Dec. 10, 1968 R. P. MILESKI 3,415,510

AUXILIARY SHEET FEEDER

Filed May 29, 1967 6 Sheets-Sheet 1

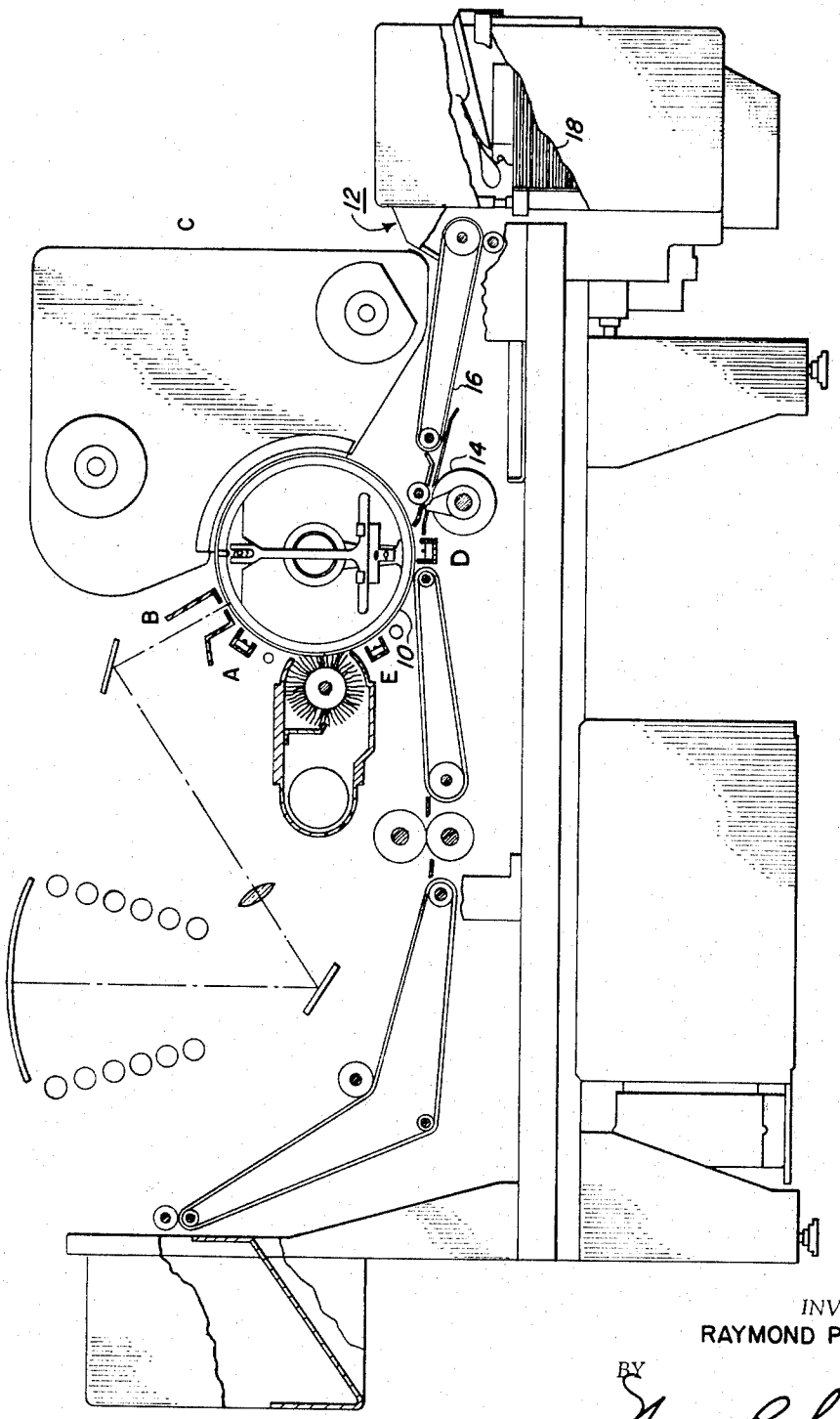

FIG. 1

INVENTOR.
RAYMOND P. MILESKI

BY

ATTORNEYS

Dec. 10, 1968 R. P. MILESKI 3,415,510

AUXILIARY SHEET FEEDER

Filed May 29, 1967 6 Sheets-Sheet 2

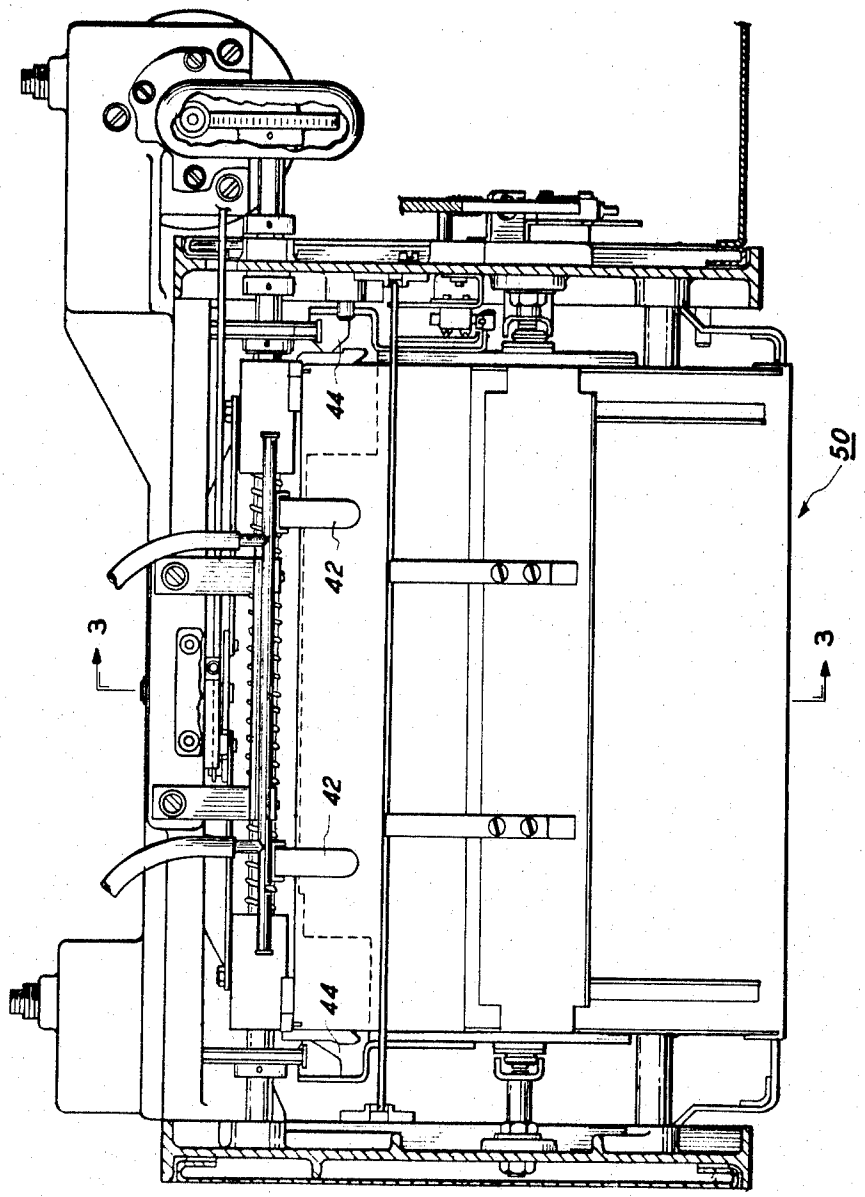

FIG. 2

INVENTOR.
RAYMOND P. MILESKI

BY

ATTORNEYS

Dec. 10, 1968 R. P. MILESKI 3,415,510

AUXILIARY SHEET FEEDER

Filed May 29, 1967 6 Sheets-Sheet 3

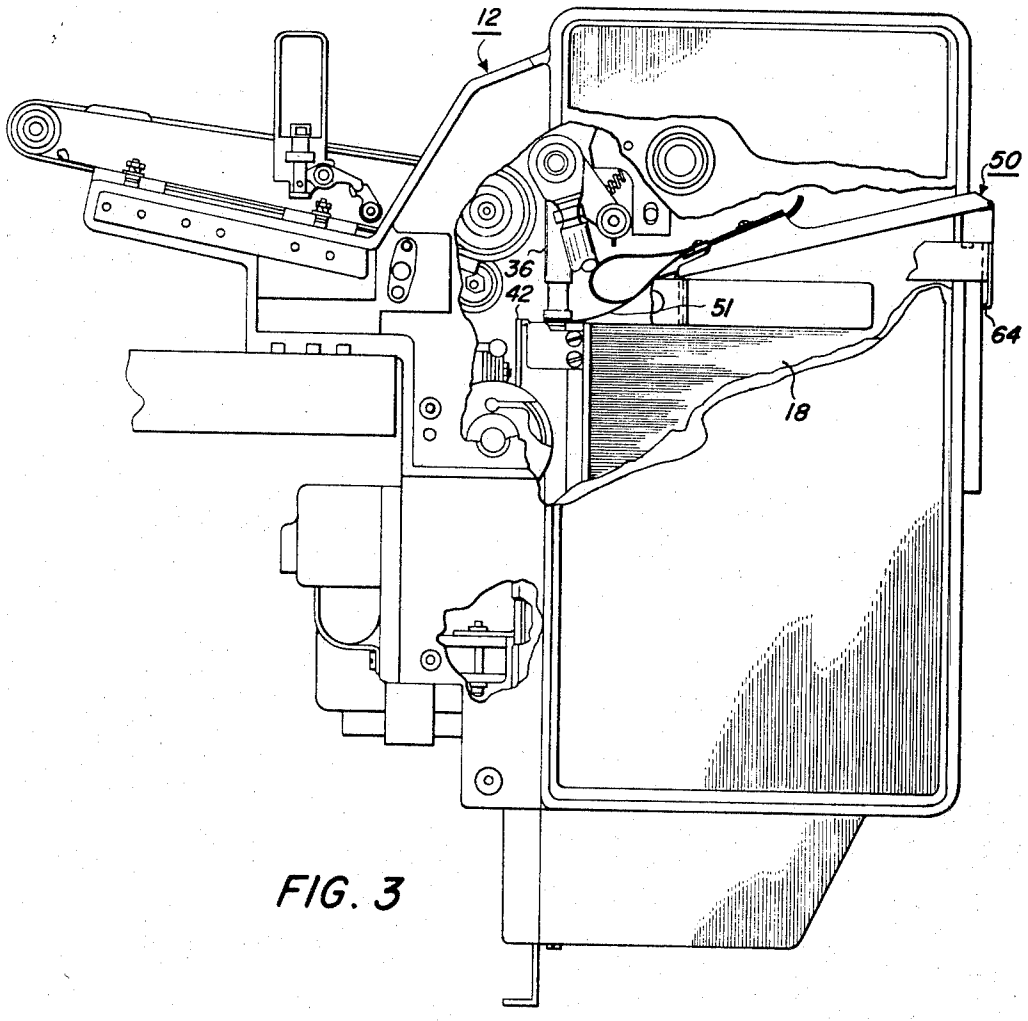

FIG. 3

INVENTOR.
RAYMOND P. MILESKI

BY Thomas P. Schuster
ATTORNEYS

Dec. 10, 1968 R. P. MILESKI 3,415,510

AUXILIARY SHEET FEEDER

Filed May 29, 1967 6 Sheets-Sheet 4

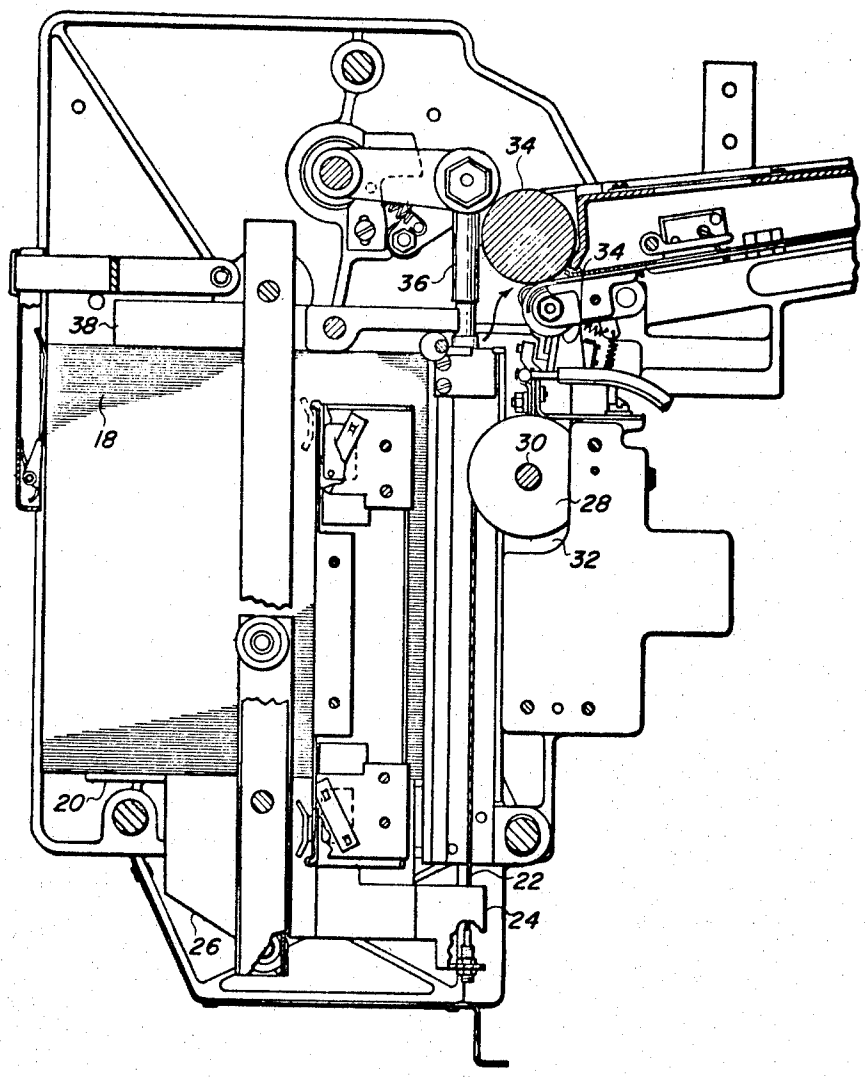

FIG. 4

INVENTOR.
RAYMOND P. MILESKI

BY Thomas P. Schneider

ATTORNEYS

Dec. 10, 1968 R. P. MILESKI 3,415,510

AUXILIARY SHEET FEEDER

Filed May 29, 1967 6 Sheets-Sheet 5

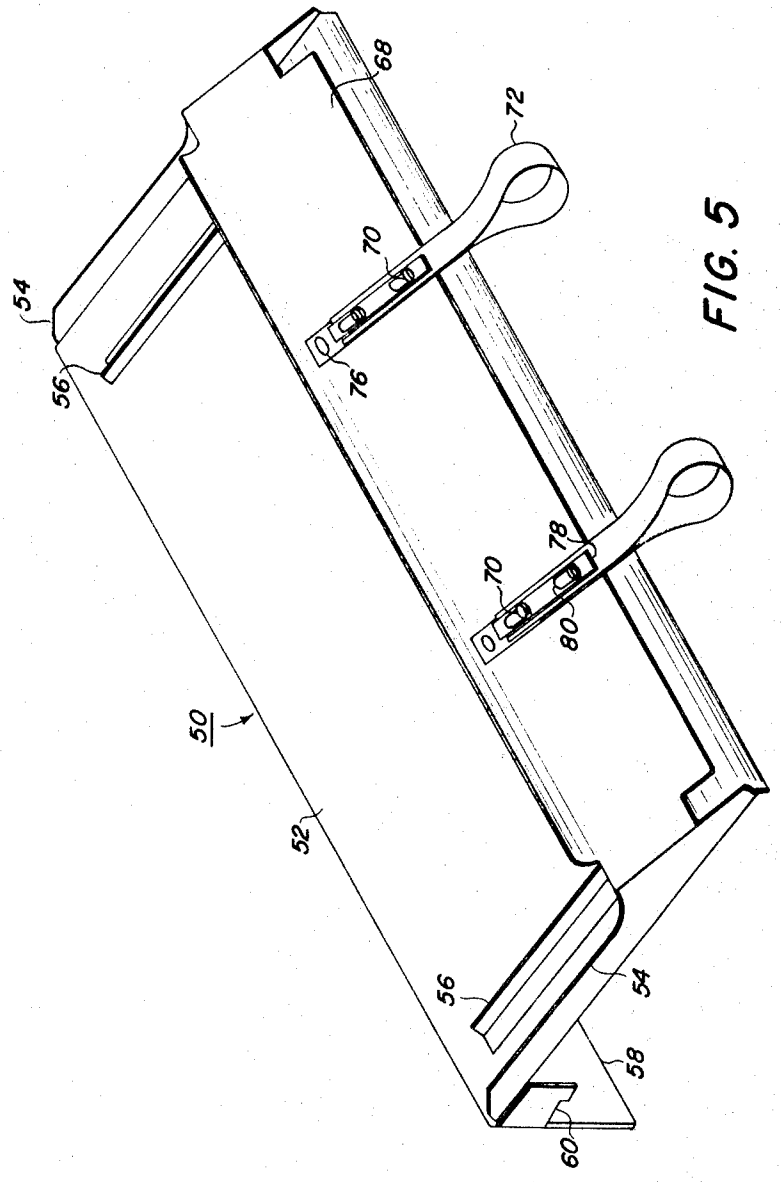

FIG. 5

INVENTOR.
RAYMOND P. MILESKI

BY

ATTORNEYS

Dec. 10, 1968 R. P. MILESKI 3,415,510

AUXILIARY SHEET FEEDER

Filed May 29, 1967 6 Sheets-Sheet 6

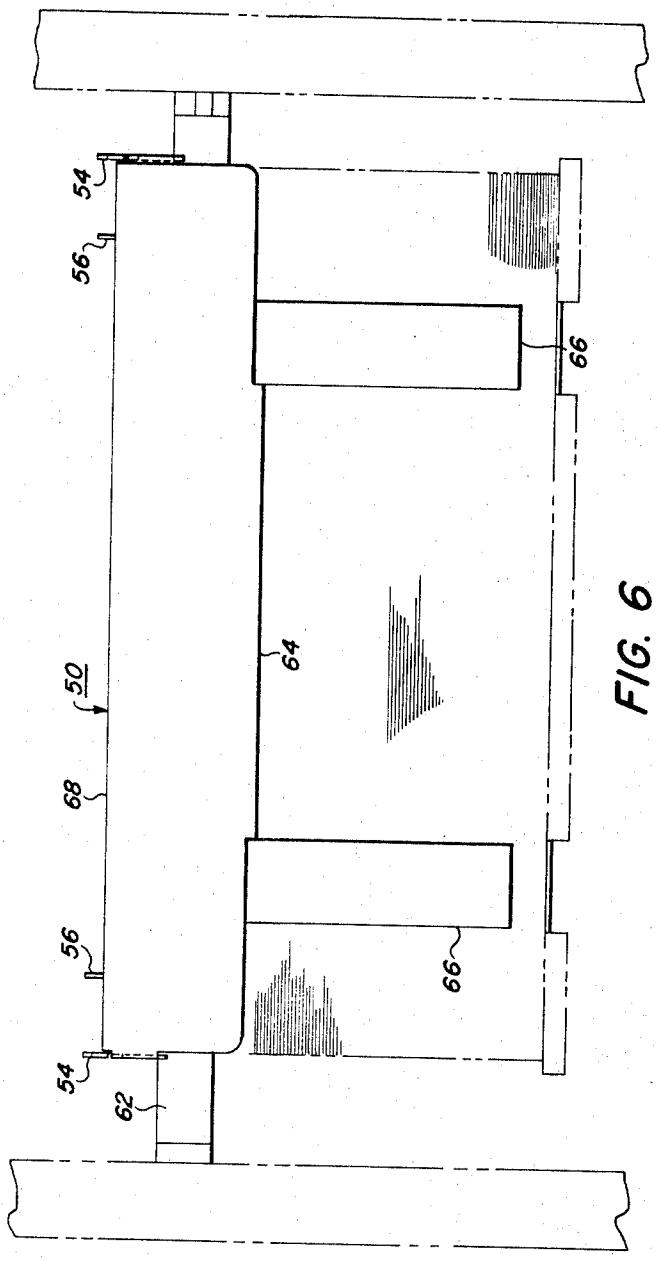

FIG. 6

INVENTOR.
RAYMOND P. MILESKI

BY

ATTORNEYS

United States Patent Office 3,415,510 Patented Dec. 10, 1968

3,415,510

AUXILIARY SHEET FEEDER

Raymond P. Mileski, Fairport, N.Y., assignor to Xerox Corporation, Rochester, N.Y., a corporation of New York

Filed May 29, 1967, Ser. No. 641,855
5 Claims. (Cl. 271—61)

ABSTRACT OF THE DISCLOSURE

A paper tray adapted to support supplemental copy sheets in position to be automatically fed through a xerographic reproducing machine or the like. The tray holds the sheets deflected at a proper orientation without disturbing a primary stack of sheets supported therebeneath which is to be similarly fed after depletion of the supplemental sheets. The tray has a paper supporting surface, sheet guiding edges, elements to removably support it on a machine, and loop-shaped sheet guides which are adjustable so that the tray is usable with various machines.

Background of the invention

This invention relates to sheet feeding and, in particular, to an auxilary sheet feeding device.

More specically, this invention relates to an auxiliary sheet feed tray adapted to be supported on a reproducing or printing machine. The machine is of the type which has an automatic sheet feeder to sequentially deliver sheet material from a primary stack of sheets to a sheet feeding mechanism. The auxiliary feeder is of the type capable of permitting the forwarding of sheet material from a supplemental stack of sheets to the same sheet feeding mechanism without disturbing the primary stack of sheets.

In the operation of high speed-high volume xerographic reproducing machines wherein large quantities of sheet material are retained in a pack advancer to be sequentially fed through the pack advancer by a suitable sheet feeding mechanism, it is sometimes desirable to feed a small quantity of sheet material of a different size or color from that contained in the pack advancer supporting the primary stack of sheets. In addition, in applications wherein the sheet material retained in the pack advancer is color coded and precollated for various coding purposes, it is sometimes desirable to add extra sheets to compensate for sheet material loss due to occasional jams or superposed sheets being diverted from the normal sequence of sheet material movement.

To change the size of the sheet material processed through such a reproducing machine, it has been necessary to remove the stack retained in the pack advancer and to replace this sheet material with another stack having the proper size even though only one or two copies are desired. Since it is very desirable that the operation of a xerographic reproducing machine be as convenient as possible as possible to an unskilled operator, the requirement of unloading and reloading the pack advancer to produce a small quantity of documents has been very vexing.

Summary of the invention

It is, therefore, an object of this invention to improve paper handling apparatus by readily interposing sheet material onto other sheet material for further processing.

Another object of this invention is to improve sheet material feeding apparatus by adapting a unitary auxiliary feed tray for cooperative relationship with a pack advancing mechanism for the feeding of sheet mterial contained in the tray prior to the forwarding of the sheet material contained in the pack advancer.

These and other objects of the invention are achieved

by an auxiliary paper feed tray adapted to be supported above a primary stack of sheet material contained in the pack advancer of a continuous and automatic xerographic machine. This auxiliary paper feed tray will interpose the sheet material which it is supporting to the sheet feeding mechanism until such time as all of these sheets have been forwarded by the sheet feeding mechanism. Thereafter, the machine resumes its regular feeding of the primary supply of sheet material contained in the pack advancer.

Brief description of the drawings

Further objects of this invention, together with additional features contributing thereto and advantages accruing therefrom, will become apparent from the following description of one embodiment of the invention when read in conjunction with the accompanying drawings wherein:

FIG. 1 is a schematic representation of an automatic xerographic reproducing machine utilizing an embodiment of this invention;

FIG. 2 is a top elevation view of the subject matter of this invention in cooperative relationship with the pack advancer and sheet forwarding mechanisms;

FIG. 3 is a section view taken along line 3—3 of FIG. 2 with parts broken away to better illusrtate the subject invention;

FIG. 4 is a sectional view similar to that of FIG. 3 looking from the opposite side but with the auxiliary paper feed tray removed and additional parts broken away to show the pack advancer and associated mechanisms;

FIG. 5 is a perspective view of the auxiliary paper feed tray to better show the features thereof, and

FIG. 6 is an end elevation of the auxiliary paper feed tray positioned on the pack advancer.

Description of the preferred embodiment

Referring now to FIG. 1 there is shown an embodiment of the subject invention in a suitable environment such as an automatic xerographic reproducing machine which includes a drumshaped photoreceptive or xerographic surface **10**, including a photoconductive layer or light receiving surface on a conductive backing, journaled in a frame to rotate in the direction indicated by the arrow to cause the plate surface sequentially to pass a plurality of xerographic processing stations.

For the purpose of the present disclosure, the several xerographic processing stations in the path of movement of the plate surface may be described functionally as follows:

A charging station A at which a uniform electrostatic charge is deposited on the photoreceptive surface;

An exposure station B at which a light or radiation pattern of copies to be reproduced is projected onto the plate surface to dissipate the charge in the exposed areas thereof, and thereby create a latent electrostatic image of the copy to be reproduced;

A developing station C at which the xerographic developing material including toner particles having an electrostatic charge opposite to that of the electrostatic latent image are cascaded over the plate surface, whereby the toner particles adhere to the electrostatic latent image to form a toner powder image in the configuration of the copy being reproduced;

A transfer station D at which the toner powder image is electrostatically transferred from the plate surface to a transfer material or a support surface fed by the sheet feeding mechanism **12** and registered in time sequence with the image formed on the xerographic plate by the register mechanism **14**; and

A drum cleaning and discharge station E at which the plate surface is brushed to remove residual toner particles remaining thereon after image transfer, and at which the plate surface is exposed to a relatively bright light source

to effect substantially complete discharge of any residual electrostatic charge remaining thereon.

It is felt that the preceding description of the xerographic process is sufficient for an understanding of this invention.

Referring now to the subject matter of the invention, the sheet feeding mechanism **12** used to separte the top-most sheets one at a time from the top of the stack contained in the pack advancer or from the auxiliary paper tray, and to feed the sheets to the paper transport **16** may be formed as an integral unit of the reproducing apparatus, or as shown in the drawings may be formed as a separate unit connected to the frame of the reproducing apparatus.

A stack of sheet material **18** is supported on a platform **20** to be maintained at a proper height in cooperative relationship within a sheet feed mechanism **12** for forwarding the top-most sheet to the paper transport **16**. Such a sheet feed mechanism is disclosed in J. W. Wagner Patent No. 3,241,830, and reference is made to the disclosure contained in there for the specific details of such an apparatus.

As shown in FIG. 4 the platform **20** is supported from a pair of cables **22** by means of brackets **24** secured to the table sides **26**. Each of the cables has one end secure to the brackets by means of suitable connectors and the other end secured to a pulley **28**. The pulleys **28** are secured to a shaft **30** journaled in suitable bearings mounted in the pack advancer frame plates **32** to raise or lower the platform to maintain the top-most sheet of the stack at a proper height in relation to the sheet feeding mechanism. The specific apparatus and operation of the pack advancer mechanism is disclosed in copending application Ser. No. 557,063 in the names of V. C. Draugelis et al. and reference is made to the disclosure thereto for details of this apparatus.

The platform **20** maintains the top of the stack adjacent a pair of coacting feed rollers **34** of the paper transport **16** which are rotated to forward the sheet for further processing. A sheet feeding mechanism **12** is provided to lift the top-most sheet of the stack and forward it to the paper transport, and comprises a plurality of suction feet **36** which engage the top-most sheet and lift it a short distance prior to being moved substantially horizontally by the paper transport.

The top of the stack of sheet material is maintained in a cooperative relationship with the sheet feeding mechanism **12** by means of a sensor bar **38** formed in a U-shaped configuration traversing the top of the stack of sheet material **18**. The sensor bar is supported in a position whereby only its center portion contacts the sheet material. The opposite end of the sensor bar is operatively connected to a level, not shown, to periodically raise and lower the sheet sensing bar in timed relationship with the movement of the sheet feed mechanism **12** so that the sensing bar is raised from the sheet stack at the time the top-most sheet is fed. Thus, the center portion of the sensor bar does not interfere with the individual sheet feeding.

A sensor bar which is oscillated into and out from contact with the top of the stack, controls the advancing of the platform **20** according to the position of the top of the stack in relation to the sensor bar. Other elements which function to orient and guide the sheets are the snubber tabs **42** and the adjustable guides **44**.

The snubber tabs **42** are inverted L-shaped members. Their vertical portions restrict horizontal displacement of the upper-most sheets on the pack advancer while their horizontal portions restrain the upper-most sheets from being unduly lifted from position by currents of air created by the pneumatic mechanisms in the vicinity. The guides **44** are members laterally adjustable to contact the edges of sheets in the pack advancer. They hold the sheets in the direction of feed and provide initial directional guidance as the sheets are lifted by suction feet **36**. These machine elements are more fully described in the above referenced copending application to Draugelis et al.

The auxiliary paper tray **50** is easily placed in position above the stack of sheet material and supports one or a plurality of sheets **51** to be interposed on top of the stack of sheet material for forwarding by the sheet feed mechanism. The tray **50** includes a lower face **52** of a width approximately equal to the length of the largest sheet of paper to be forwarded by the tray. It is preferably formed of sheet metal with upturned paper guiding side edges **54** at its extremities. Supplemental edges **56** are formed by upwardly bent portions of the lower face of the tray. These supplemental edges are equally spaced from the side edges **54** at a spacing equal to the size of alternate lengths of paper to be forwarded by the tray.

If, for example, it is desired to feed 11 or 13 inch paper supported in the tray, the end edges **54** would be about 13 inches apart and the supplemental edges 1 inch from the end edges or 11 inches from each other. The fact that the longer sheet could not rest flatly with respect to the lower face of the tray due to their conforming to the raised supplemental edges in no way affects the feeding of such longer sheets.

The rear end of the tray is formed with a downward extension **58** of the lower face of the tray for supporting and alignment functions. The tray support arms **60** adjacent the edges of the tray within the angled space between the lower face and downward extension entirely facilitates the support of the tray. These arms may conveniently be formed of extension of the downward extension, cut to conform with the upper edge of the machine's standard horizontal bracket **62**. In this manner, the tray may be supported by its arms **60** being matingly positioned on the machine bracket **62**.

Horizontal displacement of the tray is prohibited by lip **64** formed as an inturned extension of downward extension **58**. This lip **64** should be of a length equal to the space between the depending supports **66** of the machine. In this manner when the tray is supported on brackets **62** with the lip **64** between depending supports **66** motion of the tray is prohibited during normal operation.

The tray **50** is partially covered by an overplate **68** secured at its sides to the sides of the lower face **52** as by spot welding. The overplate and lower face are spaced from each other to define a sheet passage space for the movement of at least the largest desired length of paper to be moved therethrough. Removably secured to the top of the overplate **68** by pairs of set screws **70** are a pair of deflector loops **72**. The deflector loops are formed of a stiff, but flexible, material, as for example, Delron. These loops extend a distance beyond the front of the tray to guide the paper held by the tray in an orientation so that the front edge of the paper is in horizontal alignment with the paper in the stack just beneath the machine's suction feet **36**. The function of the snubber tabs is more fully described in the aforementioned Draugelis application.

The aforementioned Draugelis application describes a machine with snubber tabs **42** of a resilient material. In an earlier embodiment of that machine, the snubber tabs were made of a more rigid material and the horizontal bracket **62** was constructed slightly higher with respect to the snubber tabs than in the described embodiment of that application. Consequently, in order for the auxiliary paper tray of the instant invention to operate properly with either machine embodiment, it has been found necessary to design adjustable features into the loops. This will permit the paper within the auxiliary paper tray to properly orientate itself with respect to the paper in the primary stack for being transported by the suction feet **36**.

Each of the resilient loops **72** is formed with a pair of holes **76** at their first ends for being screwed to the overplate **68**. The other ends of the loops are provided with two pairs of holes **76** for selectively being secured to the

overplate **68** with either a larger or smaller loop configuration. This is to accommodate the older rigid type snubber tabs. When the loops are screwed into position by their alternate holes, the loops are adapted to accommodate the newer resilient snubber tabs since they will vary the angle of respose and amount of contact imparted to the paper within the tray with respect to the primary stack of paper.

During the movement of paper to the paper transport **16**, currents of air adjacent the face of the sheet material cause the upper-most sheets of paper to be slightly lifted a distance limited by the horizontal extent of snubber tabs **42**. Due to variations in the degree of such currents of air from machine to machine, it has been found desirable to incorporate supplemental loop-size varying means in the nature of deflectors **78**.

These deflectors are formed of rigid sheet metal having elongated slots **80**. The deflectors are held in position in contact with the upper surface of the loop **72** by screws **70**. The elongated nature of the slots **80** permits the deflectors to be moved from a rear-most position, as shown in FIG. 5, to any more forward position where they assist in deflecting or tipping the loops slightly downward. Trial and error use of the tray suggests that when the older rigid snubber tabs are used, the loops should be positioned as shown in FIG. 5 with the deflectors in the rear-most, or nearly rear-most, position. In some instances they can even be removed. With the newer resilient snubber tabs, the loops should be secured with the alternate loop holes **76** so as the loops are enlarged. The deflectors **78** should then be slid to their forward most, or nearly forward most, position.

To operate the auxiliary paper feed tray of the instant invention, all that is required is that the tray be positioned on the sheet feeding mechanism with the support arms **60** on the horizontal bracket **62** and the lip **64** between the depending support **66**. The loops **72** and deflectors **78** must be pre-set in accordance with the machine to which the tray is being attached as described above. These elements need not be readjusted so long as the tray is used in the same machine.

The paper may be placed on the tray between the appropriate guiding edges either before or after the tray is placed in position in the machine. The paper supported by the tray, which may range from 1 to about 15 sheets, should then be pushed forward until its forward motion is prohibited by the vertical extent of the snubber tabs **42**. At this point, the edge of the paper remote from the snubber tabs, will be about half-way through the tray. The machine is then ready to feed the paper from the auxiliary tray to the exclusion of the paper on the primary stack. When the paper on the auxiliary tray has been depleted, the suction feet will continue feeding the sheets remaining on the primary stacks.

As described in the aforementioned Draugelis application, adjustable guides **44** are provided adjacent the edges of the paper. These guides are movable to contact the edges of various sizes of paper within the stack and provide a primary guiding of the paper as it is moved from its rest position. When the paper within the tray is of the same size as that within the primary stack, no adjustment of the guides is needed. When the paper within the tray is larger than that within the primary stack, the guides must be separated to accommodate the larger paper. And while the suction feet **36** will continue to feed the smaller paper from the primary stack after depleting the paper from the auxiliary supply, it has been found desirable to stop the machine and readjust the guides. If this is not done, there is the possibility that the paper being fed to the paper transport would become cocked, in which case a paper jam could occur. The proper adjustment of these guides is desirable but not essential since it is possible to adjust the guides to their wider position and then feed alternate large and small sheets from the auxiliary paper tray.

While the present invention as to its objects and advantages, has been described herein as carried out in a specific embodiment thereof, it is not desired to be limited thereby; but it is intended to cover the invention broadly within the scope of the appended claims.

What is claimed is:

1. A tray capable of supporting supplemental sheet material in position to be sequentially fed through a xerographic reproducing machine or the like by automatic forwarding means including

a sheet supporting surface adapted to support supplement sheet material in a sheet forwarding position above a primary stack of sheet material positioned to be automatically forwarded after the depletion of the supplemental sheet material,

sheet guiding edges on said supporting surface to align the supplemental sheet material in the direction which it is to be fed,

positioning means to removably attach said sheet supporting surface to a machine capable of supporting and forwarding the primary stack of sheet material after the forwarding of the supplemental sheet material has been completed,

an overplate secured at its edges to the edges of said sheet supporting surface and defining a sheet passage space between said overplate and said sheet supporting surface, and

sheet deflecting means on said overplate to hold supplemental sheet material positioned on said supporting face in a deflected orientation with the leading edge of the supplemental sheet material substantially parallel to the primary stack of sheet material.

2. The tray as set forth in claim **1** wherein the sheet deflecting means includes a pair of loop-shaped members and further including means to attach said loop-shaped members to said overplate.

3. The tray as set forth in claim **2** wherein said loop-shaped members are removably attached to said overplate and further including means to vary the size of the loops and consequently the angle of repose and degree of contact the supplemental sheet material makes with respect to the primary stack of sheet material.

4. The tray as set forth in claim **3** and further including shiftable deflector plates positionable in contact with said loop-shaped members to selectively vary the angle of disposition of said loop-shaped members and consequently further vary the angle of repose and degree of contact the supplemental sheet material makes with respect to the primary stack of sheet material.

5. The tray as set forth in claim **1** wherein the sheet deflecting means include a pair of loop-shaped members having pluralities of apertures at their ends and further including means to selectively secure the loop-shaped members to said supporting face through any of said apertures for forming deflecting loops of various sizes.

References Cited

UNITED STATES PATENTS

2,492,577 12/1949 Janke ---------- 271—9

ANDRES H. NIELSEN, *Primary Examiner.*

U.S. Cl. X.R.

271—009