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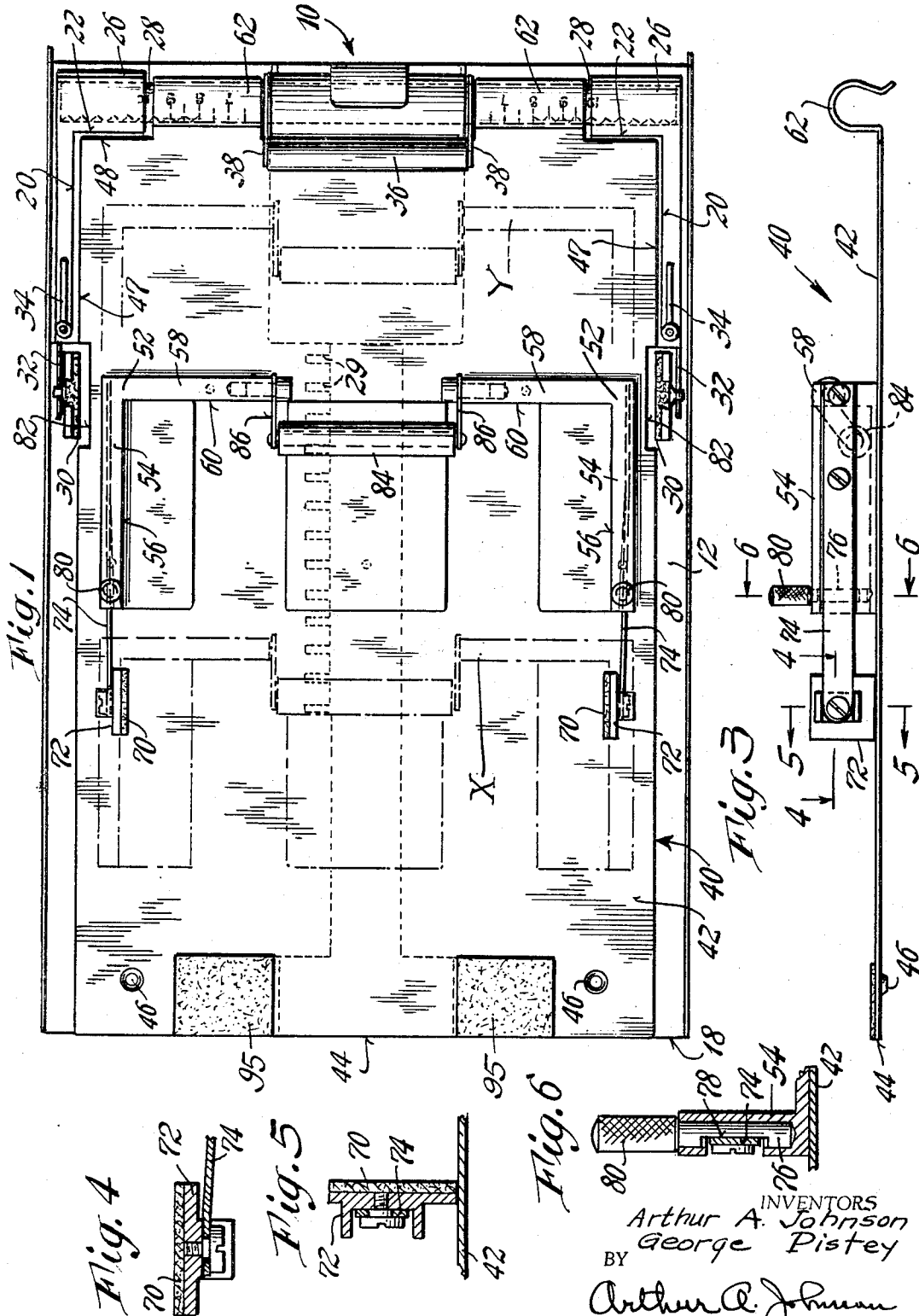
A. A. JOHNSON ETAL

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AUXILIARY PAPER TRAY FOR COPYING MACHINES

Filed May 3, 1966

3 Sheets-Sheet 1



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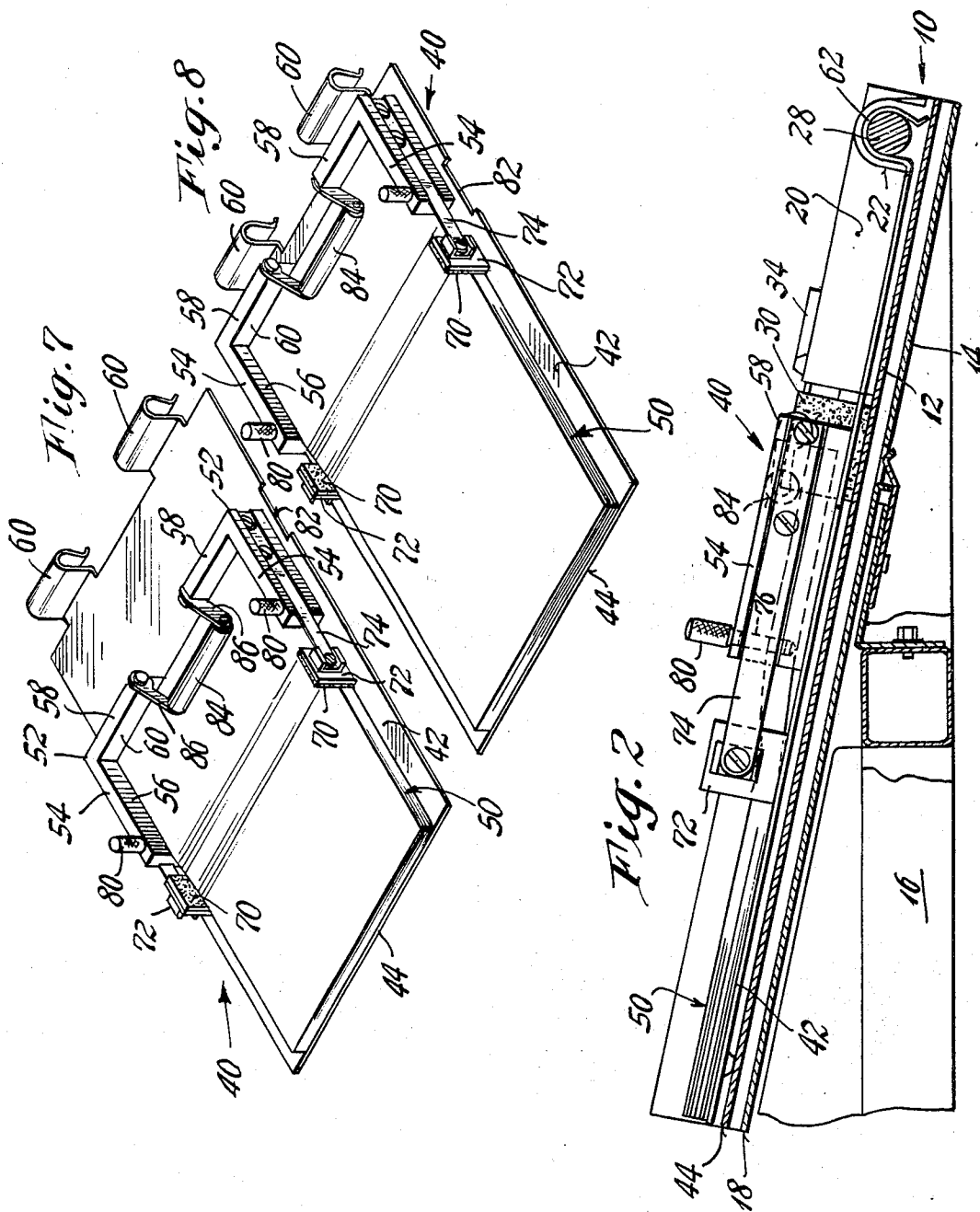
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3 Sheets-Sheet 2



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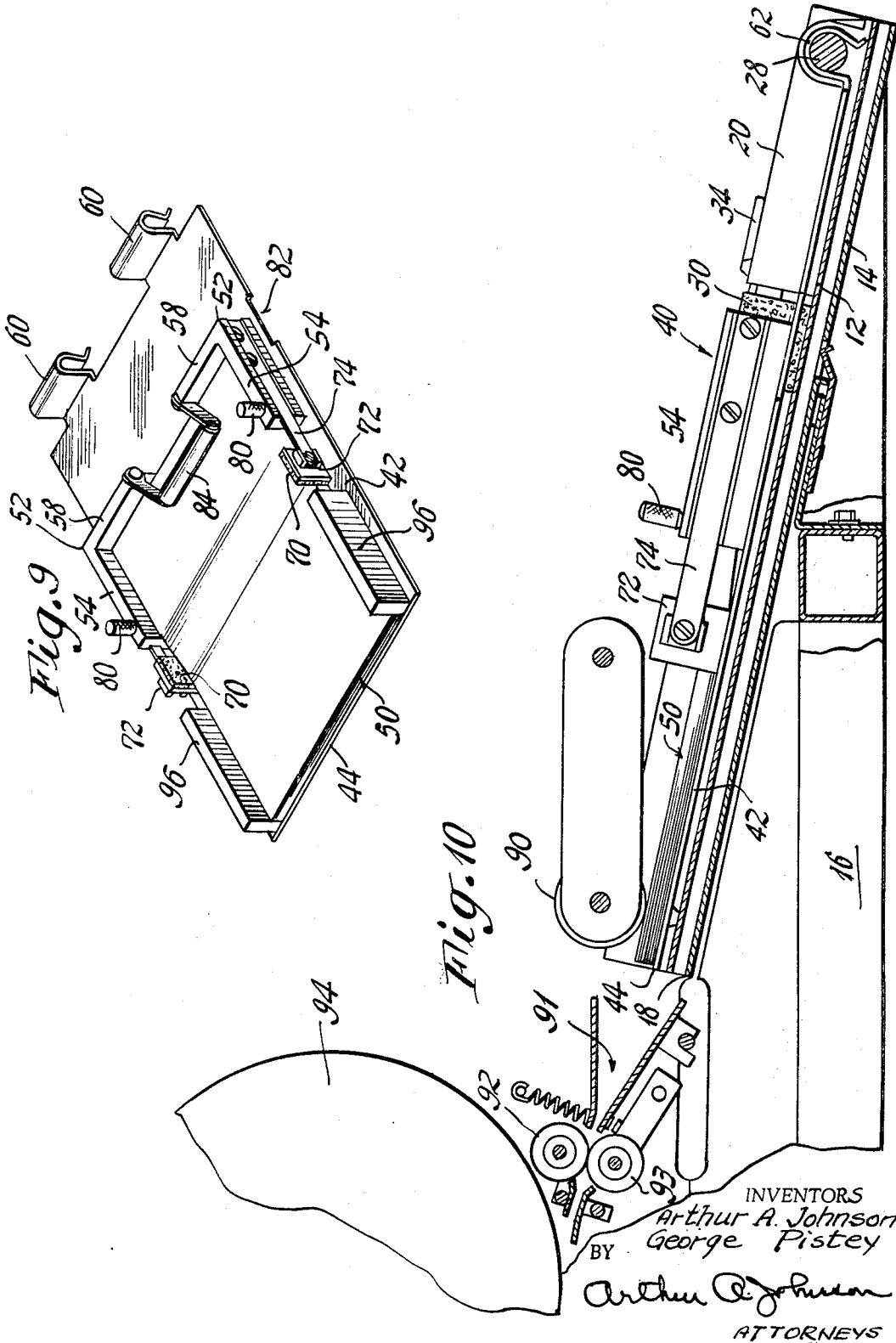
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AUXILIARY PAPER TRAY FOR COPYING
MACHINES

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ABSTRACT OF THE DISCLOSURE

A portable paper tray for transporting a stack of copy paper sheets to and from the paper table of a copying machine has a bottom plate of such size and shape as to fit between and be located by the lateral and end guides of the machine when the tray carrying a stack of copy sheets is dropped onto the paper table. The tray has lateral and end guides fixedly attached to the bottom plate to accommodate a stack of sheets of a particular width and length and may be lifted from the paper table of the machine with the sheets remaining on its after the desired number of copies has been made to be stored until again required.

This invention relates to copying machines of the type used in xerographic and other duplicating processes, and more particularly to the copy sheet supply tray for use in such machines.

Xerographic copy reproducing machines are usually provided with a suitable paper table which has lateral guides and end stop means to removably receive and support a stack of copy sheets in a desired position relative to the feed mechanism of the machine. The lateral guides and end stop means are adjustable within limits to accommodate different widths and lengths of copy sheets.

In the use of such machines for long runs of copies utilizing the same size of copy sheets, the time and effort required to properly adjust the lateral guides and end stop means present no particular problems aside from the attention which must be given to make the initial necessary adjustments accurately.

However, when the copying machine is to be used for short runs of different size sheets, the adjustment of the lateral guides and end stop means of the paper table accounts for a considerable part of the working time spent by a user in obtaining the copies. In fact, when only a few copies are to be made of short sheets, if a stack of larger sheets is on the paper table, such a large part of the working time is consumed in accurately making the necessary adjustments that the user finds it more expedient to use the larger size copy sheets and subsequently trim the copies to the desired size, the waste of paper being considered less costly than the employment of the user's time.

In addition, in order to change from one size of copy sheet to another, the user must handle loose stacks of sheets while removing one stack from the paper table and placing the other thereon, making sure that the replacement sheets are in substantial registration. The user has the additional burden of depositing the stack just removed from the paper table in loose condition in some convenient place, or replacing it in the ream package from which it had been taken. These procedures are inconvenient and bothersome, and further add to the time and effort required to effect a change-over from one size of copy sheet to another on the paper table of the copying machine.

The same problems with regard to removing and replacing stacks of copy sheets exist when substituting sheets differing in kind, even though of the same size, such for example as plain and partially preprinted sheets such as letterheads or sheets of different colors.

These and other disadvantages are overcome by the present invention by providing a portable copy sheet tray

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for carrying a supply of each different size or kind of copy sheet frequently used in the copying machine which can be quickly and easily mounted on the paper table of the copying machine to place the stack of copy sheets which it carries in proper position to be engaged by the feed mechanism of the machine.

Thus, according to the present invention, when it is desired to change from sheets of one size or kind to sheets of another size or kind, the portable tray with its stack of unused copy sheets of a size or kind previously having been used is removed en bloc from the paper table and placed aside and another tray with its supply of sheets of a different size or kind is placed upon the paper table.

A feature of the present invention is the provision of a portable supply tray which is so oriented in construction to the means on the paper table and to a particular size of copy sheet that it accurately positions the leading edge of a stack of such copy sheets in relation to the feed mechanism of the copying machine merely by placing the portable tray in position on the paper table of the copying machine.

According to the present invention, the portable paper tray not only serves to carry and support a stack of copy sheets, but also has sheet edge drag means, lateral guides and end stop means like that of the paper table, so as to control the sheets which it carries in the same manner as corresponding parts forming permanent elements of the copying machine.

The principles of the present invention in their broadest aspects are illustratively embodied in an auxiliary copy sheet supply tray for a xerographic copying machine, the supply tray having an elongate stack supporting plate of a size and shape laterally and longitudinally which is within the limits of adjustability of the adjustable lateral guide and end stop means provided on the machine paper table, the latter having a supporting plate on which the auxiliary supporting plate is adapted to rest. The supporting plate of the tray is provided with fixed lateral guide and end stop means which are positioned to receive and hold a stack of copy sheets of a determinate width and to position the leading edge of the stack in a predetermined position relative to the delivery end of the paper table of the machine. The portable tray includes means for cooperative engagement with a portion of the machine paper table to position the tray thereon in a predetermined lateral position between the lateral guide means of the paper table and in a predetermined longitudinal position in which the leading edges of the stack of sheets on the tray are in a predetermined position relative to the delivery end of the paper table. Thus, a stack of copy sheets of determinate width and length is held in the copying machine by a portable tray in the same relative position as if the stack were being supported and positioned by the paper table and its lateral guides and end stop means.

In the presently preferred embodiment of the invention, the tray has a lateral dimension such that it fits between and is engageable with the lateral guides of the paper table when these lateral guides are set to their maximum limit of adjustability. Also, in the embodiment presently preferred, there are clamp means on the paper tray removably engageable with a portion of the means for adjustably mounting the lateral guide and end stop means of the paper table, and the paper supporting plate of the tray has a longitudinal dimension such that its delivery end is in substantial registry with the delivery end of the paper table, in which situation the delivery ends of the sheets of the stack are supported by the tray.

A more thorough understanding of the present invention, together with other objects and features thereof, will be had by reference to the following detailed description when considered in conjunction with the accompanying drawings in which:

FIGURE 1 is a plan view of the portable copy paper tray of this invention shown in operative position on the paper table of a copying machine;

FIG. 2 is a fragmentary side view, partly in section, of the assembly shown in FIG. 1;

FIG. 3 is a side view of the portable tray alone;

FIG. 4 is a sectional view to an enlarged scale taken on the line 4—4 of FIG. 3;

FIG. 5 is a sectional view to an enlarged scale taken on the line 5—5 of FIG. 3;

FIG. 6 is a sectional view to an enlarged scale taken on the line 6—6 of FIG. 3;

FIGS. 7 and 8 are similar perspective views of portable paper trays to accommodate different sizes of copy paper.

FIG. 9 is a perspective view of a modified form of paper table having extended lateral guides; and

FIG. 10 is like FIG. 2 but also shows part of the feed mechanism of the copying machine.

Referring to FIGS. 1 and 2, xerographic copying machines are customarily provided with a paper table designated generally by the numeral 10, the paper table comprising an elongate substantially rectangular sheet supporting plate 12 which is carried by a base member 14 slidably supported by means not shown on a portion 16 of the copying machine frame. In this manner the paper table 10 can be manually moved between an operative copy sheet delivering position and a retracted position in which a major portion of the paper table 10 is outside of the copying machine frame and accessible to an operator for loading and unloading the table with a stack of copy sheets.

The paper table 10 has an unobstructed delivery end 18, and adjacent the opposite end is provided with opposed lateral guides 20 and end stops 22, the lateral guide and end stop for each side being formed integrally on an L-shaped member 26. Each of the L-shaped members 26 is slidably carried by a transverse rod 28 to move laterally thereon. The rod 28 is slidably carried by the supporting plate 12 to move longitudinally relative to the table 10 and is adjustably held in one of several positions indicated by the notches 29 with which a latch mechanism (not shown), also carried by the rod 28, engages. Thus, the lateral guide and end stop means 20 and 22 respectively are adjustable within limits to accommodate stacks of sheets of different widths and to position the leading edge of stacks of different lengths in a predetermined position relative to the delivery end 18 of the supporting plate 12.

The paper table 10 is further provided with opposed lateral edge drag means effective on the side edges of a stack to prevent all but the top sheet from being fed to the copying mechanism of the machine. Each edge drag means comprises a friction pad 30 secured to the free end of a flat resilient metal strip 32, the other end of each strip being secured to an L-shaped member 26 and movable therewith. The strips 32 are biased inwardly to cause the friction pads 30 to bear against opposite side edges of a stack of copy sheets. To facilitate the loading of the paper table 10, the pads 30 can be moved outwardly a short distance by cam means operated by the levers 34 also mounted on the L-shaped members 26.

To further assure the feeding of sheets singly from the stack, the paper table 10 includes a drag roller adapted, when in its operative position, to rest on the topmost sheet. The drag roller 36 is rotatably journaled on a pair of arms 38 which are rotatably mounted on the transverse rod 28.

The device of the present invention is a portable copy sheet supply tray generally designated by the numeral 40, and comprises an elongate substantially rectangular supporting plate 42 which is adapted to rest upon the supporting plate 12 of the copying machine paper table 10. The supporting plate 42 has an unobstructed delivery end 44, and preferably is provided with depressions 46 or other

suitable support elements for direct contact with the supporting plate 12.

The lateral and longitudinal dimensions of the supporting plate 42 are not critical except to the extent that the plate 42 shall have a size and shape both laterally and longitudinally which is within the limits of adjustability of the lateral guide means 20 and end stop means 22 of the paper table 10 so that the plate 42 can rest upon the plate 12 and receive and hold thereon stacks of copy sheets of substantially the same or different widths and lengths as the supporting plate 12.

Preferably, however, the paper supporting plate 42 of the tray has a lateral dimension such that the plate 42 fits between and substantially engages the lateral guide means 20 when the latter are set to their maximum limit of adjustability, so that, as best seen in FIG. 1, the side edges 47 of the plate 42 have a slightly loose fitting contacting relationship with the lateral guide means 20 to facilitate placing and removing the plate 42 on the plate 12. Similarly, it is preferable, although not essential, for the plate 42 to have a longitudinal dimension such that the delivery end 44 of the plate 42 is adjacent the corresponding end 18 of the plate 12 when the opposite end 48 of the plate 42 is in engagement with the end stop means 22 when the latter is set to its maximum limit of adjustment. Thus, when a stack 50 of copy sheets of a determinate length is held in the tray 40 with the leading edge of the stack adjacent to the delivery end 44 of the plate 42 by means hereinafter fully described, the stack 50 will be held in the copying machine in the same relative position is if the stack were being held by the paper table 10.

The tray 40 is further provided with lateral guide means and end stop means for a stack 50 of copy sheets. These, in the form illustrated by way of example, comprise a pair of L-shaped members 52 suitably secured to the plate 42, each member having a longitudinally extending leg 54 having an inwardly facing surface 56, the surfaces 56 forming the lateral guide means and being spaced apart on the plate 42 a distance sufficient to receive and locate therebetween a stack 50 of a determinate width.

Each member 52 also includes a laterally extending leg 58 having stop means 60, the surfaces of which engage the rear edge of a stack of copy sheets. The legs 58 are placed on the plate 42 in a position such that the end stop means 60 positions the leading edge of a stack of copy sheets substantially adjacent the delivery end 44 of the plate 42.

It will be observed from FIGS. 7, 8 and 9 that the lateral guide surfaces 56 are spaced inwardly from the side edges of the plate 42 a determinate distance in accordance with the predetermined width of the copy sheets to be held on the plate 42, and that the end stop means 60 is spaced longitudinally from the end 48 of the plate 42 a distance substantially equal to the length of the particular copy sheets to be held on the tray.

The plate 42 is further provided with suitable clamp means which are removably engageable with a portion of the paper table 10 to hold the plate 42 on the plate 12 and to assist in positioning the plate 42 thereon. In the preferred embodiment, the clamp means comprises a pair of substantially U-shaped resilient snap members 62 which are adapted to engage the transverse rod 28 in the manner shown in FIGS. 1 and 2 with a snap-over-center engagement therewith.

As best seen in FIG. 1, the snap members 62 are disposed between the members 26 of the paper table 10 and are of such size as to center the plate 42 on the plate 12 and also to properly position the plate 42 longitudinally on the plate 12.

From the foregoing, it is now apparent that either the physical dimensions of the plate 42 or the snap members 62 constitute broadly a means on the tray for cooperative quick removable engagement with and disengagement from a portion of the paper table 10 to position

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the plate 42 on the plate 12 in a predetermined lateral position in which the plate 42 fits between the lateral guide means 20 of the paper table 10, and in a longitudinal position in which the delivery end 44 of the plate 42 is in a predetermined position relative to the corresponding end 18 of the plate 12, so that, with the lateral guide surfaces 56 and end stop means 60 positioned as aforesaid on the plate 42, a stack of determinate width and length is held in the copying machine by the plate 42 in the same relative position as if the stack were held by the paper table 10.

This is best seen in FIG. 10 wherein the stack 50 of copy sheets is held on the plate 42 with the leading edge of the stack positioned just beyond the separator rollers 90 of the copying machine, and in position to be advanced to the feed rollers 92 and 93.

In order to insure the feeding of only one sheet at a time by the separator rollers 64, the tray is further provided with side edge drag means which are similar to that provided on the paper table 10. As shown a pair of oppositely positioned pressure pads 70 are adhesively or otherwise suitably secured to brackets 72 carried by one end of spring arm 74, the other ends of which are secured to the outer surfaces of the longitudinally extending legs 54 of the L-shaped members 52. The spring arms are biased to urge the pressure pads into engagement with the side edges of the stack 50 held by the tray. Cam means in the form of a rotatable shaft 76 having a flat surface 78 engaged by the spring arm 74 is provided in each longitudinally extending leg 54. By rotating the shafts 76 by means of the knurled handles 80, each of the pressure pads can be moved outwardly to facilitate loading the auxiliary supply tray 40 with a stack of copy sheets.

The plate 42 is recessed along its side edges as at 82 in order to accommodate the friction pads 30 of the paper table 10 when the friction pads 30 are in their normal stack engaging position. Thus, when placing a tray 40 on the paper table 10, it neither is necessary to spread the friction pads 30 nor do they interfere with the proper placing of the tray 40 on the paper table 10.

To further assure that only one sheet at a time is fed to the feed rollers 66 and 68, the tray 40 is provided with a drag roller 84 similar in structure and function to the drag roller 36, the roller 84 being rotatably journaled on arms 86 which in turn are rotatably mounted on the inner edges of the laterally extending legs 58 as by the screws 88. When a stack of copy sheets on a tray 40 is exhausted and a new supply is to be inserted into the tray, which may conveniently be done either before or while the tray 40 is supported on the paper table, the drag roller is moved to an inoperative position by merely rotating the arms 86 on the screws 88.

As shown in FIG. 10, the copying machine comprises the feeding and separating rollers 90 which advance the top sheet of the stack through a paper chute 91 to feed rollers 92 and 93 which advance the sheet to a drum 94, all as illustrated and described in more detail in U.S. Patent No. 3,104,873 to R. W. Benson et al., dated Sept. 24, 1963.

As shown in FIG. 1, the tray of the present invention may be provided with friction pads 95 to prevent the bottom sheet of the stack from being inadvertently drawn up by the feeding and separating rollers 90 toward the feed rollers 92 and 93.

To further hold a stack of sheets in the tray of the present invention against shifting laterally while being applied to or removed from the paper table of the machine or a support on which the tray rests when not in use, the delivery end of the tray may, as shown in FIG. 9, be provided with lateral guides 96 extending from adjacent the pressure pads 70 toward the delivery end of the tray.

The dot-and-dash lines X and Y in FIG. 1 indicate the positions the end stops 58, lateral guides 56 and the roller

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84 may take when certain shorter or longer sheets are to be carried by the tray.

It is within the contemplation of the present invention that the user of the copying machine be provided with a tray for each size or kind of sheets of paper which he desires to use in the machine. If such be the case, the lateral guides 20 with their pressure pads 30 and the roller 36 may be omitted from or be removed from the machine.

It is apparent from the foregoing that there is provided a supply tray for a copying machine which is effective to hold a stack of copy sheets of determinate width and length within the same range of sizes as that which the paper table provided with the copying machine can accommodate, and in the same relative position within the copying machine as if the stack were supported in the copying machine paper table. The present invention contemplates the provision of as many different trays as there are different sizes or kinds of copy sheets to be customarily used, and that, once loaded with copy sheets, an individual supply tray will be inserted into the copying machine and removed therefrom as the need for a particular size or kind of copy sheet arises. The tray therefore functions both as a supply receptacle for the copying machine and as a portable storage tray for the particular size or kind of copy sheet for which it is designed.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

We claim:

1. A portable paper transporting tray for carrying a stack of copy sheets to and supporting the same on a copying machine which machine is provided with a paper table including an elongate supporting plate having an unobstructed delivery end, opposed lateral paper guide means, adjustable end stop means to engage and position the trailing edge of said stack, means mounting the lateral guides on the supporting plate to be adjustable within minimum and maximum limits to determinate positions to accommodate stacks of sheets of different widths, and means mounting the end stop means to be adjustable to position the leading edges of stacks of sheets of different lengths in a predetermined position relative to the delivery end of the supporting plate, said portable paper transporting tray comprising an elongate stack-supporting bottom plate having an unobstructed delivery end and having a size and shape to fit between and engage said paper table lateral guides when the latter are adjusted to provide a determinate space between them, when the portable tray with its stack of copy sheets is dropped on said paper table to be supported thereby for quick removal and replacement without the use of tools, lateral guides fixedly secured on said bottom plate and spaced apart to receive and locate therebetween a stack of copy sheets of predetermined width, end stop means fixedly secured on said bottom plate and positioned intermediate the ends thereof to place the leading edge of a stack of copy sheets of a predetermined length in a predetermined position relative to the delivery end of the supporting plate of the tray, and means on the bottom plate of the tray for cooperative engagement with the end stop means of said paper table to position said bottom plate of the tray on the supporting plate of the machine paper table in a predetermined longitudinal position in which the delivery end of said bottom plate is in a predetermined position relative to the corresponding end of said supporting plate of the machine table so that a stack of copy sheets of determinate width and length is held in the copying machine by said transporting tray in the same operative position as if it were supported and positioned by the paper table of the copying machine.

2. A portable paper transporting tray as set forth in claim 1 wherein the end stop means of the transporting tray are spaced longitudinally from the delivery end of

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the tray a determinate distance in accordance with the length of copy sheets to be held on the tray.

3. A portable paper transporting tray as set forth in claim 1 wherein the lateral guide means of the transporting tray are spaced inwardly from the side edges of the bottom plate of the tray a determinate distance in accordance with the width of copy sheets to be carried by the transporting tray.

4. A portable paper transporting tray as set forth in claim 1 wherein said means for positioning the tray on the paper table includes manually operable attaching means on the tray for quick engagement and disengagement with a portion of said lateral guide and end stop mounting means of the paper table.

5. A portable paper transporting tray as set forth in claim 4 in which the said lateral guide and stop mounting means of the paper table includes a transverse rod, disposed adjacent the rear end portion of the paper table, and wherein the attaching means comprises a substantially U-shaped resilient means on the rear end portion of said

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portable tray shaped to removably engage said transverse rod with a snap-over-center fit.

6. A portable paper transporting tray as set forth in claim 4 wherein the end stop means of the portable tray is spaced longitudinally from said attaching means a determinate distance in accordance with the predetermined length of copy sheets to be held on the tray.

7. A portable paper transporting tray as set forth in claim 1 in which the bottom plate of the tray is provided with oppositely disposed side edge drag means including friction pads, means for mounting said pads on said lateral guide means on the tray, and means for urging said pads against the side edges of a stack of copy sheets to prevent more than one sheet of copy paper from being fed at a time.

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RICHARD E. AEGERTER, *Primary Examiner*.