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W. LIMBERGER

3,044,386

APPARATUS FOR MAKING COPIES

Filed July 13, 1959

4 Sheets-Sheet 1

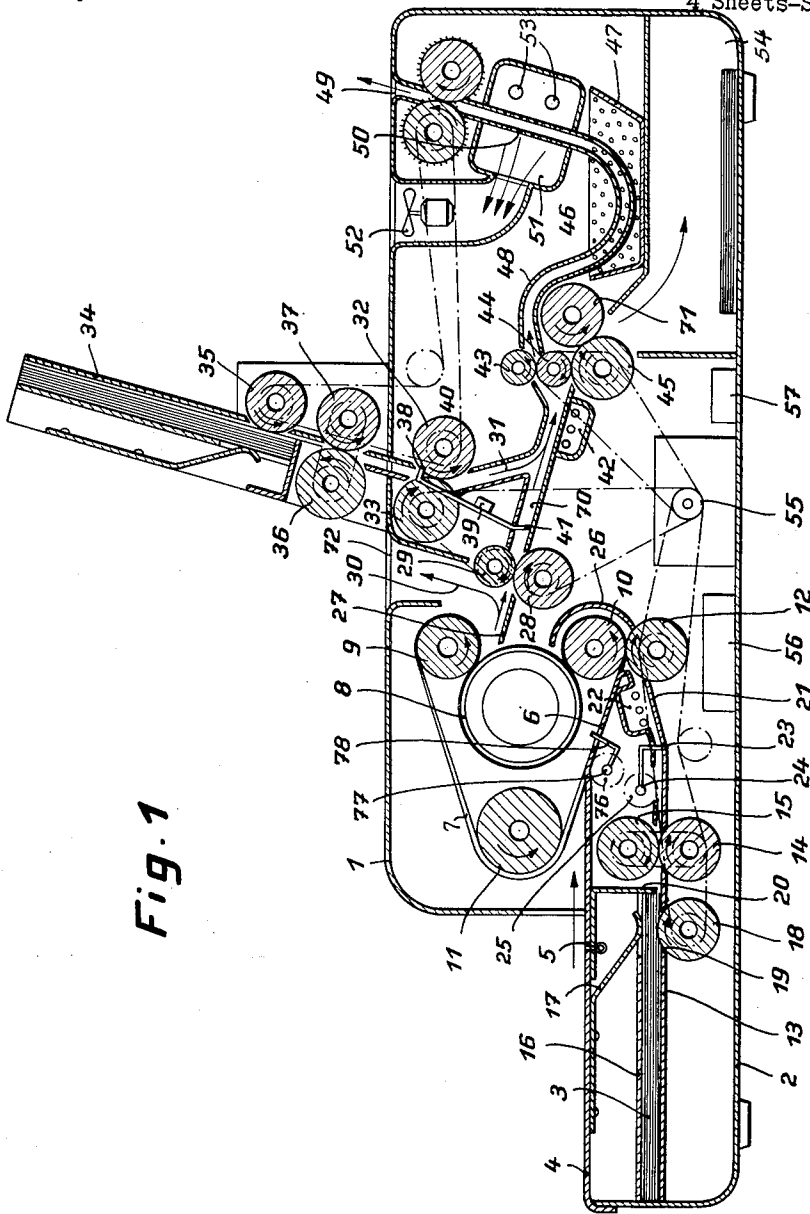


Fig. 1

INVENTOR:

Walter Limberger

BY:

Reaman Reaman
att'y

July 17, 1962

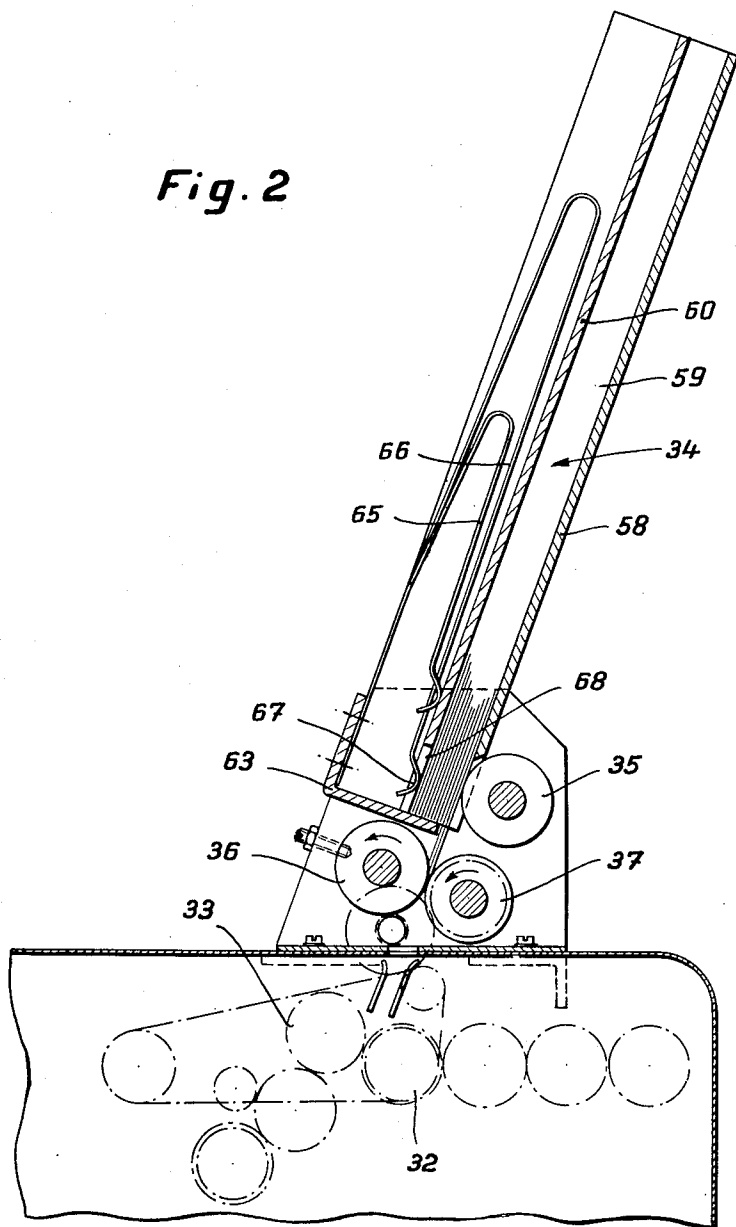
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4 Sheets-Sheet 2

Fig. 2



INVENTOR:

Walter Limberger

BY:

Beaman Beaman
attys

July 17, 1962

W. LIMBERGER

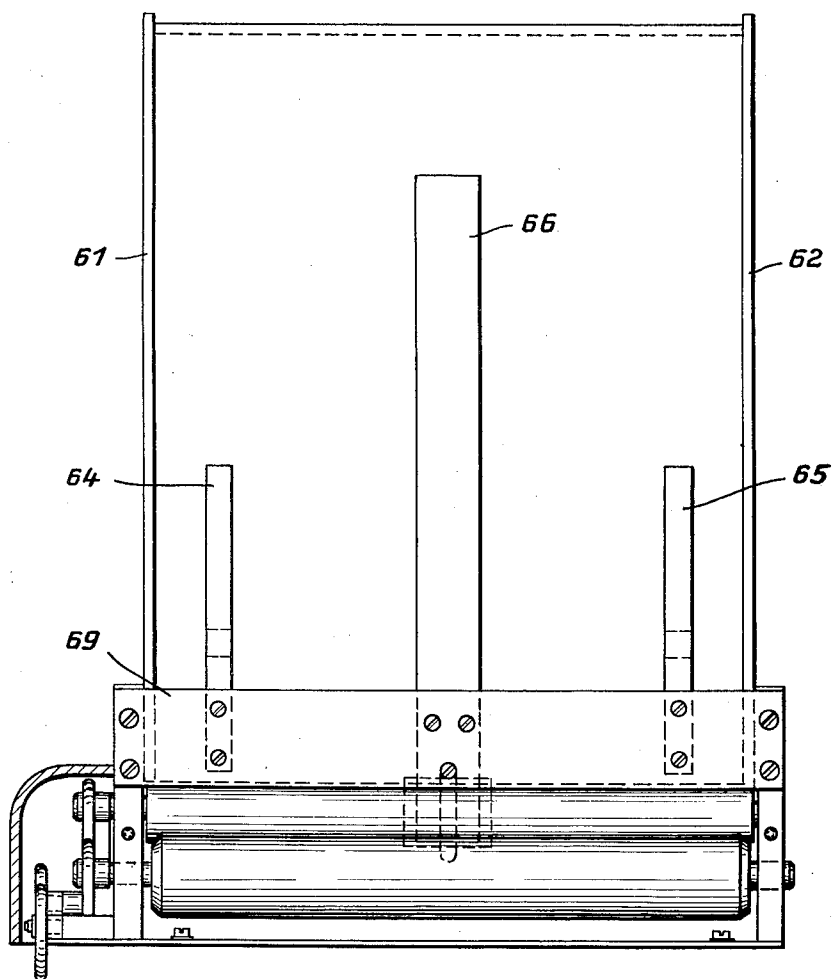
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4 Sheets-Sheet 3

Fig. 3



INVENTOR:

Walter Limberger

BY:

*Beaman & Beaman
attys*

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APPARATUS FOR MAKING COPIES

Walter Limberger, Hamburg, Germany, assignor to
Lumoprint Zindler KG., Hamburg, Germany

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Claims priority, application Germany July 23, 1958

6 Claims. (Cl. 95—77.5)

The invention relates to an apparatus for making copies in which an exposure device, a developing device and a fixing device are provided. In this connection, the invention relates to a device for making copies using the diffusion procedure as well as to a device in which photoconductive layers are used for making copies.

Advantageously, a known exposure device with a rotating cylinder is used, in which the exposing lamp is arranged, the brightness of which may be regulated for instance by means of movable diaphragms arranged within the cylinder or by means of a potentiometer arranged in the circuit of the lamps. In order to guide the original and the negative layer carrier or latent image carrier, respectively, several parallel belts are guided around a part of the periphery of the cylinder by means of rollers, at least two of them lying close to the cylinder. These belts are preferably elastic. For instance, a roller which does not touch the cylinder when rotating and around which the returning half of the belts is guided, has a profiling in the form of an annular bead in order to ensure an automatic parallel guide of the elastic belts consisting for instance of rubber.

If the diffusion process is applied, the developing device consists of a diffusion developing device known in itself having a bath and guide paths for the positive layer carrier and the negative layer carrier through the bath to a pressure roller pair arranged behind the bath.

If the invention is realised in connection with photoconductive layers, the developing device consists of a known device for applying the developing powder on the latent image on the transfer layer carrier. The developing device may for instance be laid out as a container, the bottom of which at the same time serving as a guide path for the transfer layer carrier and in which an accumulation of the developing powder is present.

The invention is based on the task to provide an easily operable table apparatus in which the steps necessary for the production of copies are running off under automatic control. In this process, transport devices are provided for the feed of the layer carriers, said transport devices always including a roller pair, the rollers of which are rotating in one and the same sense, so that only one layer carrier is fed while the other layer carriers are retained. Separating roller pairs having two rollers likewise driven in the same sense and one of them lifting the original or one layer carrier, respectively, serve to separate the original and to carry it off, and to separate the layer carriers, respectively.

According to the invention the task is solved by placing the negative layer carriers or latent image carriers, respectively, in the form of a pile into a lighttight chamber and the positive layer carriers or transfer layer carriers, respectively, likewise in a pile, always at an automatic feed guide or transport device, the feed of a layer carrier being controlled in dependence upon the insertion of the original or on the through-pass of the exposed negative layer carrier or latent image carrier.

According to an especially advantageous embodiment, the feeding table for the original at the front side of the desk-like housing is at least partially formed by the upper side of the chamber for the negative layer carrier or latent image carrier, respectively, and at the upperside of the housing the pile of positive layer carriers or transfer layer carriers which is preferably inclined towards the

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vertical direction is kept between two plate-like guiding surfaces, at least one of them being transparent, so that the available store may always be supervised.

For the feed of the layer carriers, that means for the feed of the positive and negative layer carriers as well as for the latent image carrier and the transfer paper, two kinds of embodiment, i.e. a fully automatic one and a semiautomatic one are provided. In case of the fully automatic embodiment, the control takes place exclusively in dependence upon the insertion of the original. In this process, the layer carriers are guided from pile holders to a transport roller pair, and the entrance into the transport roller pair is released by the insertion of the original and the through-pass of a layer carrier in the apparatus respectively. In case of the semiautomatic embodiment the layer carriers are always manually brought into operation position in front of a transport roller pair and only the entrance is controlled in the described manner. The arrangement, however, is such that the bringing of the layer carriers into operating position may always be effected without difficulty by one manual operation, the layer carriers being automatically guided into operating position without any special attention on the part of any guiding elements.

According to the invention, at least one portion of the feeding table for the original is in touch with the returning halves of the belts guided around the exposure device, so that these belts serve as a stop for the inserted original and are taking over the further transport in accordance with the speed of the apparatus. At the beginning of this portion, preferably a pivotable roller is arranged around which the belts are deviated into a direction parallel to the portion of the feed drive. According to a preferred feature of the invention, the release device for the negative layer carrier or the latent image carrier, respectively, is arranged in the portion of contact. By this, a defined guidance of the original is obtained from the moment of release for the feed of a negative layer carrier or latent image carrier, respectively, so that a travel of the original and the negative layer carrier or latent image carrier, respectively, atop of one another in mating relation is ensured.

If the invention is used for making copies with photoconductive layer carriers, an electrode arrangement is provided at the feed guide, behind the release device for the latent image carrier and in front of the separating device of the latent image carrier from the transfer layer carrier. These electrode arrangements are switched on and off for instance by stops in dependence upon the through-pass of the layer carriers or the insertion of the original in connection with time-relays.

According to an especially advantageous embodiment, the invention provides a combination of a separating device consisting of two rollers rotating in one and the same sense, and two transport rollers, which combination lies close always to one roller of the separating device and rotates in an opposed sense with regard to this roller, so that a combined transport and separating device for two layer carriers is formed. In accordance with the invention, this combination has, when arranged in front of the developing device, special advantages, as on the one hand a strong feed is imparted to the transfer layer carrier in order to pass it through the developing device, and on the other hand the transport of the latent image carrier is effected into a depositing container situated underneath the developing device. The latent image carriers guided into this container are automatically piled by the feed from above and are re-usable, so that they may be replaced into the chamber situated in the front side of the apparatus, when the pile in this chamber has been used up.

The piles for the negative layer carriers or latent image

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carriers, respectively, in one embodiment of the invention are kept between two plate-like guide surfaces one of which being rigidly arranged in alignment with the slot of a feed roller pair while the other one is vertically displaceable towards the first one by means of springs. In the rigidly arranged guide surface, suitably at least one aperture is arranged through which always one transport roller is bearing on the layer carrier of the pile lying close to this guide surface. For pressing action against these transport rollers, at least one compression spring is provided, which advantageously bears immediately on the layer carrier at the opposite side of the pile via this transport roller. The edge of the pile holder facing the feed roller pair is provided with a guide ledge which merely at the guide surface aligned to the feed roller pair leaves a slot for the feed of several layer carriers.

According to another embodiment, the piles of layer carriers are kept each in a bracket and are pressed to that leg of the bracket which is arranged in parallel to the direction of the pile under the influence of a spring, for instance with the aid of a plate. This leg advantageously at the same time forms one side of an insert slot, the other side of which being formed by a guiding plate which guides past a feed roller at a space of advantageously 3 to 4 times the thickness of a layer carrier on to a transport roller pair. When this semiautomatic guide is used, the middle portion of the table for the original is formed as a flap, in order to make the chamber accessible to the negative layer carrier and latent image carrier, respectively.

Further advantages and features of the invention will be seen from the following description of preferred embodiments in which, however, only those parts are shown which are essential for the invention.

In the drawings:

FIG. 1 is a sectional side view of an apparatus,

FIG. 2 is a sectional side view of the pile holder shown on the apparatus according to FIG. 1 above,

FIG. 3 is a front view of the pile holder according to FIG. 2,

FIG. 4 is a sectional side view of another apparatus,

FIG. 5 is a front view of a portion of FIG. 4 looking in the direction of the arrow V in FIG. 4.

FIG. 1 shows an apparatus in which the copies are made using layer carriers having photoconductive layers.

On its operation side, the desk-like housing 1 has a projection 2 in which a pile 3 of latent image carriers is arranged. This pile is situated in a lighttight chamber, the upper cover 4 of which being hinged and in alignment with the backing surface 5 when in downward position, said backing surface 5 guiding into the apparatus. Backing surface 5 and cover 4 form together the feed table for the original which is placed on the cover 4 and pushed into the device over the backing surface 5. The end 6 of the backing surface 5 which faces the inside of the apparatus is bent downwardly and extends in tangential relation to the belts 7 of the exposure device. This device consists of the cylinder 8 with its light source and guide rollers 9, 10 and 11 for the belts 7. The rollers 9, 10 are running in contact with the cylinder, while the roller 11 serves to guide the returning halves of the belts 7 and is equipped with profilings in the form of annular beads which automatically effect a parallel movement of the rubber belts 7 when the apparatus is in operation.

The end 6 of the backing surface 5 is guided to be in tangential relation with the lower returning halves of the belts 7 and at least in one portion has surface contact with these belts. Thus the original is inserted by hand on the backing surface 5 until it abuts the belts 7 and is then guided by these belts past the end 6 of the backing surface and on to the transport roller pair consisting of the rollers 10 and 12. The transport rollers may for instance be made of rubber.

The pile 3 is situated on a guide surface 13 which is

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aligned to a slot between a feed roller pair 14, 15 in such a manner that a layer carrier fed over the guide surface 13 enters this slot. The slot between the rollers is at least as wide as a layer carrier is thick, but smaller than the combined thickness of two layer carriers. Both rollers 14, 15 are for instance driven in one and the same sense in direction of the arrows by means of a chain shown in dotted lines, so that the lower roller 14 runs in the sense of the feed of a layer carrier, while the top roller 15 with its circumferential portion facing the slot rotates in a direction opposed to the direction of feed.

On the pile 3, a further guide surface 16 is arranged, which is vertically displaceable with regard to the guide surface 13 and pressed by means of springs 17. In the illustrated embodiment several springs are arranged side-by-side which bear on the guide surface 16, the pressing of the springs 17 to this guide surface suitably being effected over a driven transport roller 18, which is driven in the sense of feed of the lowermost layer carrier in the pile 3 as indicated by the arrow by means of a chain drive. For engagement with the roller 18, a recess is provided in the lower guide surface 13 through which the circumference of the roller 18 extends. The roller preferably has a rough surface and suitably consists of Vulcollan, which is a synthetic substance of ethylene glycol-adipic acid polyester in combination with naphthalene-1,5-diisocyanate. It is essential that the upper surface of this roller in spite of a certain roughness does not have any abrasive effect.

A preferred embodiment of a pile holder consisting of two guide surfaces will be referred to below in connection with FIGS. 2 and 3. It is only pointed out that the pile is kept in alignment in front of the feed roller pair 14, 15 by means of a wall 20 in the upper portion covering its front face above the guide surface 13 and that only above the guide surface 13 a slot is left free for the passage of several layer carriers.

Behind the feed roller pair 14, 15 a guide surface 21 defining the path of a latent image carrier is situated which terminates in front of the transport roller pair 10, 12. Above this path, behind the release device for the advance, an electrode arrangement 22 screened in upward direction by a cover is arranged, from which the latent image carrier fed with its photoconductive layer facing upwardly receives the necessary charge prior to the exposure. The electrode arrangement 22 for instance consists of several wires insulated with regard to the remaining parts of the apparatus, to which the charging voltage is supplied. The switching-on may for instance take place simultaneously with the switching-on of the apparatus drive or in dependence upon a stop not shown, which may be actuated by the advance of the latent image carrier. In the latter case it is possible to provide a switching-off which is actuated in dependence upon a time relay. The time relay then is adjusted with respect to the feed speed in such a manner that a switching-off takes place after the throughpass of a layer carrier.

In the feed guide of the latent image carrier leading to the transport roller pair 12, 10 the release device is provided which consists of a pivotable lever 23 which is fastened to a slightly pivotably supported axis 24. The ends of this axis are for instance supported in the housing walls. The axis 24 is provided with a gear 25 meshing with a further gear 76 which is arranged on an axis 77 pivotably supported in a similar manner. This axis carries the lever 78, which projects into the feed path of the original. If thus the lever is pivoted by the leading edge of the inserted original, the gear 76 rotates in clockwise direction in FIG. 1. The gear 25 is turned in anti-clockwise-direction, by which the lever 23 is lifted out of the feed guide for the latent image carrier. In the supporting table, i.e. part 6 of it, through which the lever 78 is projecting, a slot of a corresponding length is provided to enable the pivoting movement of the lever. Correspondingly formed slots are provided in the guide surfaces de-

fining the guide path for the latent image carrier, with at least one recess being available as well especially in the lower guide surface 21 into which the end of the lever 23 merges when being in locked position. At its lower end, the lever 23 is curved in the direction of feed, so that the latent image carrier after a lifting of the lever may easily pass the latter one.

For the rest, the arrangement is such that the lever 23 after release of the lever 78 when the original has passed, returns into its position as shown as a result of its own weight. It is possible to arrange additional means for this purpose, for instance springs.

It is considered to be very advantageous for the arrangement of the release device if the lever 78 is situated in that portion of the feed path for the original in which a surface contact takes place between the supporting surface 5 and the returning halves of the belts 7. By this it is ensured that the original which is rigidly guided on the end 6 of the backing surface 5 by means of the belts 7, deflects the lever 78. The employed arrangement ensures that the releasing function may be carried out even by originals consisting of tissue paper. Upon release of the feed guide for the latent image carrier the latter is pushed to the transport roller pair 12, 10 by the feed roller pair 14, 15, especially by the roller 14 of that pair.

In the drawing, always only one lever 23, 78 is visible. Attention is, however, drawn to the fact that suitably several levers are distributed in spaced arrangement over the width of the feed guides.

Behind the transport roller pair 12, 10 a curved guide surface 26 which surrounds the roller 10 is arranged, by which the original and the latent image carrier traveling one over the other in mating relation through the roller pair 10, 12 are guided to the exposure cylinder 8. The original and the latent image carrier are then guided along the circumference of the exposure cylinder 8 by belts 7, where the exposure takes place and a latent image corresponding to the original is created in the charged layer of the latent image carrier. The superimposed layer carriers coming from the slot between the cylinder 8 and the roller 9 are guided to a transport roller pair 28, 29 over the guide element 27. Both rollers 28, 29 are driven in the same direction in accordance with the indicated arrows via chain drives. There is a slot between the rollers, the width of which corresponds at least to the thickness of one latent image carrier, but is smaller than the combined thickness of the latent image carrier and the original. The direction of drive is selected to be such that the lower roller 28 with its mantle surface facing the slot rotates in feed direction of the latent image carrier. The lower roller 28 preferably has a larger diameter than the top roller 29. The lower roller 28 for instance has a mantle of ground rubber or preferably a mantle of ground steel. The top roller 29 has a mantle of roughened rubber, a small amount of roughness as is obtained, when grinding a rubber roller being sufficient. Advantageously, this roller is, however, provided with an additional roughness, for instance providing flutes extending in transverse direction. According to another embodiment, a ground rubber roller which has been rubbed with talcum is used. According to another embodiment, the invention provides for a rough mantle surface of the roller 29 in an especially elastic form. The roughness serves the purpose to bring about a temporary engagement of the leading edge of the original with the mantle of the roller, so that the original is lifted by its edge running against the roller 29 and is transported out of the housing through the exit slot 72 for the original as shown by the arrow 30.

The latent image carrier runs through the slot of the roller pair 28, 29 into the guide path 70 formed by guide elements 28, 29, into which another guide path 31 for the transfer layer carrier terminates. The feed guide 31 comes from a transport roller pair 32, 33 for feeding

the transfer layer carrier. The rollers 32, 33 are running elastically side-by-side.

Above the transport rollers 32, 33 the feeding device for the transfer layer carrier is arranged. This device consists of a vertically inclined pile holder 34 and a transport roller 35 as well as a feed roller pair 36, 37, which substantially corresponds to the roller 18 and the feed rollers 14, 15. This arrangement will be referred to in more detail in connection with FIGS. 2 and 3 below.

The feed guide between the feed rollers 36, 37 and the transport roller pair 32, 33 for the transfer layer carrier comprises a blocking element 38 which is arranged on a double-armed lever 40 which is pivotable at 39. That end of the lever 40 which carries the blocking element 38 is guided in circumferential slots of the roller 33. These slots are so deep that the lever 40 may pivot therein, in order to lift the blocking element 38 out of the feed guide for the transfer layer carrier. The end 41 of the lever 40 which is averted from the blocking element 38 projects into the feed guide 70 for the latent image carrier. During this, the blocking element 38 is in blocking position. The latent image carrier passing through the path 70 abuts against the end 41 of the lever 40 with its leading edge, deflecting it in such a manner that also the feed guide for the transfer layer carrier to the transport roller pair 32, 33 is released. During this deflection, the latent image carrier may proceed on the guide path under the end 41 of the lever 40. The distance between the end 41 of the lever 40 and the junction of the guide path 31 and the guide path 70 is suitably of the same size as that between blocking element 38 and the junction so that the layer carriers are moving in the guide path 70 in mating relation. In doing so, the feed is effected from the transport roller pair 32, 33 and the roller 9 and the belt 7, respectively.

These elements pass the layer carriers past an electrode arrangement 42 for the transfer of a charge from the latent image carrier to the transfer layer carrier. In one embodiment, this electrode arrangement consists of parallel wires extending transversely to the feed guide and being insulated with respect to other parts of the apparatus. For carrying out a charge transfer, these wires are connected to a voltage source. The connection is carried out for instance either in dependence upon the actuation of the lever 40 or by starting the apparatus in connection with time relays.

The guide feed 70 terminates at a roller group consisting of the superimposed rollers 43, 44, 45. The two bottom rollers 44, 45 are arranged as a separating roller pair and are driven via chain drives in one and the same sense in a direction according to the arrows in the drawing. This roller arrangement corresponds to that of the roller pair 28, 29. The roller 44 of this roller group is in relation with the roller 43. The roller 43 runs elastically on the roller 44, but is driven in an opposed sense of movement, so that rollers 43, 44 are working as a transport roller pair. In this embodiment, the transfer layer carrier which is lifted by the roller 44 from the latent image carrier passing through the slot between the rollers 44, 45, is transported further into the developing device 46 with strong feeding power. The developing device 46 consists of a container 47, over the bottom of which guiding elements in the form of combs and/or other guiding means with displaced interruptions, or perforations are provided for the transfer layer carrier. Spaced from these guide elements, other guide elements 48 are extending. Both groups of guide elements are lying in the accumulation of developing powder in the container 46, and are permeable to the developing powder. The guide elements 48 prevent the transfer layer carrier from leaving its assigned path.

Subsequent to the developing device a fixing device is arranged which leads to the exit slot 49, the guiding surface 50 of which for the transport layer carrier being

an elongation of the guide elements 48. The guiding surface 50 is perforated. Behind the guide-surface, a box 51 is situated, in which for instance by means of a fan, a vacuum is generated, which keeps the transfer layer carrier close to the guide surface 50. Opposite the guide surface 50, there are heating elements 53, for instance infrared emitters, which fix the powder image on the transfer layer carrier from that side where the layer is present. Further transport roller pairs with rollers having preferably sharp points at the layer side are arranged in front and behind the fixing device. In an especially suitable embodiment it is the guiding surface 50 which is formed as a heating grid taking over the fixing operation from the back side.

Below the developing device, a container 54 is provided into which the transported latent image carrier drops.

In order to effect the necessary feed it is suitable to associate the roller 45 with an additional roller 71 which is running on the roller 45 under elastic pressure. If the path 70 is sufficiently inclined, however, a special roller 71 is not necessary.

In this process, the arrangement of the roller 45 or the roller pair 45, 71 respectively, in a top corner of the container 54 ensures that the layer carriers are dropping into the container in oblique direction and form a pile lying one atop of the other. The container 54 is light-tightly enclosed and is accessible from outside for instance over a side wall of the housing 1. The latent image carriers collected in the container 54 may be used for completing the pile 3 first, because their initial charge decreases in the course of time and, secondly, because when newly charged by the electrodes 22, the old charge will be abolished.

The driving motor 55 is arranged at the bottom of the housing 1, to which for instance, a reducing gear is series connected. This driving motor drives the moving parts via chain drives shown in dotted lines. Furthermore there are switch means 56 for the exposure device and an assembly 57 for the electrical connection means or for the switch elements, respectively, for the charging electrodes.

In FIGS. 2 and 3, the pile holder 34 with the pertaining transport roller 35 and the feed roller pair 36, 37 is shown enlarged. In FIG. 2, furthermore the transport roller pair 32, 33 and the drive belts or chain drives are shown.

The pile holder consists of a guide surface 58 forming the supporting surface for the pile 59. The transfer layer carriers in the pile are pressed to the guide surface 58 by a further guide surface 60. The guide surface 60 is vertically displaceable with respect to the guide surface 58 and moves between side walls 61, 62 of the pile holder and on a front wall 63, which however does not extend as far as the guide surface 58. The pressing of the guide surface 60 in the embodiment shown is accomplished by two springs 64, 65 bearing on that part of the guide surface 60 which faces the feed roller pair 36, 37, so that the pile is pressed especially in its lower region. Furthermore, according to an especially advantageous embodiment of the invention, another spring 66 is arranged, which directly bears on the top layer carrier of the pile. In doing so, the pressing end 67 of the spring 66 projects through a recess 68 at the lower edge of the guide surface 60. The springs 64, 65, 66 are fastened with their rigid ends to a transverse rail 69, for instance by means of a screw. This transverse rail may be made integral with the front wall 63.

The end 67 of the spring 66 which directly bears on the pile of layer carriers, bears on that region of the pile, in which the lowermost layer carrier of the pile lies close to the transport roller 35. By this, a faultless operation of the transport roller for feeding at least the lowermost layer carrier to the feed roller pair 36, 37 is ensured. The roller 37, which is driven in the sense of feed move-

ment of a layer carrier out of the pile in the direction of the arrow shown in the drawing, suitably has a ground steel mantle, while the roller 36, which is driven in the same sense, has a rubber surface. Owing to the drive in the same sense, the circumference of the roller 36, on its side facing the roller 37, moves in the sense of a pushing back movement with respect to the layer carriers entering the roller slot. These layer carriers are guided by a corresponding alignment of the guide surface 58. Only the lowermost layer carrier to which the strongest feed forces are imparted by the roller 35, may move into the slot between the rollers 36, 37 which substantially corresponds to the thickness of one layer carrier, and is guided through this slot by a corresponding circumferential movement of the roller 37. The top layer carriers are kept back by the roller 36 corresponding to the opposed direction of influence so that a wedging of several layer carriers in the roller slot is avoided.

It should be noted that the transport roller pairs 33, 32 and 10, 12 are considered as being essential. Without the transport roller pairs, the layer carrier transported into the rollers 14, 15 or 36, 37, respectively, would stick in the slot between the rollers after having been released from the transport rollers 18, 35. In this case the transport rollers 18, 35 would advance the next sheet between the rollers 14, 15, 36, 37 and an upsetting would be the result if the transport roller pairs were not present. The feed effected by the transport roller pairs 10, 12 and 32, 33 is suitably more rapid than that obtained by the transport rollers 18, 35.

Summing up, it is once more pointed out with regard to the design of the rollers that the rollers 15, 29, 36, 44 have a mantle which preferably consists of a wear-resistant substance, so that the slots are not clogged by small parts generated by wearing action. Contrary to this, the rollers 14, 28, 37, 45 preferably have a mantle out of ground rubber.

In the FIGS. 4 and 5, a device is shown wherein the copies are made using the diffusion procedure. The structure of the device is substantially the same as shown in FIG. 1. At the front side of the device, a supporting table 80 is arranged below which a chamber 81 for the pile of negative sheets of paper is situated. At the top side of the housing, the pile arrangement 82 for the positive layer carrier is provided. The exposure device 83 corresponds to that shown in FIG. 1. A bath container is provided as developing device 84 having two guide paths 85, 86 for the guidance of the negative layer carrier and the positive layer carrier. Behind these guide paths, and in front of the exit slot 87, the pressure roller pair 88, 89 is situated which at the same effects the transport out of the apparatus.

In the following, it is referred only to those parts which differ from the corresponding parts of FIG. 1 in design or arrangement.

The pile 90 of negative layer carriers is situated on a table 92 which is pressed upwardly under the influence of a spring 91, the upward movement of the table 92 being limited by a bracket 93 which has its one end 94 extending in parallel to the pile. The table 92 is preferably arranged in guides not shown which ensure its horizontal position.

At its front edge in the middle portion thereof, the supporting table 80 for the original is provided with a flap 95 which may be opened in order to have access to the pile 99. The flap 95 preferably is not fully transparent and may be made, for instance, of red synthetic substance, so that the feed of the negative sheets of paper may be observed while avoiding detrimental light invasion.

The pile 96 for the positive layer carriers is kept on a table 97 and by a bracket 98 in the same manner, which bracket has a corresponding end 99 extending in parallel to the pile. Other ends of the bracket serve as supporting surface for the piles.

If a layer carrier of the pile 90 is to be fed, the top

layer carrier is seized, after opening of the flap 95, pulled back, so that it gets free of the end 94, and pushed forward again. By this its leading edge arrives between its guiding plate 100 and a feed roller 101. The distance between the guiding plate 100 and the feed roller 101 preferably corresponds to three to four times the thickness of a layer carrier. Here, consideration must be paid to the fact that the emulsified layer carriers often are not uniformly thick and as a result of the emulsion layer sometimes roll a little, so that they are pressed to the feed roller 101 also at this width of the slot. By this, transport up to the stop 102 is ensured which may be deflected in dependence upon the introduction of an original as already explained in connection with FIG. 1. If the stop 102 is brought into its release position, the negative layer carrier is brought between the transport rollers 103, 104 or the transport roller 103, respectively and the belts of the exposure device running over the transport roller 104. The actuation of the stop is controlled by a stop 105 in the feed guide for the original in a manner already described.

In order to ensure an exact transport of the original through the belts of the exposure device, a deviation roller 106 is arranged at the beginning of the portion in which the transport belts are running in parallel to the supporting table, at which roller the belts are deviated into a direction parallel to the following table portion. Thus, a certain pressure of the belts to the rollers is exerted, by which at the same time the drive of the rollers may be effected. In one embodiment, the roller is provided freely pivotable, may however also be driven synchronous to the remaining part of the apparatus.

If a positive layer carrier is to be brought into operative position in front of the transport roller 107, 108, the top layer carrier of the pile 96 is lifted and then dropped and falls between the ends 99 and the guide plate 109 which guides it to a feed roller 110. Also between the feed roller 110 and the guide plate 109, there is a slot of preferably three to four times the thickness of the layer carrier so that this layer carrier is guided to the blocking element 111 in front of the transport roller pair 107, 108. After pivoting the blocking element by actuating the stop 112 by means of an exposed negative layer carrier, the positive layer carrier is pushed into the transport roller pair 107, 108 and is guided by them into the guide path 86 which leads through the developing device in such a manner that the negative layer carrier and the positive layer carrier are passing through the pressure roller pair 88, 89 simultaneously. Advance of the negative layer carrier is effected by the roller 113 of the separating roller pair, whose separating roller 114 loosens the original from the negative layer carrier and transports it upwardly and out of the apparatus.

The rollers 101 and 110 have a relatively rough rubber surface.

The function of the apparatus according to FIGS. 4 and 5 is easily intelligible in connection with the detailed description of the apparatus according to FIG. 1.

What I claim is:

1. A device for the production of copies using sheet material layer carriers, by exposing an original with a first layer carrier and guiding said first layer carrier into engagement with a second layer carrier for transmitting the original image to said second layer carrier, said device comprising a housing, first introducing means for the introduction of an original into the housing, second introducing means for introducing a positive layer carrier into the housing, first issuing means for guiding the original out of the housing, second issuing means for guiding the positive layer carrier and a negative layer carrier out of the housing, a lighttight chamber located adjacent said first introducing means containing a pile of negative layer carriers, an exposure device within said housing comprising an exposure cylinder and a transport belt at least partially surrounding said cylinder for guid-

ing the original and the negative layer carrier around the exposure cylinder, a working table provided at the first introducing means having a surface having a portion parallel and in engagement with the transport belt, the lighttight chamber for the pile of negative layer carriers being provided beneath said working table, first guide means between the pile for the negative layer carriers in the lighttight chamber and the exposing device for feeding the negative layer carrier including a feed roller which is driven in a direction to transport the negative layer carrier towards the exposure device, first control means within the feed path for the original within that surface portion of the working table which engages the transport belt and within said first guide means and being adapted to be moved interdependently out of the feed path and the first guide means, respectively, a developing device within said housing, second guide means between the exposure device and the developing device, said second guide means including a separating device in which the original is lifted from the negative layer carrier sheet and guided through said first issuing means, third guide means between the second guide means and the second introducing means for feeding a positive layer carrier through said housing, second control means having stops extending into the second and third guide means and being movable out of these guide means in order to effect an alignment of a negative layer carrier sheet and a positive layer carrier sheet prior to transferring the image from said negative to said positive layer carrier, means guiding said positive layer carrier through said developing device and a pile holder to receive a pile of positive layer carrier sheets and located adjacent said second introducing means.

2. A device according to claim 1, in which the first control means consists of two hooked stops which are drivingly interconnected so that one stop is removed when the other one is being deflected by the leading edge of a sheet.

3. A device according to claim 1, wherein the second control means consists of a lever which is pivotally supported between its two ends and is provided with hook-like stops at its ends which stops extend into said second and third guide means for the layer carrier sheets and may be moved out of the guide means on actuation of one stop by a leading edge of one layer carrier sheet.

4. A device according to claim 1, in which the first control means consist of two hook-like stops, each pivotally supported about an axis within the housing, a gear being operatively associated with each stop, said gears being in mesh whereby pivoting of one of said stops pivots the other.

5. A device for making copies using a layer carrier material in the form of sheets and exposing a first layer carrier to an original by guiding said first layer carrier in contact with a second layer carrier for the purpose of transferring the original to the second layer carrier, said device comprising: a casing, first introducing means for introducing an original into the casing, second means for feeding a positive layer carrier sheet into the casing, first issuing means for transporting the original out of the casing, second issuing means for transporting the positive layer carrier out of the casing and third issuing means through which a negative layer carrier is transported, a lighttight chamber located adjacent the first introducing means and containing a pile of negative layer carriers, an exposure device within the casing, means transporting the original and the negative layer carrier in exposing relationship to said exposure device, first guiding means between the pile of negative layer carriers and the exposure device for feeding the negative layer carrier including a feed roller rotated in a direction to transport the negative layer carrier to the exposure device, first control means including a first movable stop in the feed path for the original between said first introducing means and the exposure device and a

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second movable stop in the first guide means and movable out of the said original feed path and the guide means, respectively, said stops being substantially equal travel distances from the exposure device and actuated by the leading edge of the original whereby the stops are removed from their associated path and guide means simultaneously so that the original and a negative layer carrier transported through the first guide means are collated in the exposure device, a developing device in said casing, second guide means between the exposure device and the developing device, a first separating device within said second guide means separating the original from the negative layer carrier sheet and guiding the separated original to the first issuing means, third guide means provided between the second guide means and the second feeding means for feeding a positive layer carrier through the casing, second control means having movable stops which selectively simultaneously project into and are removed from the second and third guide means to effect an alignment of a negative layer carrier sheet and a positive layer carrier sheet prior to collating these sheets in the second guide means, an image transfer device adjacent the end of the second guide means trans-

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ferring the negative layer sheet image to the collated contiguous positive sheet, a second separating device between the image transfer means and the developing device, said second separating device guiding the negative layer carrier to the third issuing means and the positive layer carrier to the developing device and means guiding the positive layer carrier through the developing device to the second issuing means.

6. A device according to claim 5, in which the first and second separating devices comprise a first roller and a second roller parallel to said first roller, means rotating said first and second rollers in the same direction, said rollers being spaced such that a gap is defined between the first roller and the second roller which is slightly wider than the thickness of the negative layer carrier.

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