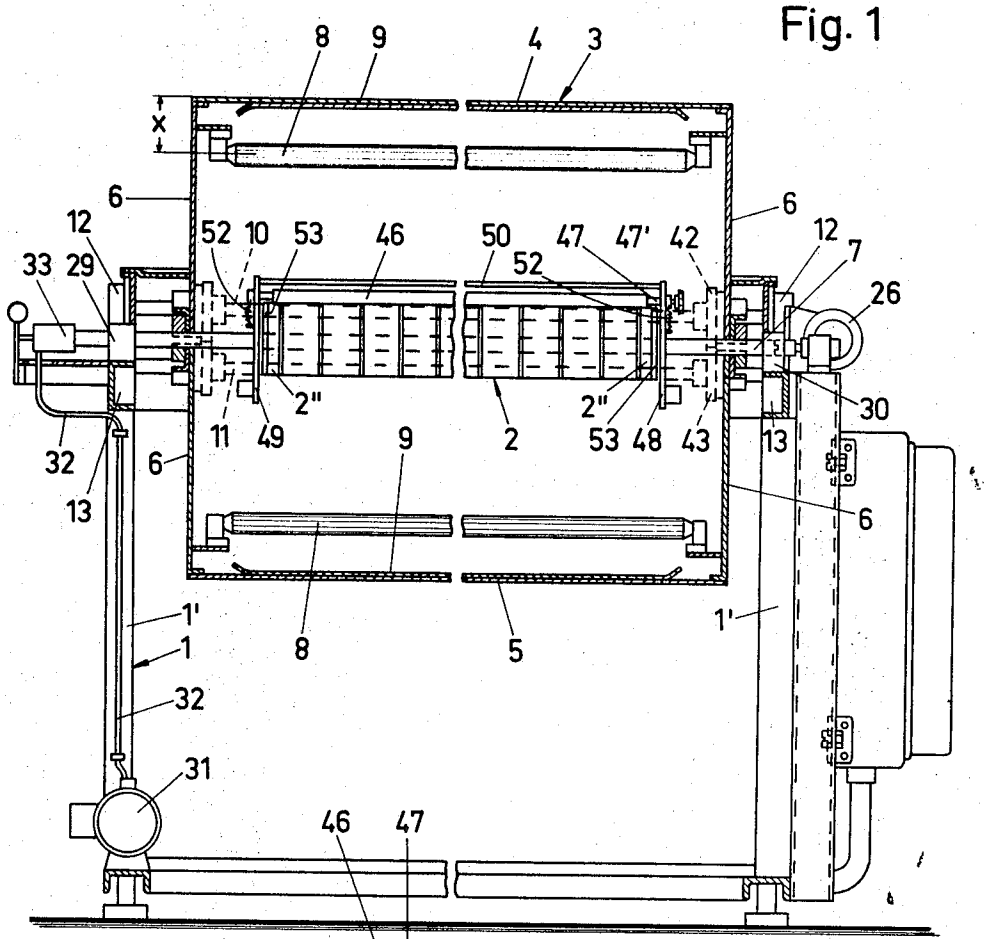
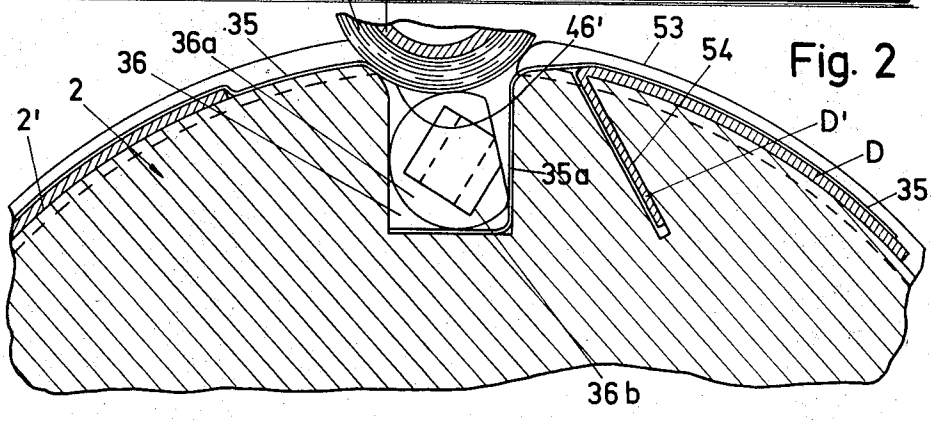


Fig. 2



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Fig. 3

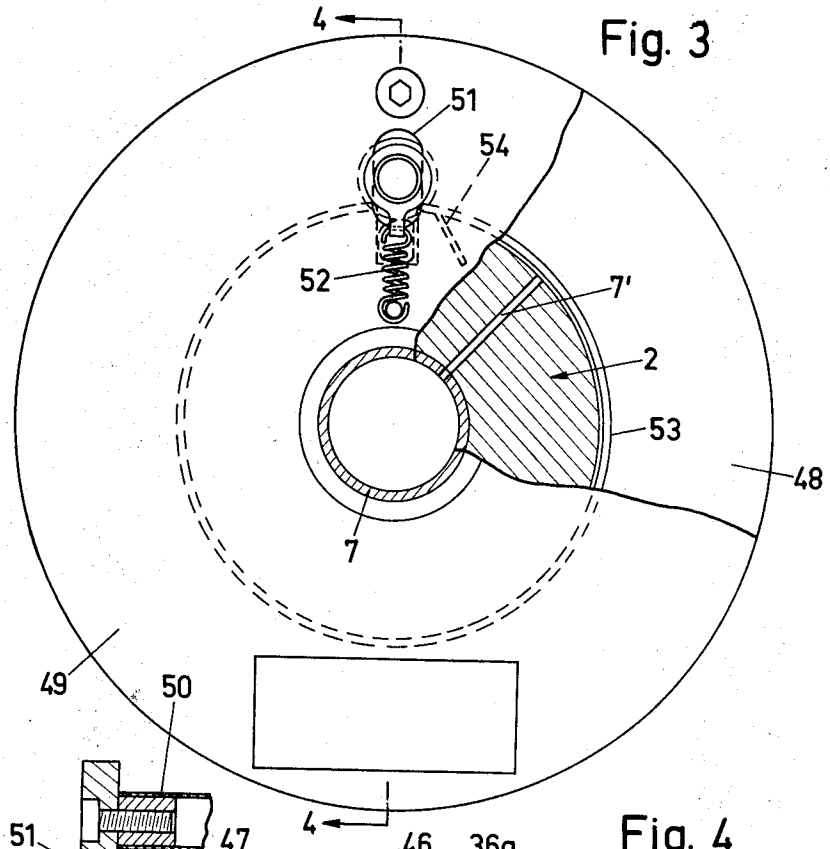
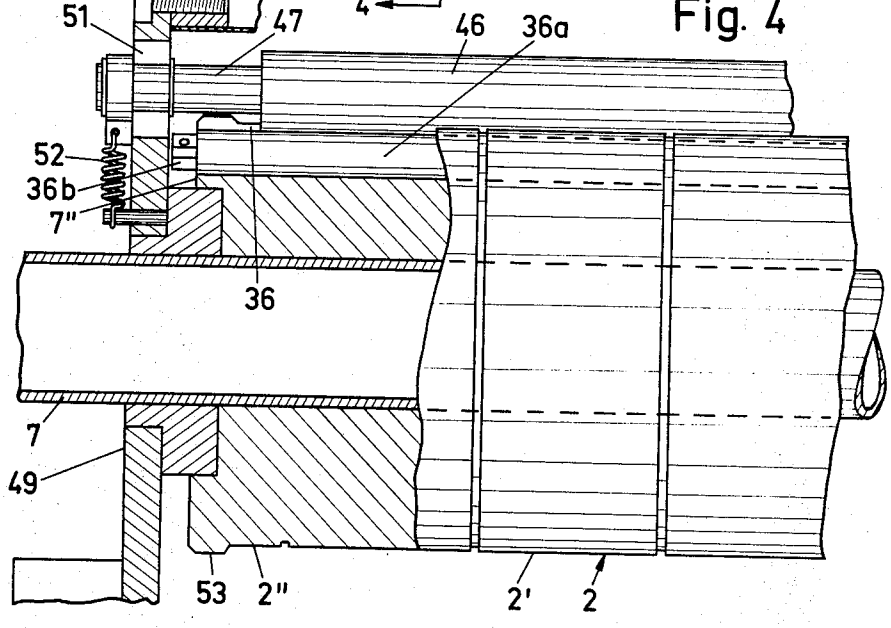


Fig. 4



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CIRCULAR EXPOSING DEVICE

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Int. Cl. G03b 27/04
U.S. Cl. 355—85 6 Claims

ABSTRACT OF THE DISCLOSURE

A printing device comprising a supporting cylinder rotatably mounted about an axle with a cylindrical envelope face for printing plates and having a longitudinal groove at a portion of the periphery of the envelope face. A clamping rod is disposed in the groove and holds the face end of a transparent foil covering the printing plates and wound from a storage roller. The latter is carried by extension arms mounted on the cylinder axle and rollably positioned on the envelope face. The rod is snappingly retained in the longitudinal groove with a part of its peripheral face entering the groove by a spring force when the transparent foil surrounds the supporting cylinder.

The present invention relates to a circular exposing device, in general, and to such device for photo polymer printing plates, in particular.

In the copending patent application, Ser. No. 460,385, by Kurt Fries and Helmar Weis, now Pat. No. 3,369,471, dated Feb. 20, 1968, a circular exposing device for photo polymer printing plates has been disclosed, which comprises a rotatable supporting cylinder, which has a shaft and is adapted to carry printing plates. Two tiltable half cups are coupled together for a mutual weight balance and define in their closed position a hollow disposed coaxially with the longitudinal axis of the supporting cylinder, and surround the supporting cylinder. The hollow cylinder has closed end faces and contains a plurality of lighting tubes disposed around the outside of and about the length of the supporting cylinder and is mounted along a curved line. Thus the previous application is concerned with a circular exposing device for photopolymer printing plates with a rotatable supporting cylinder for printing plates, to which are coordinated outside disposed lighting tubes aligned preferably along a cylindrical jacket face and of about the length of the supporting cylinder, on which the photo polymer printing plates are secured by means of a clear view foil covering the printing plate and disposed about the supporting cylinder thereby. Arms are mounted on the axle of the supporting cylinder, which arms carry a clear view foil-storing roller rolling on the envelope face of the cylinder, which storage roller is held snappingly in one position, in which the supporting cylinder is almost completely surounded by the clear view foil.

In the solution disclosed in the above-mentioned prior application the end of the clear view foil secured to the supporting cylinder is retained there in an insert groove with one of its longitudinal edges. The insert groove is formed by a longitudinal ledge provided on the other side of the supporting cylinder. The corresponding holding of the end of the clear view foil brings about certain difficulties concerning the mounting, particularly when the clear view foil is to be removed from the supporting cylinder for instance for clearing. The snap-in holding of the clear view foil storage roll takes place in the arrangement of the prior patent application by particular springs, which are disposed on the end faces of the supporting cylinder and snap-in a suitable manner on the arms. Also the particular snap-in holding of the end position of the clear view foil brings about certain drawbacks as to manufacture, as well as to its use. First of all, however, the holding of the clear view foil end, secured on the supporting cylinder side, in combination with the corresponding holding in the unwound position of the clear view foil-storage roller brings about the drawback, that a very appreciable peripheral range of the supporting cylinder cannot be used as exposing zone. This is particularly disadvantageous, if one deals with circular exposing devices for the so-called endless printing, aside from the fact, that always larger diameters of the supporting cylinder must be chosen in view of the lost zone of the peripheral face.

It is one object of the present invention to provide a circular exposing device, which, while simultaneously avoiding these drawbacks, and by further advancing the invention of said prior application, the supporting cylinder has a longitudinal groove for receiving a clamping rod holding the end of the foil, whereby the storage roller spring biased in a radially inward direction enters the groove upon the unwound clear view foil, with one part of its peripheral face.

By this arrangement a more favorable and also better usable design of a basically similar circular exposing device is created. The end secured at the supporting cylinder side of the clear view foil can be secured in the longitudinal groove without any effort and can be released therefrom. A clean fold free holding of this foil end does not create any difficulties. The longitudinal groove of the supporting cylinder serves additionally to snappingly fix therein the clear view foil storage roller in its unwound end position, in which position a part of the periphery of the clear view foil storage roller partially enters into this longitudinal groove. In this manner reverse winding or a displacement of the clear view foil storage roller is prevented during the rotary movement of the supporting cylinder the latter being necessary for exposing purposes. The securing end of the clear view foil and of the storage roller on the supporting cylinder side are practically radially disposed relative to each other, so that the non-exposable peripheral zone of the supporting cylinder is reduced to a minimum.

An advantageous design comprises thereby in accordance with the present invention a feature, according to which the clamping rod comprises a flattened round profile. This solution enhances first of all the fold-free holding of the clear view foil end.

It is furthermore an advantage of the present invention that the clamping rod, projecting beyond the end face of the supporting cylinder, forms operating faces with its projecting end for engagement of a tool. This permits an easy release and also a stiff clamp bracing.

In order to assure in connection with the nearly complete use of the peripheral face of the supporting cylinder a tensioning of the printing plate parallel to the axis, in accordance with the present invention an insert slot is provided in the supporting cylinder wall extending substantially parallel to the longitudinal groove and adjacent thereto. In this insert slot the angularly bent end of a printing plate or an abutment ruler can be inserted. In spite of the provision of this insert slot, that part of the periphery of the supporting cylinder which is available for the exposure, is still appreciably larger than that of the embodiment disclosed in the above mentioned prior application.

A constructively advantageous solution which permits also the clean unwinding of clear view foil resides, in accordance with the present invention, in the fact, that the arms formed of disc-shaped plates are connected with each other by means of a stabilizing rod.

It is yet another object of the present invention to pro-

vide a circular exposing device, wherein the suporting cylinder has at its ends annular beads. The shaft of the clear view foil-storage roller resiliently biased in axial direction, can roll up on the latter during unwinding and winding, respectively, of the clear view foil.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIG. 1 is a longitudinal elevation of a circular exposing device broken away in part;

FIG. 2 is a fragmentary section of the end of the supporting cylinder, shown at an enlarged scale;

FIG. 3 is an end view, partially in section, of a supporting cylinder; and

FIG. 4 is a section along the lines 4—4 of FIG. 3.

Referring now to the drawings, and more particularly to FIG. 1, the circular exposing device comprises a foot frame **1**, a rotatable supporting cylinder **2**, and a surrounding hollow cylinder **3**.

The hollow cylinder **3** consists of two half cups **4** and **5**, which are tiltable towards each other, as well as coupled together for a mutual weight balance and congruent to each other. The half cups **4** and **5** are closed at their end side by means of walls **6**. The division plane of the hollow cylinder **3** is disposed at the height of the axle **7** for a supporting cylinder **2**.

The inner sides of the two half cups **4** and **5** are equipped at equal spacings with a plurality of ultraviolet lighting tubes **8** arranged coaxially to the supporting cylinder axle **7**, the ultraviolet light of the lighting tubes **8** impinging on all sides and equally upon the supporting cylinder **2** and a photo polymer printing plate D held thereon, respectively. The lighting tubes **8** are disposed at the distance *x* from the shell envelope. The free space formed thereby serves the reception of reflectors **9**. The latter are mounted directly on the inner sides of the cups and have therefore the same coaxial disposal to the supporting cylinder axle **7**, as the two half cups **4** and **5**.

Both half cups **4** and **5** are mounted separately and in particular about the axles **10** and **11**, respectively. The latter enter with their free ends in bearing bushings **12** and **13**, which are flanged to supporting columns **1'** projecting from the foot frame **1** and formed in a fortified manner.

The half cups **4** and **5** are coupled together for a mutual weight balance. Equally large weight balancing pinions **42** and **43** wedged rigidly to the bearing axles **10** and **11** and meshing each other serve this purpose.

The supporting cylinder **2** receiving the photo polymer-supporting plate D, to be exposed, is driven by an electric motor **26** with constant speed. The axle of the supporting cylinder **2** is guided in plain bearings **29** and **30**, which are open and which permit the removal of the supporting cylinder **2**.

The supporting cylinder **2** is designed as a so-called vacuum cylinder. The pressure below atmospheric pressure is produced in a compressor **31** disposed at the foot frame **1**. The compressor **31** is in connection with the hollow axle **7** of the supporting cylinder **2** by means of a flexible conduit **32** and a sluice **33**. Radial connecting channels **7'** (FIG. 3) lead from the axle **7** to the periphery of the supporting cylinder body.

Referring now to the drawings, and more particularly to FIG. 2, a clear view foil **35** is disposed on the outside on the envelope face of the supporting cylinder **2**. The clear view foil **35** is secured in a longitudinal groove **36**. The longitudinal groove **36** sits in the supporting cylinder **2**. A clamping rod **36*a*** serves the securing of the clear view foil **35**. The clamping rod **36*a*** comprises a flattened round profile. It projects at one end beyond the end face **7''** (FIG. 4) of the supporting cylinder **2**. It forms the operating faces **36*b*** for applying a tool with this projecting end. By applying the tool the clamping rod **36*a*** can be brought into an edged position, shown in FIG. 2. The clear view foil end **35*a*** is thereby secured between the wall of the longitudinal groove **36** and the clamping rod **36*a***. The photo polymer-printing plate D is disposed between the envelope face **2'** of the supporting cylinder **2** and the clear view foil **35**.

The end, disposed opposite the securing end of the clear view foil **35**, is wound up on a storage roller **46** of the clear view foil. The storage roller **46** sits on the supporting shaft **47**. The latter is mounted in the disc-like shaped extension arms **48** and **49**. The latter are mounted in turn again on the supporting cylinder axle **7**. A stabilizing rod **50** connects the two disc-like extension arms **48** and **49** free of edging.

Referring now again to the drawings, and more particularly to FIGS. 3 and 4, the shaft **47** of the storage roller **46** is displaceable in the longitudinal slots **51** of the discs **48** and **49** radially inwardly in the direction of the axis of the supporting cylinder and is charged by the spring **52** in this direction. By this arrangement it is brought about that the storage roller **46** rolls up relative to the envelope face **2'** of the supporting cylinder **2**, if the discs **48** and **49** are rotated about the axle **7**.

By means of this rotary movement, the clear view foil is wound around the supporting cylinder **2**. The completely surrounding position is shown in FIG. 2. During the surrounding movement, the clear view foil **35** rolls off the storage roller **46** and adheres smoothly about the supporting cylinder **2**. The pulling force occurring thereby favors the clamping effect on the secured foil.

In the end-unwinding position, the part envelope face **46'** sits resiliently in the longitudinal groove **36** of the supporting cylinder **2**. By this arrangement this end-unwinding position is fixed without additional means. It remains secured even if the supporting cylinder **2** turns during the exposure of the photo polymer-printing plate. A corded handwheel **47'** of the shaft **47** of the storage rollers simplifies the winding and unwinding respectively of the clear view foil.

The supporting cylinder **2** has at its ends on the cylinder envelope face **2'** projecting annular beads **53**. The storage roller-shaft **47** runs on the latter.

The supporting cylinder **2** is slightly fluted on its surface up to the smooth margin zones. This flutting permits complete suction of the air present between the clear view foil **35** and the supporting cylinder envelope face **2'**, so that optic disturbing factors are eliminated, which would interfere with the equalized exposure of the printing plate D. Also the clear view foil and, thereby, the printing plate D is pressed rigidly onto the supporting cylinder **2**. The smooth edge zones **24** bring about a sufficient sealing of the clear view foil engaging thereon.

An insert slot **54** is provided in the supporting cylinder **2** adjacent and parallel to the longitudinal groove **36**. The present, angularly bent end D' of the printing plate D can enter the insert slot **54**. Likewise an abutment ruler can be inserted therein, which abutment ruler projects only slightly beyond the supporting cylinder envelope face **2'**.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. A circular exposing device, comprising

photo polymer-printing plates including a rotating supporting cylinder having a cylinder envelope face for said printing plates,

said supporting cylinder being mounted on an axle,

a clear view foil covering said printing plates and disposed about said supporting cylinder, as well as retaining said photo polymer-printing plates,

extension arms mounted on said axle of said supporting cylinder,

a clear view foil-storage roller having said clear view foil wound thereon rolling up on the envelope face of said supporting cylinder and carried by said extension arms,

said supporting cylinder having a longitudinal groove in a portion of its periphery,

a clamping rod disposed in said longitudinal groove and holding one end of said clear view foil,

said storage roller being spring biased in a radially inward direction, and

said storage roller having a length at most equal to the length of said longitudinal groove and positioned in snapped-in retention in said longitudinal groove with a part of its peripheral face therein when said clear view foil nearly completely surrounds said supporting cylinder.

2. The circular exposing device, as set forth in claim **1**, wherein

said clamping rod comprises a flattened round profile.

3. The circular exposing device, as set forth in claim **1**, wherein

said clamping rod has an end projecting beyond the end face of said supporting cylinder and defines with said projecting end operating faces adapted for engagement of a tool.

4. The circular exposing device, as set forth in claim **1**, wherein

said supporting cylinder has an insert slot disposed parallel and adjacent to said longitudinal groove.

5. The circular exposing device, as set forth in claim **1**, which includes

a stabilizing rod, and

said extension arms comprise disc-shaped plates which are connected by said stabilizing rod.

6. The circular exposing device, as set forth in claim **1**, wherein

said supporting cylinder has at its end annular beads projecting from the face of the cylinder envelope.

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355—104