Nov. 24, 1959 L. H. BISHOP ET AL 2,914,189

COLLATING TRAY AND ASSEMBLY

Filed Dec. 19, 1955

FIG. 1

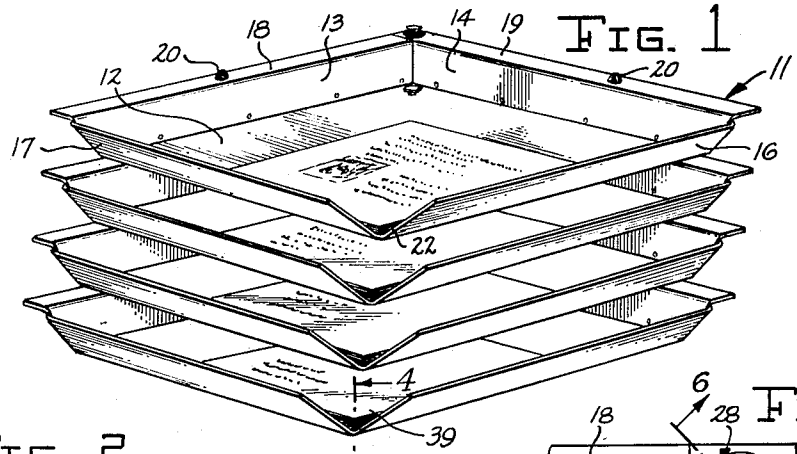


FIG. 2

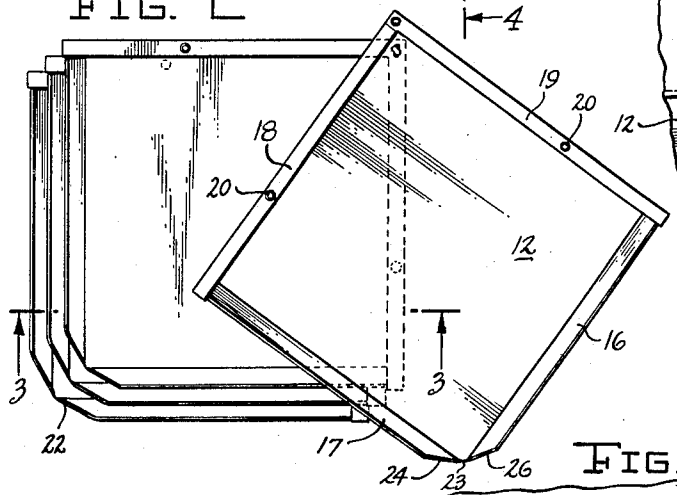


FIG. 5

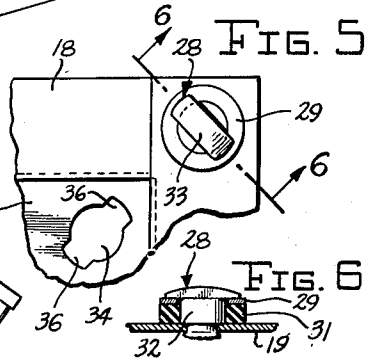


FIG. 6

FIG. 7

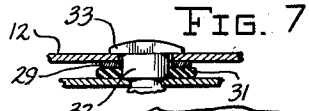


FIG. 3

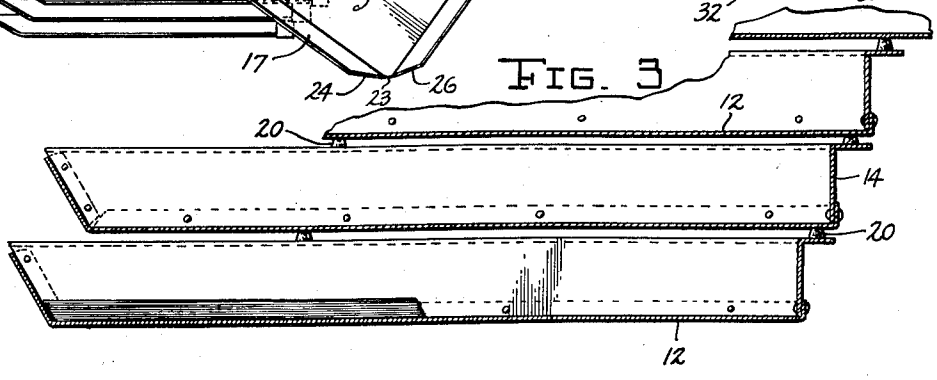
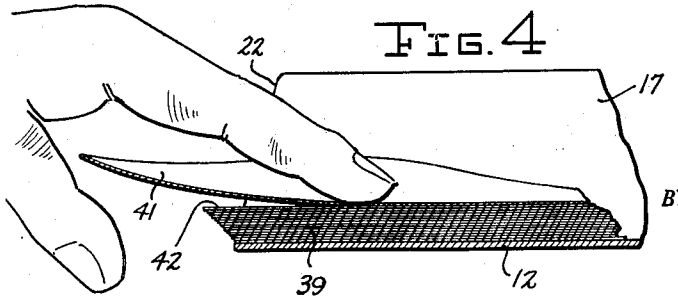


FIG. 4



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COLLATING TRAY AND ASSEMBLY

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8 Claims. (Cl. 211—129)

This invention relates generally to a collating tray and assembly.

Heretofore in collating or gathering sheets of paper into pads, pamphlets, books and the like, it has been the practice to put the individual sheets or pages on separate piles and then pick up the pages or sheets one by one from the separate piles. This has been found to be unsatisfactory because often one or more sheets stick together when the top sheet is removed from the pile. In addition, it is often necessary to walk or otherwise move to reach the piles to remove the sheets if very many pages are being assembled. Vertically aligned trays have been used to eliminate the necessity of walking or moving but they have not overcome the disadvantage that the top page may often carry one or more pages with it when it is removed from the pile.

In general, it is an object of the present invention to provide a collating tray and assembly which will greatly facilitate removal of sheets one by one from piles of sheets.

Another object of the invention is to provide a collating tray in which means are provided on each tray to facilitate removal of the sheets one by one from a stack or pile of the sheets carried within the tray.

Another object of the invention is to provide a collating tray of the above character in which the means provided on each tray to facilitate removal of the sheets causes one corner of the sheet being removed to be curved and lifted away from the sheet immediately below as it is being removed from the tray.

Another object of the invention is to provide a collating tray of the above character in which air is caused to move under the sheet as it is being removed from the tray to facilitate separating it from the sheet immediately below.

Another object of the invention is to provide a collating tray of the above character in which a V-shaped cut-out is provided in one corner of the tray to facilitate the removal of the sheets one by one from a stack or pile of the sheets carried within the tray.

Another object of the invention is to provide a plurality of collating trays which can be stacked in staggered substantially vertical alignment to provide a collating tray assembly.

Another object of the invention is to provide a plurality of collating trays of the above character in which each tray is provided with cooperative latching means whereby one corner of the tray may be fixed to the corresponding corner of the lower tray.

Another object of the invention is to provide a plurality of collating trays of the above character in which means are provided on each of the trays for supporting two sides of the tray immediately above it.

A further object of the invention is to provide a plurality of collating trays of the above character which can be nested when not in use.

Still further objects and features of the invention will

appear from the following description in which the preferred embodiment has been set forth in conjunction with the accompanying drawing.

Referring to the drawing:

Figure 1 is an isometric view showing a plurality of collating trays made into a collating tray assembly.

Figure 2 is a plan view of the collating tray assembly shown in Figure 1 showing the top tray pivoted sidewise.

Figure 3 is a fragmentary cross sectional view taken along the line 3—3 of Figure 2.

Figure 4 is a cross sectional view taken along the line 4—4 of Figure 1 showing the effect of the tray upon a sheet as it is being removed from the tray.

Figure 5 is an enlarged detail view of a portion of a tray showing the means for connecting the trays to each other.

Figure 6 is a cross sectional view taken along the line 6—6 of Figure 5.

Figure 7 is a cross sectional view similar to Figure 6 but shows the position of the connecting means when it is connected to the tray above it.

The tray assembly shown in the drawing consists of a plurality of trays **11** which are connected together in a manner hereinafter described.

Each of the trays **11** is formed of a suitable material such as 16-gauge aluminum and is comprised of a bottom wall **12** and side walls **13**, **14**, **16** and **17**. The side walls **13** and **14** are substantially perpendicular to the bottom wall **12** whereas side walls **16** and **17** are inclined at an obtuse angle with respect to the bottom wall **12**. It has been found that the operation of the trays is most satisfactory when the side walls **16** and **17** are inclined at an angle of 120 degrees with respect to the bottom wall **12**. however, it has been found that the tray will operate satisfactorily within plus or minus 10° of the desired 120° angle.

The size and depth of the trays may be changed to suit individual requirements, however, it has been found that a tray 18½" x 18½" square and 2" deep suits most applications.

The side walls **13** and **14** are provided with flanges **18** and **19** which extend at substantially right angles to the side walls of which they are an integral part. Rests **20** of a suitable resilient material such as rubber are mounted at spaced intervals on the upper surfaces of flanges **18** and **19** for a purpose hereinafter described.

As can be seen from the drawing, the side walls **13**, **14**, **16** and **17** have been joined to form four corners. However, the corner formed by the inclined side walls **16** and **17** has been cut away to provide a V-shaped cut-out **22**, the lower portion **23** of the V terminating adjacent the bottom wall **12**. Equal portions have been cut out of each of the side walls **16** and **17** to form the cut-out **22**. The side edges **24** and **26** of the V-shaped cut-out form angles of 45° with respect to the bottom wall **12**.

Any suitable means may be provided for mounting the trays **11** one on top of the other so that they can be used to form a collating tray assembly. On means found to be satisfactory consists of a T-shaped member **28** which is fixed to the flanges **18** and **19** on the corner of the tray opposite the corner having the V-shaped cut-out **22** and on an imaginary line passing through the V-shaped cut-out and the corner opposite the V-shaped cut-out. A pair of washers **29** and **31** are mounted on the hub portion **32** of the T-shaped member **28**. Washer **29** is of a suitable rigid material and is mounted immediately beneath the head **33** of the T-shaped member **28** and member **31** is of a suitable resilient material such as rubber and is mounted between the washer **29** and the flanges **18** and **19**. It will be noted that the longitudinal axis of the head **33** is perpendicular to the

aforementioned imaginary line drawn between the V-shaped cut-out and the corner opposite the cut-out.

The bottom wall 12 of each of the trays is provided with a circular hole 34 mounted adjacent the corner formed by the adjacent edges of the side walls 13 and 14 and is also centered on the imaginary line running between the V-shaped cut-out and the corner opposite the V-shaped cut-out. The hole 34 is provided with enlarged portions 36 which are adapted to receive the head 33 of the T-shaped member 28.

The operation of our device may now be described as follows:

Let it be assumed that it is desired to assemble a plurality of trays 11 into a tray assembly as shown in Figure 1. One of the trays 11 is lifted over one of the other trays 11 so that the hole 34 with its enlarged portions 36 is in alignment with the head 33 of the T-shaped member 28. The upper tray is then pressed downward slightly to compress the resilient washer 31 as shown in Figure 7 after which the upper tray is rotated clockwise as shown in Figure 2 until the upper tray substantially overlies the lower tray as shown in Figure 1. The head 33 in this position of the tray engages the circular portions of the hole 34 and thus engages the upper tray. The resilient rests 20 upon the flanges 18 and 19 support the two sides of the tray immediately above them. Thus by securing one corner of a tray to the tray immediately below it and resting two sides of the upper tray upon the lower tray a support is provided for the upper tray which will enable the upper tray to carry a substantial pile of sheets of paper.

Now let it be assumed that an additional number of trays are mounted one on top of the other as hereinbefore described until the desired number of trays have been assembled. Piles 39 of sheets of paper may then be inserted into the trays. If desired, the trays may be rotated slightly from their normal position to facilitate entry of the piles. It will be noted however, that by mounting the trays one upon the other in the manner hereinbefore described, the trays are slightly staggered as shown in the drawing. This facilitates insertion of the piles 39 so it is not necessary to rotate the separate trays. The staggered relationship of the trays also facilitates removal of the sheets of paper one by one as hereinafter described.

Now let it be assumed that it is desired to remove the top sheet 41 from the pile 39 in the lowest tray 11 shown in the assembly in Figure 1. As shown in Figure 4, the index finger or any other suitable finger is used to frictionally engage the top sheet 41. The sheet 41 is then drawn by the finger towards the V-shaped cut-out 22. As the sheet is pulled out through the V-shaped cut-out, the sides of the sheet adjacent the side edges of the V-shaped cut-out are engaged and cause that corner sheet of paper to be curved slightly. At the same time, the sheet is urged upwardly by the V-shaped cut-out away from the sheet 42 immediately below it. As the sheet 41 is continued to be pulled through the cut-out, air enters between the sheet 41 and the sheet 42 immediately below it and facilitates separation of the sheet 41 from sheet 42. As soon as sheet 41 is drawn through the cut-out, it may be grasped firmly by the thumb and forefinger and removed from the tray. The same procedure is then used for removing sheets from the other trays in the tray assembly.

It has been found that when the sheets are removed rapidly from the individual trays, air is urged between the sheet being removed and the sheet immediately below and greatly facilitates separation of the sheets. However, it is to be understood that the lifting and curving action of the V-shaped cut-out upon the sheet also greatly facilitates separation of the sheet being removed from the sheet immediately below it. At no time will more than one sheet at a time be withdrawn from the tray.

By the use of such a tray assembly, it has been found that the output of an individual collating or gathering material can be increased as much as 40%. The use of the tray assembly places all the sheets being collated within each reach of the collator so that no waste motion occurs.

When the tray assemblies are not in use, the individual trays may be readily disassembled and nested.

It is apparent from the foregoing that we have provided a collating tray and assembly which greatly facilitates the collating of sheets of material. The trays are relatively inexpensive and when not in use can be nested and stored away.

We claim:

1. A collating tray having a planar bottom wall and four abutting side walls forming four corners, two abutting side walls being inclined outwardly at an angle from a line perpendicular to the bottom wall, the other two side walls forming a right angle with the bottom wall, the two inclined walls being provided with a V-shaped cut-out in the corner joining the two inclinded abutting side walls, the bottom of the V terminating at a point which is level with the top surface of the bottom wall.

2. A collating tray as in claim 1 wherein the inclined side walls are inclined at an angle between 20 to 40 degrees from a line perpendicular to the bottom wall.

3. A collating tray having a planar bottom wall and four abutting side walls forming four corners, two abutting side walls being inclined outwardly at an angle from a line perpendicular to the bottom wall, the other two side walls forming right angles with the bottom wall, the inclined side walls being formed with a V-shaped cut-out in the corner joining the two inclined side walls, the bottom of the V terminating at a point flush with the upper surface of the bottom wall, the bottom wall having a hole therein adjacent the opposite corner diagonally opposite the corner having the V-shaped cut-out therein and means mounted on the tray adjacent said opposite corner on the side opposite the hole, said last named means being adapted to extend through the hole in the bottom wall of another tray and being adapted to engage the other tray to hold the other tray in a plane substantially parallel to the first named tray and to permit rotational movement of the other tray in a horizontal plane.

4. In a collating tray assembly, a plurality of collating trays having a planar bottom wall and four abutting side walls forming four corners, two abutting side walls being inclined at an angle from a line perpendicular to the bottom wall, the two inclined walls being formed with a V-shaped cut out in the corner joining the two inclined side walls, the bottom of the V-shaped cut out terminating at a point flush with the upper surface of the bottom wall, and cooperating means carried by each of the trays and serving to connect said trays so that the trays are mounted one above the other in a spaced relationship with the cut out corner of each of the trays being staggered rearwardly from the cut out corner of the tray directly below to thereby facilitate access to the trays, said last named cooperating means permitting said trays to be detached from each other so that said assembly may be disassembled and the trays nested.

5. In a collating tray assembly, a plurality of trays having a planar bottom wall and four abutting side walls forming four corners, two abutting side walls being inclined at an angle from a line perpendicular to the bottom wall, the inclined side walls being provided with a V-shaped cut out in the corner joining the two inclined side walls, the bottom of the V-shaped cut out terminating at a point flush with the upper surface of the bottom wall, the bottom wall having a hole therein adjacent the corner diagonally opposite the corner having the V-shaped cut out and means mounted on each of the trays adjacent the opposite corner and extending through the hole in the tray immediately above and engaging the tray, said

last named means on each of the trays serving to hold the tray in such a position that all of the trays are held in a spaced parallel relationship, said last named means being spaced from the hole in the tray, in line with an imaginary line running between the hole and the V-shaped cut out in the tray so that the cut out in each of the trays is staggered rearwardly from the cut out in the tray immediately below to thereby facilitate access to the trays.

6. In a collating tray assembly, a plurality of trays, each of said trays having a planar bottom wall and four abutting side walls forming four corners, two abutting side walls being inclined at an angle from a line perpendicular to the bottom wall, the inclined side walls being provided with a V-shaped cut out in the corner joining the two inclined side walls, the bottom of the V-shaped cut out terminating at a point flush with the top surface of the bottom wall, the bottom wall of each of the trays being formed with a hole which has its center substantially in line with an imaginary line running between the corner with the V-shaped cut out and the corner diagonally opposite therefrom, the hole being adjacent the opposite corner, the other two side walls forming right angles with the bottom walls, abutting flanges mounted on said two other side walls and extending in a plane parallel to the bottom wall, means mounted on said abutting flanges at a point in line with the imaginary line, a portion of said last named means extending through the hole in the tray immediately above and engaging the tray to hold the tray in such a position that

all of the trays lie in spaced parallel planes and so that the cut out portion of each of the trays is staggered rearwardly from the tray immediately below, said last named means permitting each of said trays to be detached from each other whereby the trays in the assembly may be separated and nested.

7. An assembly as in claim 6 wherein said last named means consists of a T-shaped member extending upwardly from the tray and resilient means mounted on the T-shaped member, said resilient means being compressed when said T-shaped member engages the tray above.

8. An assembly as in claim 6 together with means mounted on said flanges, said means engaging the bottom wall of the tray above to support the tray in a horizontal plane.

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