

Feb. 5, 1963

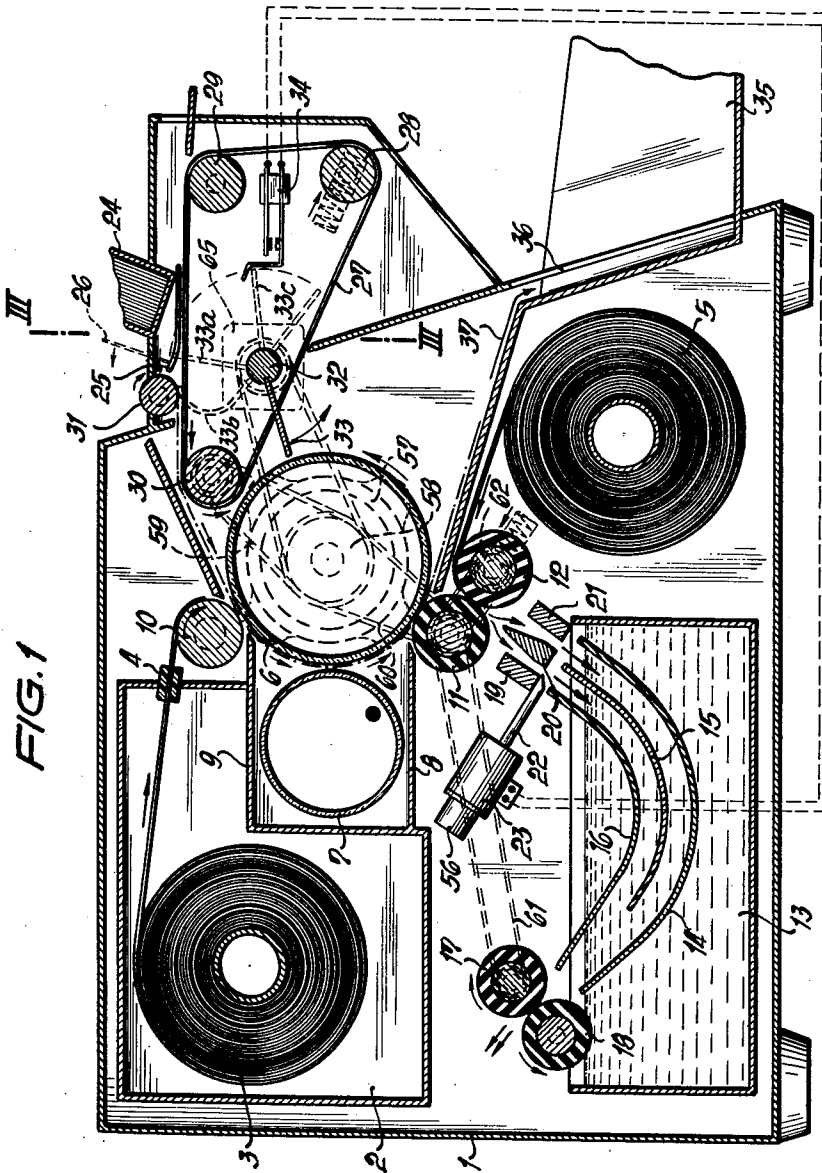
W. LIMBERGER

3,076,400

APPARATUS FOR MAKING COPIES

Filed May 23, 1960

4 Sheets-Sheet 1



INVENTOR:
Walter Limberger,
by Singer, Stern
& Carlberg, Attorneys.

Feb. 5, 1963

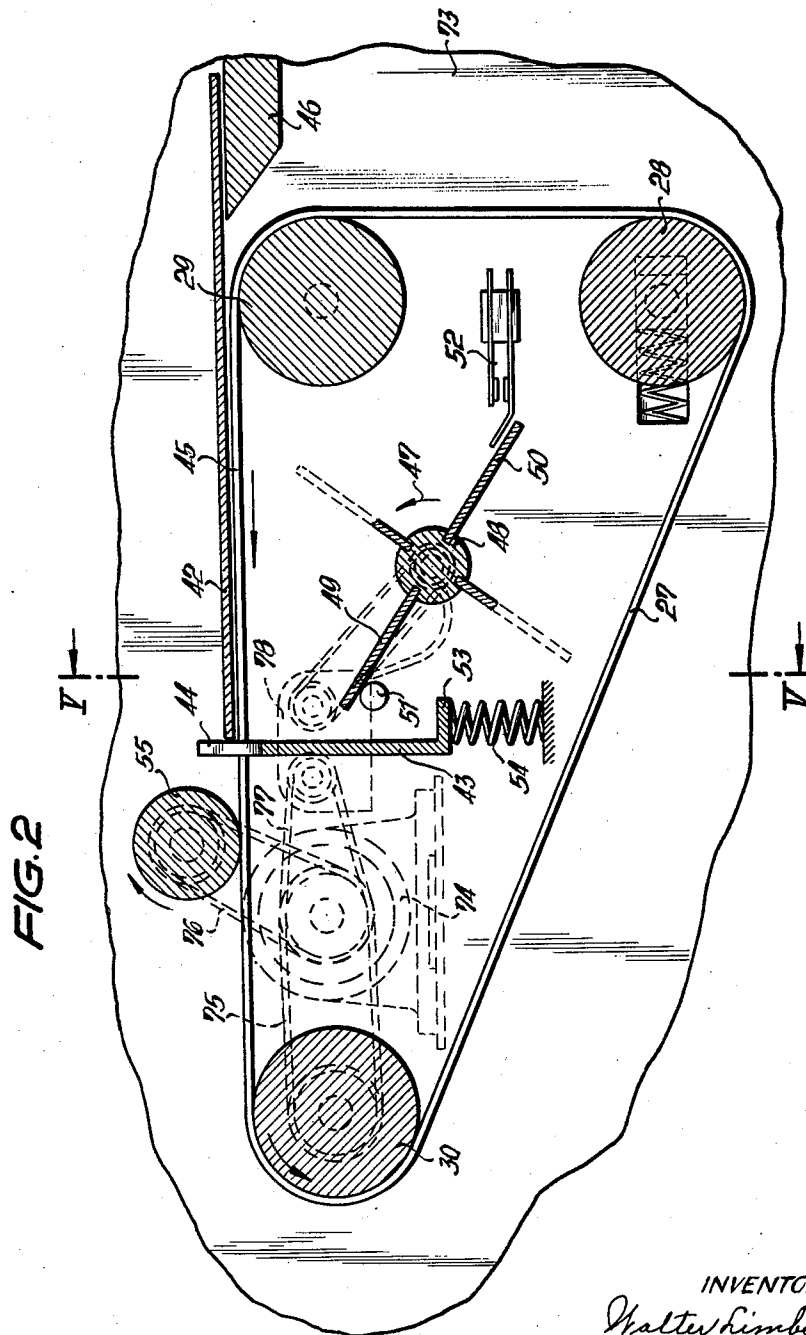
W. LIMBERGER

3,076,400

APPARATUS FOR MAKING COPIES

Filed May 23, 1960

4 Sheets-Sheet 2



INVENTOR:

Walter Limberger,
by Singer, Stern & Carlberg,
Attorneys.

Feb. 5, 1963

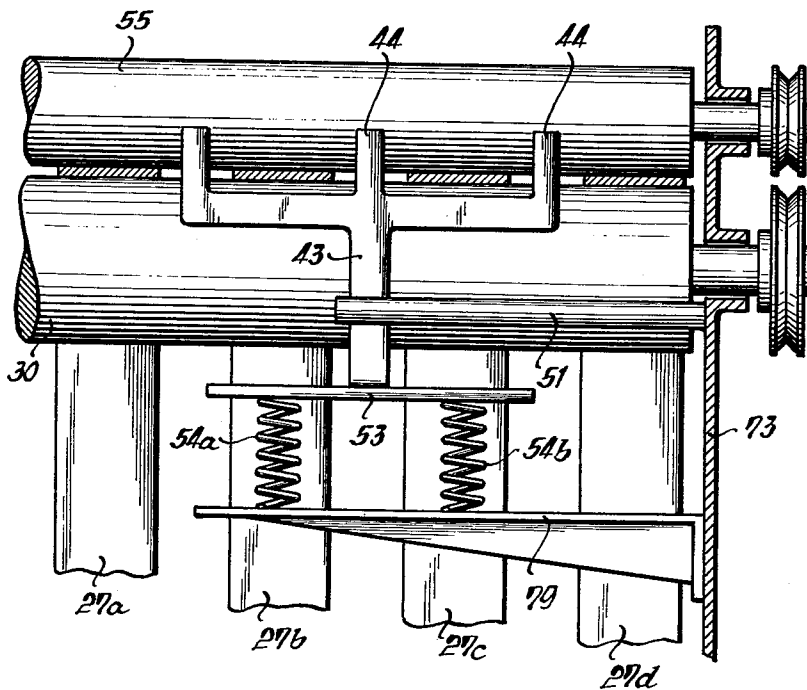
W. LIMBERGER
APPARATUS FOR MAKING COPIES

3,076,400

Filed May 23, 1960

4 Sheets-Sheet 4

FIG. 5



INVENTOR:
Walter Limberger,
by Singer, Sten Carlberg,
Attorneys.

1

3,076,400

APPARATUS FOR MAKING COPIES

Walter Limberger, Hamburg, Germany, assignor to

Lumoprint Zindler KG., Hamburg, Germany

Filed May 23, 1960, Ser. No. 31,165

Claims priority, application Germany May 29, 1959

11 Claims. (Cl. 95-75)

This invention relates to an apparatus for making copies using tape-like layer carriers which are cut according to the size of the image exposed thereon.

Advantageously a developing device is arranged within this apparatus, operating according to the diffusion method. In addition the apparatus comprises supply rollers for the tape-like positive and negative layer carriers and an exposure device past which the negative layer carrier and the original are guided.

Known apparatuses of this type show an extremely complex construction, as special problems arise in the mutual correlation of the cutting devices for the positive and the negative layer carrier. Furthermore special means must be provided for guiding these layer carriers together in a mating manner.

One object of the invention is to provide an apparatus adapted to transfer in rapid succession a great number of copies from a sheet-like original to tape-like layer carriers, said apparatus showing a simplified construction as compared with known apparatuses.

Another object of the invention is to provide an apparatus in which the original, from which a copy is to be made, is placed on a supporting surface from which the original is fed into the apparatus by means disposed within the housing, which means not only cause the feeding of the original but at the same time actuate the cutting device also. Besides this said means may be readily adjusted to different sizes of the originals.

One advantage of the invention must be seen in that the operating person may place an original on the supporting surface in a position of readiness, after a preceding original has been fed into the apparatus, without having to care at which moment this original should be fed into the operating means of the apparatus.

In this a special object of the invention is to provide an apparatus in which a plurality of originals, all of which having the same size, may simultaneously be passed through the apparatus in immediate succession.

According to the invention this object is achieved in that for cutting the tape-like positive and negative layer carriers only one knife is provided which is operated in dependence of the introduction, or respectively the passage, of the original.

The construction of an apparatus comprising a common knife associated with the positive and negative layer carrier will already greatly simplify the apparatus according to the invention as compared with known constructions, at the same gaining the functional advantage that the layer carriers fed in form of a tape are cut with certainty into exactly equal sections by the common cut without additional means and in addition to this the advantageous feature of controlling this knife in dependence on the introduction, or the passage respectively, of the original is obtained. According to an especially advantageous embodiment also the introduction of the original into the transporting device associated therewith is controlled by an element rotating within the apparatus, said element causing the knife to be actuated.

According to a preferred embodiment the transporting device for the original is provided with a supporting surface for the original and an abutment associated with the supporting surface for actuating the knife. If the transporting device, which may for example be an endless belt, is continuously moving the original may be

2

placed on said supporting surface manually, or it may be fed from a stack automatically in such a manner that always one original is taken from the supply stack in dependence on the movement of said abutment and is placed into a position of readiness.

According to an especially preferred embodiment a stationary supporting surface for the original is provided, from which the original is fed in dependence on the drive of the apparatus, for example by a synchronously rotating element, which, at the same time, serves to actuate the knife. This embodiment is of advantage in that the original is fed into the apparatus from a stationary supporting surface, which is independent of the movement of a transporting element, whereby a defined position of the original on this support is ascertained.

According to an especially preferred embodiment of the invention one original of a supply of originals stored in a stack holder is fed in dependence on the drive of the apparatus by the switch element for actuating the knife which will effect to introduce an original into the apparatus from its position of readiness. In this the original may be brought into the position of readiness either manually or automatically, whereby the automatic feeding of an original may be effected in dependence on the introduction of a preceding original into the apparatus.

According to an especially preferred embodiment said switch element has the form of a turnstile, or a disc with cams, the circumferential speed of which being such, with respect to the length of the image to be exposed, that the actuation of the knife is retarded a certain amount relative the feeding of the original.

Preferably the circumferential speed of the disc or the turnstile is adjustable, for example by a gear, so that it may be adapted to differing sizes of the original. According to another embodiment the cams of the disc, or the arms of the turnstile are adjustable. In this it should be noted, that if two sizes, for example DIN A4 and DIN A3, are to be copied, the length to be exposed is doubled which may be achieved by a symmetrical arrangement, or respectively by removing intermediate arms or cams.

According to an advantageous construction the cams or arms, forming for example a rake-like structure, will pass through slot-like supporting and/or transporting elements for the original leading the latter between special transporting means effecting the further advance of the original.

According to a preferred embodiment the arms of the turnstile, or respectively the cams of the disc, are made of elastic material forming force accumulators, said arms or cams becoming preferably pretensioned upon engaging the supporting surface, or feeding the original towards a transporting element, so that on the one hand a sudden actuation of the supporting surface is obtained, or on the other hand a forward movement is effected for feeding the original under pressure action thereon towards a transporting element.

According to an advantageous embodiment these arms or cams cooperate for example with a delay switch arranged within the operating circuit of the actuating device for the knife, for example an electric magnet.

According to an especially advantageous embodiment the positive and the negative layer carrier are clamped together between transporting rollers disposed in front of the knife, whereby a defined position of the two layer carriers with respect to each other is obtained. If these transporting rollers and the knife are arranged between the exposure device and the developing device a preferred embodiment provides to use the negative layer carrier as guiding and pressing means for the original, when it is

passed through the exposure device, thus avoiding any additional elements.

Further advantages and features of the invention will become evident from the following description of several different embodiments shown in the accompanying drawings by way of example only, in which only those parts are shown schematically which are essential for the function of the apparatus.

In the drawings are:

FIG. 1 a sectional side view of the apparatus according to the invention,

FIG. 2 a sectional detail of a part of the apparatus according to FIG. 1 in an enlarged scale showing however a different construction for introducing the original,

FIG. 3 a sectional part view along line III—III in

FIG. 1 a sectional side view of the apparatus according for clarity.

FIG. 4 a sectional top view along line IV—IV in FIG. 3 but only for illustrating the supporting surface shown in this figure,

FIG. 5 a sectional part view along line V—V in FIG. 4.

Referring now to FIG. 1 it will be noted that a supply roll 3 of the negative layer carrier is arranged within a light-proof chamber 2 disposed in the interior of the apparatus housing 1. An outlet slot 4 for the negative layer carrier is provided with means for passing the tape of the negative layer carrier therethrough in a light-proof manner, in order to prevent any light to get into the chamber.

In addition to this a supply roll 5 for the positive layer carrier is arranged within the housing. Between the chamber 2 and the supply roll 5 an exposure device is disposed, comprising a rotatable and preferably transparent cylinder 6 adjacent one side of which a light source 7 is arranged. Suitably this light source is arranged within a chamber between walls 8 and 9 which are extending close to the cylinder 6, so that the exit of light out of the chamber containing the light source 7 is substantially prevented. It is possible however to construct the exposure device in a different way also, in which for example the light source is provided with a screen.

An additional seal against the exit of the light is formed by rollers 10 and 11 which are elastically engaging the cylinder 6 and are arranged in front of the slots between the ends of the walls 8 and 9 and the cylinder 6.

By the pressure of the rollers 10 and 11 against the cylinder 6 the negative layer carrier guided over these rollers is kept in tensioned engagement with the cylinder 6. In this it is possible to drive the roller 11 relative to the roller 10 a little faster in order to assure the maintenance of the tension. It is for example also possible to merely drive the roller 11 while the roller 10 is idling the tension being effected by breaking the movement of the supply roller 3.

A roller 12 cooperates with the roller 11 both rollers 10 and 11 being elastically urged together. The roller 12 serves to guide the positive layer carrier coming from the supply roll 5 so that the negative layer carrier and the positive layer carrier are fed and urged together between the driven rollers 11 and 12.

Substantially below the chamber 2 a diffusion developing device is arranged through which the layer carriers are guided by the guide elements 14, 15 and 16 towards a pair of squeezing and transporting rollers 17 and 18 which will squeeze-off the developing liquid and at the same time transport the layer carriers which are lying together and are cut-off from the tape out of the apparatus.

Between the pair of rollers 11 and 12 and the entrance openings of the guide paths formed by the guide elements 14, 15 and 16 the cutting device is disposed. It comprises for example an abutment 19, two stationary counter knives 20 and 21, and one movable knife 22 which will sever the positive and negative layer carrier when

the knife 22 is moved. One of the layer carriers is for example guided in a channel formed between the abutment 19 and the counter knife 20, while the other one is guided in a channel formed between the counter knives 20 and 21, these channels forming extensions of the guide paths formed by the guide elements 14, 15 and 16. It is emphasized however, that other arrangements of the cutting device are possible without departing from the scope of the invention.

The movable knife 22 may for instance be actuated by a D.C. electric lifting magnet which will be energized in a manner to be described yet.

According to FIG. 1 a stack holder 24 having a supporting surface 25 for the originals is arranged on the side of the housing 1 for feeding the original. One original 26 may always be placed on the supporting surface in a position of readiness.

Below the supporting surface 25 a transporting element 27 for the original is arranged. This transporting element consists of one or more belts arranged side by side in spaced relation and guided over rollers 28, 29 and 30. At least one of these rollers, for example the roller 30, is driven. Furthermore one of the rollers 28, 29, 30 is supported displaceably, resilient means acting thereon and pressing this roller outwardly for tensioning the belts 27.

In the direction of advance of the belt or belts, behind the supporting surface 25 there is for example a transport roller 31 arranged running on the belt or belts being driven in such a way that the circumferential speed of the roller 31 corresponds with the speed of advance of the belt or belts.

FIG. 1 shows that the supporting surface 25 is disposed above the belt or belts so that the belts may freely move below the supporting surface. Between the end of the supporting surface 25 and the roller 31 a sufficiently wide slot is provided for feeding an original 26 between the roller 31 and the belt or belts. This feeding is effected by a rotating disc 32. This rotating disc 32 is provided with at least one arm 33 the length which being greater than the distance between the axis of the disc 32 and the roller 31. The arm 33 is made of elastic material so that it will be bent, when moved past the roller 31. The end of the arm 33 is preferably forming a rake, each prong being adapted to pass through the space between the belts and slots provided in the supporting surface 25. If the arm 33 is formed rod-like it will advantageously be arranged in the middle of the device and moves through a middle slot arranged between two belts 27 and in the supporting surface, as it is shown in FIGS. 3 and 4.

FIG. 1 shows the arm 33 in different positions of the operating stage of the device, the arm not being shown completely in the different positions. 33a shows the position of the arm 33 before it engages the original being in its position of readiness, the length of the arm 33 being dimensioned so that the original 26 is surely moved along the supporting surface and will fall at the end of the supporting surface through the space formed between this end and the roller 31 upon the belt or belts 27. On continued rotation of the arm 33 it will press this original against the roller 31, the arm 33 being deformed on continued rotation of the disc 32 as shown in the position 33b, moving the original synchronously with the circumferential speed of the roller 31 between the roller 31 and the transporting belt or belts. By this it is assured that the original is moved between the transporting means 31 and 27 and in this it is especially advantageous that this movement is achieved in dependence of the movement of the device and that this is effected by an element 33 which continued rotation to the position 33c will actuate a switch 34 disposed in the operating circuit of the magnet 23.

The circumferential speed of the disc 32 is such that a certain time passes between the feeding of an original 26 and the actuation of the switch 34, corresponding to the passage of the original through the exposure device,

5

and a leading movement of the negative layer carrier in such a way that the rear edge of the image of the original exposed on the negative layer carrier will be positioned below the knife 22. For adjusting this time additional means may be provided, for example a time delay in energising the electric magnet 23. This time delay may be achieved by providing a switch 34 which is operating with a corresponding delay, or a time delay relay may be arranged in the circuit of the electric magnet. It is essential that the feeding of the original is effected by the element 33 which, after a certain rotating movement, will also actuate the electric magnet 23. By way of example FIG. 1 shows a switch arrangement 56 in the operating circuit in which time delay means and a source of current are arranged. It is also possible to provide the electric magnet 23 with a time delaying element, or to provide a time delaying relay control in the arrangement 56.

In this connection it is pointed out, that also, if occasion arises, a control of the circumferential speed of the disc 32 may be provided to achieve in this way the necessary delay of time between the feeding of the original 26 and the actuation of the switch 34.

It may be seen from FIG. 1, that several arms 33 may be arranged symmetrically, these arms being arranged in correspondence with the size of the originals to be copied. For example the selective arrangement of one or two, or respectively two or four arms provides the possibility to handle original sizes of the double or fourfold length without necessitating changes of speed in the drive of the disc 32.

The drive elements for the different parts of the apparatus have not been shown in detail. The rotating parts are driven in the directions indicated by arrows, preferably by a central drive motor which for example may be connected with the cylinder 6. It is possible to rotate the rollers 10 and 11 and the roller 30 by friction by urging them against the cylinder 6, whereby at the same time the parts having drive connection with the rollers 10, 11 and 30 (for example the belts 27 on the rollers 23, 29 and 30) will be moved. In this case the roller 12 is driven.

Behind the intermediate wall extending in the plane of FIG. 1 and serving to support the rollers drive motors may be provided or a central motor is drivingly connected with the cylinder 6 and with the rollers by belt drives or the like. Such a motor 57 is shown in dashed lines in FIG. 1. On its drive shaft several pulleys 58 are arranged which are for example directly or indirectly connected by drive belts 59, 60, 61, 62 shown in dashed lines with the pulleys arranged on the shafts of the rollers extending through said intermediate wall.

Furthermore it is pointed out that the roller 12 is displaceably supported in the direction indicated by the arrow, spring means acting thereon urging the roller 12 resiliently against the roller 11. In order to allow this movement an endless helical spring 62 may be provided for this drive.

The drives are shown in a schematical manner in FIG. 3 in which said intermediate wall 63 is partly shown. Furthermore it shows the roller 31 the shaft 64 of which is supported in the wall 63 and carries a pulley 65 connected with the motor 57 by a belt drive. It will also be noted that the schematically illustrated shaft 64' of the disc 32 is driveably connected with the drive motor 57 through a change gear 65'. This change gear is schematically shown in the drive arrangement of FIG. 1 by dashed lines and may be of any suitable type.

The end of the roller 31 remote from the intermediate wall 63 may for instance be journaled in an outer wall of the housing extending parallel to the intermediate wall. The other outer wall of the housing is denominated with 66 and shown in FIG. 3 illustrating the defined chamber for the drive elements.

It is shown in FIGS. 3 and 4 that the supporting surface 25 is provided with a plurality of spaced extensions 25a, 25b, 25c, and 25d. These extensions are at one end con-

6

nected by a lateral member 67 fastened on the intermediate wall 63. This lateral member 67 is disposed on the right side of a circle indicating in dashed lines in FIG. 1 the path of the arm 33. According to FIG. 3 the arm 33, which is also referred to as actuating member, is fastened in a not shown manner on the shaft 64', or respectively on a disc fixedly arranged on this shaft. The arm 33 is forked at its upper end having three prongs 33a arranged in spaced relation which will extend and pass through the slots between the extensions 25a, 25b, 25c, and 25d. The upper sections of the prongs 33a are elastical allowing the prongs to be deformed when passing along the roller 31, as shown in FIG. 1 in the position denominated with 33b.

In FIG. 3 the belts 27 are shown sectioned, and it will be noted that in correspondence with the number of extensions 25a, 25b, 25c, and 25d four belts 27a, 27b, 27c, and 27d are provided. By this arrangement the prongs 33a of the arm 33 may pass through the slots. The illustrated embodiment assures that the original is engaged over its entire width and evenly removed from the supporting surface 25 urging it against the roller 31.

FIG. 3 also shows in dashed lines the arrangement of the switch 34 clearly showing its positioning in the path of movement of the arm 33. The switch 34 is arranged on a bracket 68 fastened on the intermediate wall 63 in such a way that its movable actuating member 69 extends into the path of movement of the arm 33. One lead 70 is connected to the ground, while the other lead is connected with the magnet 23.

The apparatus according to the invention is characterized by an extremely simple construction, by which at the same time the operation is facilitated. The stack arrangement at the top side above the transporting arrangement 27, 30—the guide means of which must be spaced a certain amount due to the length of the arm 33—facilitates the arrangement of a receiving plate 35 below the outlet slot 36. Through this outlet slot the original will be dispensed in the direction indicated by the arrow 37 via a guide surface 38 which extends close to the roller 11 the end of said guide surface facing the exposure device serving as stripper for separating the original from the negative layer carrier. By means of this arrangement a suitable casing for the supply roll 5 of the positive layer carrier is formed at the same time.

Before starting to operate the apparatus the ends of the tape-like layer carriers are placed between the rollers 11 and 12, the negative layer carrier being laid around the cylinder 6 under tension. The layer side of the layer carriers coming from the supply rolls is in each case on the upper side so that these layer sides will contact each other in the pair of rollers 11 and 12. Then suitably an original is pulled upwardly out of the stackholder 24 over the retaining ledge 39—for example manually—and placed on the supporting surface 25. Now the apparatus may be started. The rotating disc 32 will move the original in the described manner between the transporting means 31 and 27 which will convey it in the direction indicated by the arrow 40, for example along the guide surface 41, and between the negative layer carrier, which is guided around the roller 10 and the cylinder. The negative layer carrier and the original now move past the cylinder 6 and are separated at the end of the guide surface 38. After the layer carriers have advanced so far that the end of the image exposed thereon is located below the knife 22 the switch 34 for severing the layer carriers which will be transported out of the bath container and the housing 1 by the pair of squeezing and transporting rollers 17 and 18.

Immediately after the original 26 has been fed into the apparatus another original may be taken from the stack and placed on the supporting surface. In order to reduce the distance between the succeeding images on the layer carriers to a minimum the exposure of the next following original may take place already before

the preceding image has moved into the developing device. The apparatus according to the invention may advantageously be used for producing a great number of copies in a continuous mode of operation, in which especially the immediately succeeding feeding of the originals allows that the exposures on the negative layer carrier may take place in immediate succession. The control for feeding the original and for actuating the knife 22 by one element makes it possible to work with extremely small distances between the succeeding images so that the loss of material is greatly reduced. For an operation of this type it is of advantage to arrange several arms 33 on the disc 32, as it is necessary to delay the feeding of a next original until the switch 34 has been actuated by the preceding original.

FIG. 2 shows the arrangement of the rollers 28, 29 and 30 and the transporting belts 27 of FIG. 1 in an enlarged scale to illustrate another method of feeding an original 42. In this embodiment a stop 43 is arranged in the housing of the apparatus the end of which is forming a rake 44. The different prongs of this rake extend through slots between the belts 27, thus preventing the passage of original 42 which is fed through a slot in the housing and placed on the upper ends 45 of the belts 27. For supporting the original 42 antecedent to the transporting belts 27 a platform 46 may for example be provided.

The belts 27 are made of a material which on the one hand will frictionally engage the original 42 in such a manner that the original will be taken along when resting on the belts 27 by its own weight, but which on the other hand will pass along below the original without damaging or bending it, when its forward edge is engaging the stop 43, 44. It is of advantage that the image on the original is facing upwardly, i.e. that the back side of the original is resting on the belts 27.

In corresponding with FIG. 1 a disc 48 with elastic arms 49 and 50 rotating in the direction indicated by the arrow 47 is arranged between the rollers 28-30. Within the path of these arms an abutment 51 and a switch 52 have been provided, the switch 52 having the same functions as the switch 34 of FIG. 1.

Substantially below the abutment 51 an engaging surface 53 is provided formed integral with the stop 43. The stop 43 is movably guided in a vertical direction and supported on a spring 54.

When the disc 48 is rotating the arm 49 is tensioned on the abutment 51 until it snaps off and strikes the engaging surface 53. By means of this the rake 44 is moved downwardly so that the original is moved forwardly by the belts 27 and fed between the belts and a transporting roller 55, which substantially corresponds to the transporting roller 31 of FIG. 1. By suitably selecting the circumferential speed of the disc 48 and/or the length and/or the elasticity of the arms 49 it is assured that the upper end of the rake 44 will be kept below the plane of the upper end 54 of the belts 27 long enough to allow the original 42 to be fed between the belts 27 and the roller 55 assuredly. When the rake 44 returns to its upper position the original is bent upwardly somewhat, without however injuring the original or influencing its transport in any way. This is of advantage in that the next original may be fed immediately following the advance of the preceding original 42, as the succeeding original will automatically abut the rake 44 controlled by the arm 49 which will retain the original in a position of readiness until the stop 43, 44 is released by one of the arms 49 of the rotating disc 48.

FIG. 2 shows that one of the arms 48 at the same time serves to operate the switch 52 which may be arranged according to FIG. 3 so that in this case also a precisely correlated control between the actuation of the knife 22 and the feeding of an original is obtained.

In correspondence with the description and in accordance with FIGS. 1 and 2 one or a plurality of arms 49,

50, for example four arms, may be provided in which latter case they are evenly radially spaced allowing an immediate succession of the exposures on the negative layer carrier in dependence on the size of the original being copied at the time.

FIG. 2 shows a broken out section of an intermediate wall 73 which is also shown in FIG. 5 and corresponds in its arrangement to the intermediate wall 63 shown in FIG. 3. The drive motor 74 is for example arranged behind this intermediate wall 73 and driveably connected with a change gear 78 which is driving the roller 30, the roller 55, and the disc 48 by the belt drives 75, 76 and 77.

The construction of the stop 43 is shown in FIG. 5 in which the roller 55 and the roller 30 are journaled with their one ends in the intermediate wall 73. The belts 27a, 27b, 27c, and 27d are guided over the roller 30. The rake 44 of the stop 43 extends between these belts. The engaging surface 53, which also serves as a lateral supporting surface, is arranged on two springs 54a and 54b for guiding the stop parallelly. These springs are supported with their lower ends on a bracket provided on the intermediate wall 73.

The arrangement of the abutment 51 which is formed by a rod fastened with one end on the intermediate wall 73 is also shown in FIG. 5.

It is to be understood that the invention shall by no means be restricted to the illustrated and described embodiments, as changes may be made by those skilled in the art, without departing from the scope of the invention.

What I claim is:

1. In a copy-making apparatus of the type having transport means for feeding an original in contact with a tape of layer-carrying material past an exposure device through which said original and layer carrier to be exposed are guided and in which said original is supported on a retaining surface, means for severing a length of said tape substantially equal to said original from said tape, and means for automatically controlling the actuation of said transport means and severing means, the improvement comprising retaining means adjacent said transport means for preventing said transport means from moving said original from said retaining surface, rotary means, at least one substantially radially projecting actuating element on said rotary means operable to move an original from said retaining surface onto said transport means, drive means for driving said transport means and said rotary means, and means operated by at least one of said actuating elements for actuation of said severing means in controlled sequence with the feeding of said original.

2. An apparatus according to claim 1, including timed delay means interposed between said rotary means and said severing means to cause actuation of said severing means with a predetermined time delay.

3. An apparatus according to claim 1, in which a plurality of said actuating elements are arranged in radially spaced relation on said rotary means.

4. An apparatus according to claim 1, in which the end of at least one of said actuating elements is constructed in the form of a rake, slots being arranged in said retaining means through which said rake-like ends of said actuating element are movable for removing an original placed on said retaining means in a position of readiness.

5. An apparatus according to claim 4, in which said transport means comprise a transporting arrangement arranged below said retaining surface formed by a plurality of endless belts guided on rollers in spaced relation and cooperating with a driven transport roller arranged with respect to the direction of advance behind said retaining means said rotary means having at least one of said actuating elements consisting of elastic material which on engaging said transport roller from below will bend elastically thereby pressing said original removed from

9

said retaining means against said transport roller and pulling it between said transport roller and said transporting belts.

6. An apparatus according to claim 1, in which said transport means comprise a transporting arrangement 5 formed by a plurality of endless belts guided on rollers in spaced relation cooperating with a driven transport roller contacting the upper side of said belts, said retaining means being arranged in front of said transport roller and being movable in a vertical direction having at its 10 upper end projections extending through the slots formed by said belts, spring means being provided holding said retaining means in a position in which said extensions project beyond said transport belts, an engaging surface provided on said retaining means disposed in the path of 15 movement of said actuating element which on engaging said engaging means will move said retaining surface out of its blocking position above said transport belts in front of said transport roller allowing an original lying on said transport belts and abutting said retaining means to be moved by said transport belts below said transport roller. 20

7. An apparatus according to claim 6, in which at least one of said, actuating elements consists of elastic material which will be deformed acting as a power accumulator when said actuating element engages a fixed abutment in the path of movement of said actuating element above said engaging surface of said retaining means, said tensioned actuating element on snapping off from said abutment striking said engaging surface of said retaining means. 25

8. An apparatus according to claim 1, in which said rotary means is a turnstile, a change gear being arranged between the drive means and said turnstile allowing the revolutions to be varied, the circumferential speed of said turnstile being controlled with respect to the length of the image to be exposed in such a way that the actuation of said severing device is delayed a predetermined period of time relative to the feeding of said original. 30

9. An apparatus according to claim 1, in which said rotary means is provided with a plurality of said actuating elements adapted to be positioned in various radial spacing, said actuating elements being removable from said rotary means thus allowing adjustment to different sizes of said originals. 35

10. An apparatus for making copies using tape-like layer carriers which are cut according to the size of an original exposed thereon, comprising within a housing the arrangement of a negative layer carrier tape wound up on 40

10

roll carried by supporting means; an exposure device through which said negative layer carrier and an original to be exposed thereon are guided; a retaining surface for said original; first transporting means for guiding said original to said exposure device, said first transporting means being disposed between said retaining surface and said exposure device; second transporting means for guiding said negative layer carrier tape and said original past said exposure device; separating means arranged behind said exposure device serving to separate said original from said layer carrier tape; a cutting device arranged behind said separating means with respect to the direction of advance of said layer carrier tape, said negative layer carrier tape being guided into said cutting device by said second transporting means; control means having at least one actuating element adapted to transfer said original from a position on said retaining surface to said first transporting means; drive means for driving said control means and said first and second transporting means; an impulse sender arranged in the path of movement of at least one actuating element of said control means for engagement by said actuating element thereby giving an impulse for actuating said cutting device; a positive layer carrier tape wound up on a roll carried by supporting means; guide means for said positive layer carrier and said negative layer carrier serving to guide said positive layer carrier and said negative layer carrier together, said guide means consisting of two driven rollers elastically pressed together arranged between said second transporting means and said cutting device, said cutting device comprising two channels one of which serving to guide said negative layer carrier while the other one serves to guide the positive layer carrier, said channels being provided with a counter-knife each in the movement zone of said knife of said cutting device; a developing device arranged behind said cutting device comprising a container for developing liquid, guide means for passing said positive and said negative layer carrier through said liquid, and a pair of squeezing and transporting rollers arranged at the end of said guide elements. 45

11. An apparatus according to claim 10, in which the distance of said pair of squeezing and transporting rollers from said cutting device is shorter than the length of the smallest size of said originals to be copied.

References Cited in the file of this patent

UNITED STATES PATENTS

2,732,778 Limberger ----- Jan. 31, 1956