Jan. 14, 1941. A. R. BROTHERSON 2,228,298

SHEET HANDLING DEVICE

Filed Dec. 12, 1938 3 Sheets-Sheet 1

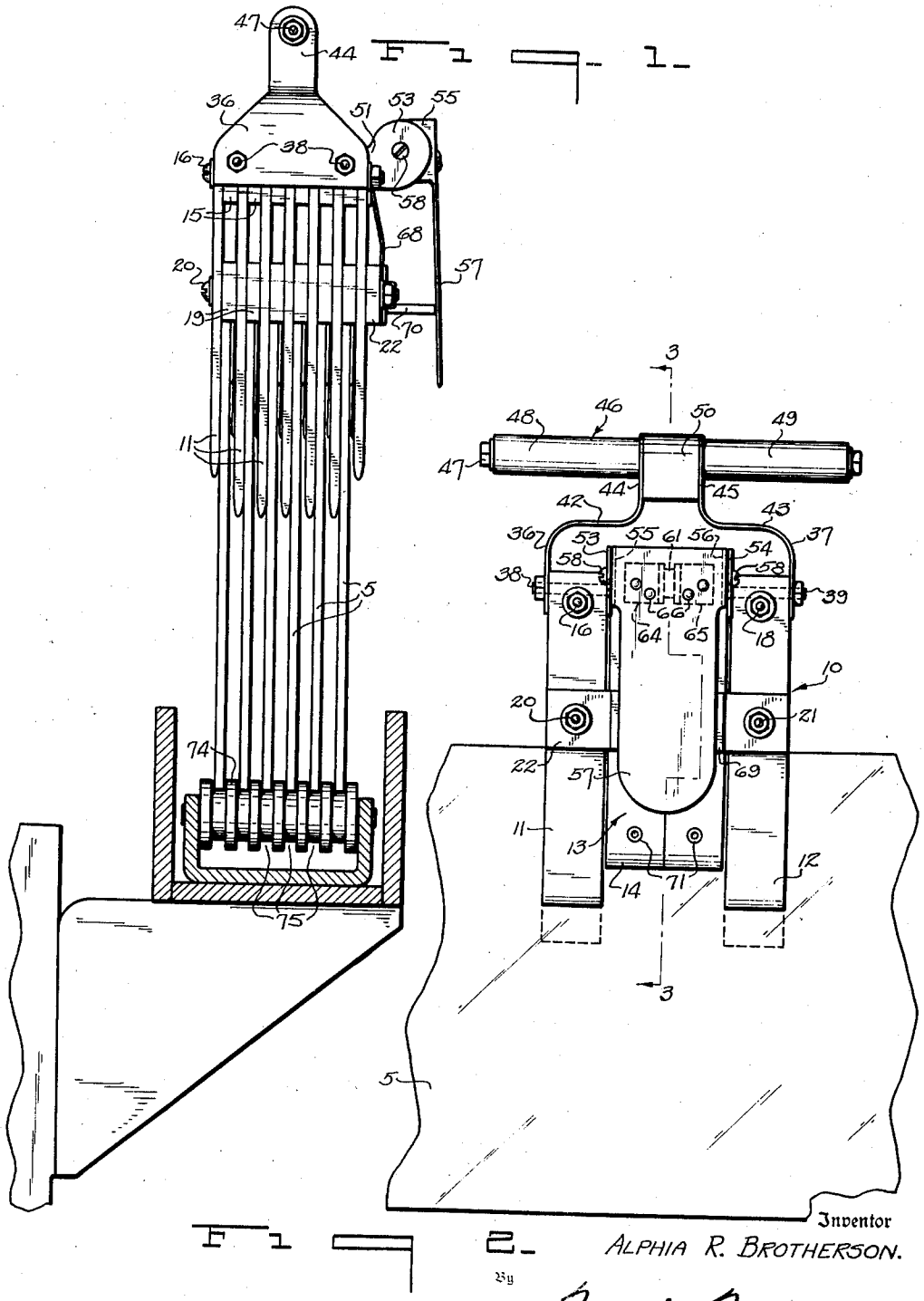


Fig. 1.

Fig. 2.

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SHEET HANDLING DEVICE

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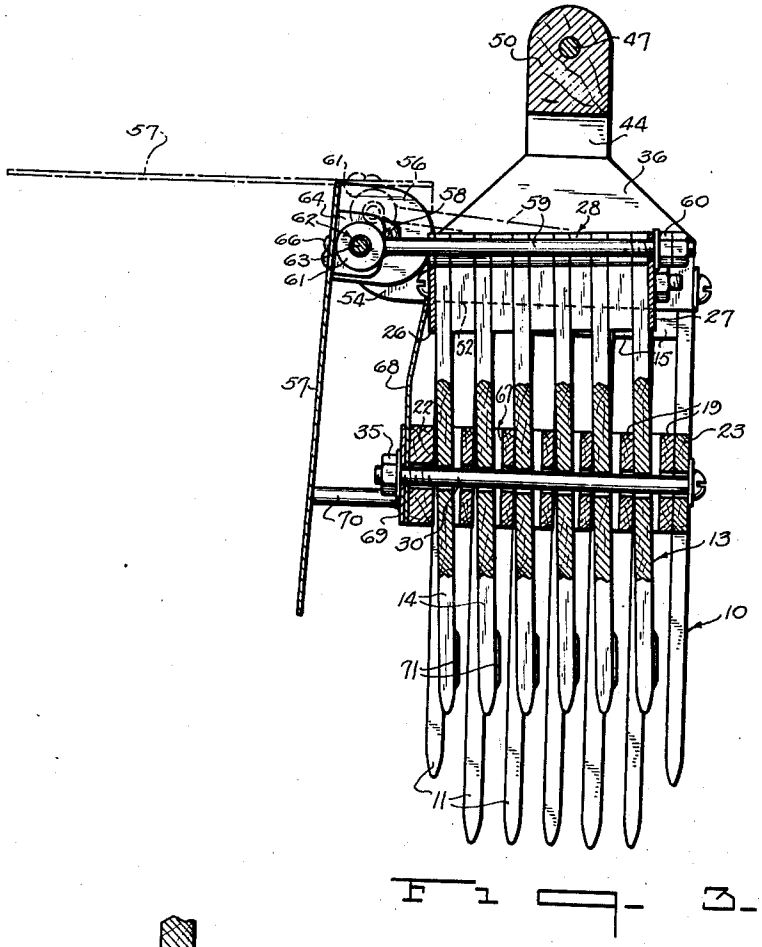


FIG. 3.

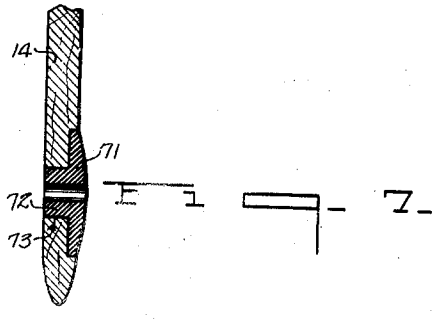


FIG. 7.

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SHEET HANDLING DEVICE

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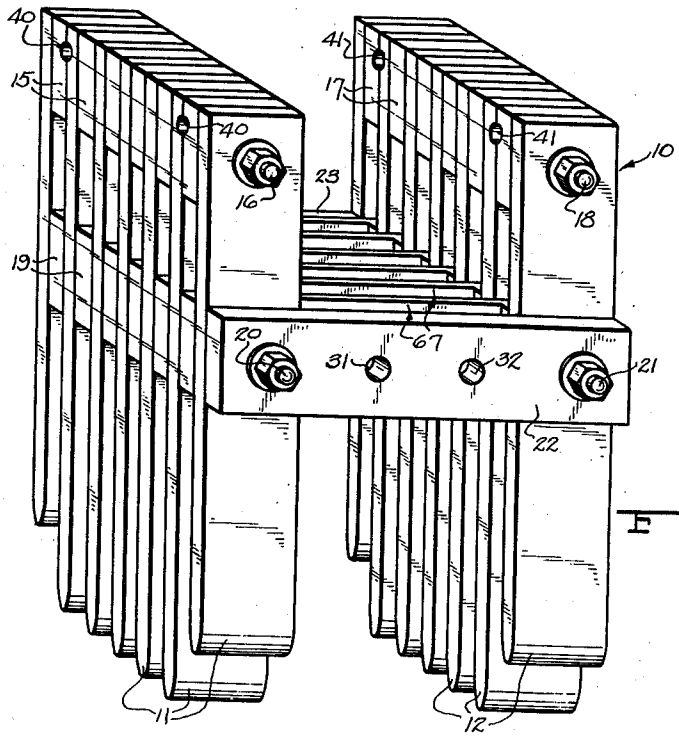
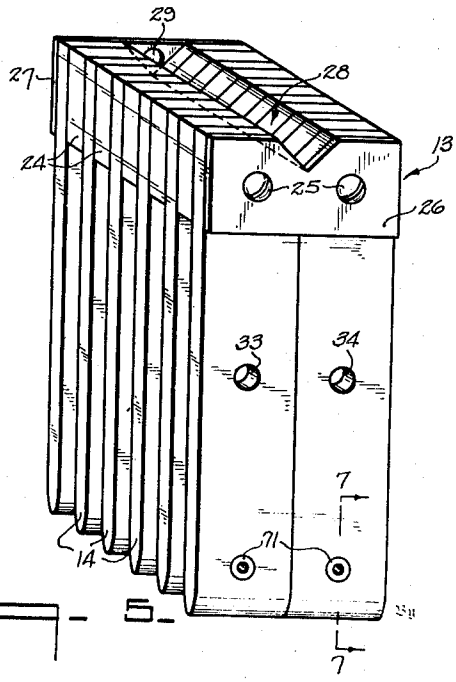


Fig. 4.



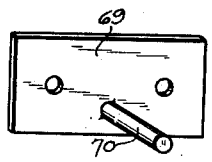


Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE

2,228,298

SHEET HANDLING DEVICE

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Application December 12, 1938, Serial No. 245,113

12 Claims. (Cl. 294—87)

The present invention relates to improvements in sheet handling devices.

An important object of the invention is to provide an improved sheet clamping device primarily designed for the handling of plate or window glass but which can also be used to advantage in the lifting and carrying of sheets or plates of other materials.

Another important object of the invention is to provide an improved clamping device of relatively simple, inexpensive construction for handling a plurality of sheets or plates simultaneously and for maintaining them a predetermined distance from one another during such handling.

A further important object of the invention is to provide an improved clamping device for facilitating the lifting and carrying of a plurality of sheets or plates simultaneously, so constructed as to apply a positive gripping action to the said sheets or plates to avoid slipping thereof relative to one another or the accidental displacement of the sheets or plates whereby to minimize the danger of breakage.

Other objects and advantages of the invention will become more apparent during the course of the following description, when taken in connection with the accompanying drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is an end view of a sheet handling device constructed in accordance with the invention;

Fig. 2 is a side view of the handling device;

Fig. 3 is a vertical section through the handling device taken substantially on line 3—3 of Fig. 2;

Fig. 4 is a perspective view of the stationary clamping unit of the device;

Fig. 5 is a perspective view of the movable clamping unit of the device;

Fig. 6 is a detail perspective view of a portion of the device; and

Fig. 7 is a vertical section through a portion of one of the movable clamping fingers taken substantially on line 7—7 of Fig. 5.

With reference now to the drawings and particularly to Figs. 4 and 5, there is illustrated in Fig. 4 the outer stationary clamping unit designated in its entirety by the numeral 10 and embodying the two transversely spaced series of clamping fingers 11 and 12, while in Fig. 5 is illustrated the inner movable clamping unit designated in its entirety by the numeral 13 and including a series of clamping fingers 14. The two clamping units 10 and 13 are adapted to be associated with one another, as will be more clearly hereinafter described, in such a manner as to effect the clamping of a plurality of sheets of glass or the like between the fingers 11—12 of unit 10 and fingers 14 of unit 13.

The fingers 11 of stationary clamping unit 10 are maintained a predetermined distance from one another adjacent their upper ends by the spacer blocks 15 and are secured together by a bolt 16 passing transversely through the said fingers and spacer blocks. The fingers 12 of stationary clamping unit 10 are also maintained in properly spaced relation at their upper ends by spacer blocks 17 and are secured together by a bolt 18. The two series of fingers 11 and 12 are disposed in transverse alignment with one another and are connected together intermediate their upper and lower ends by the transverse spacing strips 19. The opposite ends of the spacing strips 19 are received between the fingers 11 and 12 and are secured together and also to the fingers 11 and 12 by bolts 20 and 21 extending transversely therethrough.

Arranged at one end of the series of fingers 11 and 12 is a plate 22 also secured in place by the bolts 20 and 21. Positioned between the opposed fingers 11 and 12 at the opposite end of the unit, and suitably secured thereto, is a spacer plate 23.

The fingers 14 of the movable clamping unit 13 are maintained a predetermined distance from one another adjacent their upper ends by the spacer blocks 24 and are secured together by bolts 25 passing transversely through the fingers and also through the spacer blocks. The space between adjacent fingers 14 is preferably the same as the spaces between the fingers 11 and 12. Arranged at the opposite ends of the series of fingers 14 are the metal plates 26 and 27 also secured in place by the bolts 25. The fingers 14, spacer blocks 24, and end plate 26 are notched at their upper edges to provide a substantially V-shaped groove 28. The end plate 27 is not notched but instead is provided with an opening 29 disposed in alignment with the groove 28.

In assembling the stationary and movable clamping units 10 and 13, the fingers 14 of the movable clamping unit are adapted to be slipped downwardly between the spacing strips 19 of the stationary clamping unit so that the movable clamping unit will be received between the two series of fingers 11 and 12 of said stationary clamping unit. The two units are then loosely connected together by a pair of bolts 30 which pass through aligned openings 31 and 32 in the

spacing strips 19 and end plates 22 and 23 of the stationary unit and through openings 33 and 34 in the fingers 14 of the movable clamping unit. In this way, the movable clamping unit is supported intermediate the upper and lower ends thereof upon the bolts 30. The openings 33 and 34 in the fingers 14 of the movable clamping unit are relatively larger than the bolts 30 so as to provide a comparatively loose fit which permits the movable clamping unit to be rocked upon the bolts to move the fingers 14 thereof either into or out of alignment with the fingers 11 and 12 of stationary clamping unit 10 as will be more clearly hereinafter described.

Secured to the outer edges of the fingers 11 and 12 of stationary clamping unit 10 are the metal hangers 36 and 37 respectively, said hangers being fastened at their lower ends by bolts 38 and 39 which pass through openings 40 and 41 respectively. The hangers 36 and 37 are bent inwardly as at 42 and 43 and terminate in the upwardly extending substantially parallel end portions 44 and 45 with which is associated a handle 46. The handle 46 is provided to facilitate the lifting and carrying of the device by the operator and comprises a horizontal rod 47 passing transversely through openings in the end portions 44 and 45 of hangers 36 and 37. Carried upon the rod 47 outwardly of the hangers are sleeves 48 and 49 while interposed between the end portions of said hangers is a spacer block 50 through which the said rod 47 also passes. The device can be lifted and carried about by the operator by simply grasping the handle 46.

Secured to the inner adjacent edges of the fingers 11 and 12 of stationary clamping unit 10, by means of the bolts 38 and 39, are the metal plates 51 and 52 respectively provided at one end with projecting ears 53 and 54. Received between the ears 53 and 54 are complemental ears 55 and 56 provided at the upper end of the operating lever 57. The ears 55 and 56 on lever 57 are pivotally carried by transverse bolts 58 which pass through the ears 53 and 54 on plates 51 and 52 so that the lever 57 can be swung upwardly and downwardly to either a substantially horizontal position as shown by the broken lines in Fig. 3, or to a substantially vertical position as shown by the full lines.

Received within the V-shaped groove 28 at the upper end of the movable clamping unit 13 is a bolt 59, said bolt passing at one end through the opening 29 in plate 27 and having threaded thereon nuts 60. The opposite end of the bolt is provided with a head 61 formed with an opening 62. Passing through the opening 62 is a horizontal pin 63 carried by the substantially L-shaped brackets 64 and 65 riveted or otherwise suitably secured to the operating lever 57 as at 66, (Fig. 2). The bolt 59 is loosely mounted upon pin 63 which is offset with respect to bolts 58 upon which the operating lever 57 pivots. Upon raising and lowering of the lever 57, pin 63 acts in the nature of an eccentric to swing the movable clamping unit 13 in one direction or the other upon the supporting bolts 30.

When the lever 57 is swung to horizontal position as shown by the broken lines in Fig. 3, the movable clamping unit 13 will be disposed in such position that the fingers 14 thereof will be in substantial alignment with the fingers 11 and 12 of the stationary clamping unit 10. When the fingers are in this position, the clamping device can be slipped downwardly over a plurality of sheets or plates 5 as shown in Fig. 1. The clamping device illustrated in the drawings is capable of handling six sheets simultaneously, although it may, of course, be constructed to handle either a smaller or a greater number of sheets. The upper portions of the sheets will be received within the spaces between the fingers 11, 12, and 14 and the device can be slipped downwardly over the sheets until the upper edges thereof engage the spacing strips 19. After the device has been properly associated with the sheets, the lever 57 is swung downwardly, at which time the pin 63 will move in an arc about the bolts 58 to draw the upper end of the movable clamping unit 13 forwardly or to the left as viewed in Fig. 3. This will cause the movable clamping unit 13 to rock upon bolts 30 and swing the lower ends of the fingers 14 thereof in the opposite direction to grip the glass sheets and clamp them firmly against the fingers 11 and 12 of the stationary unit.

In order to provide sufficient clearance for the proper rocking movement of the movable clamping unit 13 upon bolts 30, the spacing strips 19 are preferably notched or cut away between the fingers 11 and 12 as indicated at 67 in Figs. 3 and 4. When it is desired to release the sheets 5, the lever 57 is simply swung upwardly to horizontal position thereby rocking the movable clamping unit 13 in the opposite direction to move the lower ends of the fingers 14 thereof away from the sheets. The movable clamping unit 13 is normally urged into non-clamping position by means of a spring member 68 received at its lower end upon the bolts 30 outwardly of plate 22 and bearing at its upper end against the metal plate 26 at the upper end of the movable clamping unit. Also carried by the bolts 30, outwardly of spring member 68, is a metal plate 69 provided with a stop 70 for limiting the downward swinging movement of the lever 57. The spring member 68 and metal plate 69 are secured against the end plate 22 by the nuts 35 threaded upon bolts 30.

To improve the gripping action of the fingers 14 of movable clamping unit 13, they are each preferably provided with a pair of resilient gripping pads 71 of rubber, rubber composition or the like. These pads normally project slightly beyond the faces of the fingers 14 as shown in Fig. 7, and serve to yieldably but firmly clamp the sheets in place against the fingers 11 and 12 of the stationary clamping unit. The pads 71 may be formed with cylindrical portions 72 inserted within openings 73 in the fingers 14.

The clamping device above described may obviously be employed for handling sheets or plates of any material and for any desired purpose. One use, however, to which this device is especially adapted is for the handling of sheets or plates of glass to facilitate the lifting of a plurality of sheets simultaneously from a buck or the like and placing them in proper position upon a horizontal roller runway leading to an edge grinding machine. The device can also be used for removing the glass sheets from the edge grinding machine and replacing them upon the buck or the like. Also for turning the sheets about a vertical axis during the grinding thereof, as is sometimes required due to the curvature of the lower edges being ground. By way of example, the clamping device is illustrated in Fig. 1 as being used for positioning a plurality of glass sheets 5 upon a horizontal roller runway consisting of a plurality of rolls 74. As shown, the rolls 74 are provided with grooves 75 and the

spacing of the grooves is substantially the same as the spacing between the fingers 11, 12, and 14 of the clamping device so that the lower edges of the sheets can be readily positioned within the grooves 15 by simply lowering the sheets upon the rolls.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a sheet handling device of the character described, a stationary clamping unit provided with spaced stationary clamping fingers for receiving the sheets therebetween, a movable clamping unit carried by said stationary clamping unit and including spaced movable clamping fingers arranged at one side of said stationary fingers in substantially transverse alignment therewith and between which the sheets are also received, and means for actuating said movable clamping unit to move the fingers thereof out of alignment with the fingers of said stationary unit to grip the sheets between the said stationary and movable fingers.

2. In a sheet handling device of the character described, a stationary clamping unit provided with spaced stationary clamping fingers for receiving the sheets therebetween, a movable clamping unit including spaced movable clamping fingers arranged at one side of said stationary fingers in substantially transverse alignment therewith and between which the sheets are also received, means for rockably mounting said movable clamping unit upon said stationary clamping unit, and means for rocking said movable clamping unit relative to said stationary clamping unit to move the fingers thereof out of alignment with the fingers of said stationary unit to grip the sheets between the said movable and stationary fingers.

3. In a sheet handling device of the character described, a stationary clamping unit provided with spaced stationary clamping fingers for rereceiving the sheets therebetween, a movable clamping unit including spaced movable clamping fingers arranged at one side of said stationary fingers in substantially transverse alignment therewith and between which the sheets are also received, means for rockably mounting said movable clamping unit upon said stationary clamping unit, means for rocking said movable clamping unit in one direction upon said stationary clamping unit to move the fingers thereof out of alignment with the fingers of said stationary unit to grip the sheets between the said movable and stationary fingers, and spring means acting to normally rock said movable clamping unit in the opposite direction to move the fingers thereof out of gripping engagement with the sheets and into substantial alignment with said stationary fingers.

4. In a sheet handling device of the character described, a stationary clamping unit provided with spaced vertical stationary clamping fingers for receiving the sheets between the lower ends thereof, a movable clamping unit including spaced vertical movable clamping fingers arranged at one side of said stationary fingers in substantially transverse alignment therewith and between the lower ends of which the sheets are also received, means for rockably mounting said movable clamping fingers intermediate the upper and lower ends thereof upon said stationary clamping unit, and means carried by said stationary clamping unit and connected with the upper end of said movable clamping unit for rocking the latter to move the fingers thereof out of alignment with the fingers of said stationary unit to grip the sheets between the said movable and stationary fingers.

5. In a sheet handling device of the character described, a stationary clamping unit provided with spaced vertical stationary clamping fingers for receiving the sheets between the lower ends thereof, a movable clamping unit including spaced vertical movable clamping fingers arranged at one side of said stationary fingers in substantially transverse alignment therewith and between the lower ends of which the sheets are also received, means for rockably mounting said movable clamping fingers intermediate the upper and lower ends thereof upon said stationary clamping unit, means carried by said stationary clamping unit and connected with the upper end of said movable clamping unit for rocking the latter in one direction to move the fingers thereof out of alignment with the fingers of said stationary unit to grip the sheets between the said movable and stationary fingers, and spring means acting to normally rock said movable clamping unit in the opposite direction to move the fingers thereof out of gripping engagement with the sheets and into substantial alignment with said stationary fingers.

6. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, means for connecting the two series of fingers together in transverse alignment with one another, the sheets to be handled extending between the two series of fingers and received within the spaces between the fingers of each series, a movable clamping unit carried by said stationary clamping unit between the two series of fingers thereof, said movable clamping unit including a series of spaced movable clamping fingers between which the sheets are also received, and means for actuating said movable clamping unit to cause the fingers thereof to clamp the sheets against the two series of fingers of said stationary clamping unit.

7. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, means for connecting the two series of fingers together in transverse alignment with one another, the sheets to be handled extending between the two series of fingers and received within the spaces between the fingers of each series, a movable clamping unit including a series of spaced movable clamping fingers between which the sheets are also received, means for rockably mounting said movable clamping fingers upon said stationary clamping unit between the two series of fingers thereof, and means for rocking said movable clamping unit relative to said stationary clamping unit to cause the fingers thereof to clamp the sheets against the two series of fingers of said stationary clamping unit.

8. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, means for connecting the two series of fingers together in trans-

verse alignment with one another, the sheets to be handled extending between the two series of fingers and received within the spaces between the fingers of each series, a movable clamping unit including a series of spaced movable clamping fingers between which the sheets are also received, means for rockably mounting said movable clamping fingers upon said stationary clamping unit between the two series of fingers thereof, means for rocking said movable clamping unit in one direction upon said stationary clamping unit to cause the fingers thereof to clamp the sheets against the two series of fingers of said stationary clamping unit, and spring means acting to normally rock said movable clamping unit in the opposite direction to move the fingers thereof out of gripping engagement with the sheets.

9. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, means for connecting the two series of fingers together in transverse alignment with one another, the sheets to be handled extending between the two series of fingers and received within the spaces between the fingers of each series, a movable clamping unit including a series of spaced movable clamping fingers between which the sheets are also received, means for rockably mounting said movable clamping fingers intermediate the upper and lower ends thereof upon said stationary clamping unit between the two series of fingers thereof, and means carried by said stationary clamping unit and connected with the upper end of said movable clamping unit for rocking the latter to cause the fingers thereof to clamp the sheets against the two series of fingers of said stationary clamping unit.

10. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, means for connecting the two series of fingers together in transverse alignment with one another, the sheets to be handled extending between the two series of fingers and received within the spaces between the fingers of each series, a movable clamping unit including a series of spaced movable clamping fingers between which the sheets are also received, means for rockably mounting said movable clamping fingers intermediate the upper and lower ends thereof upon said stationary clamping unit between the two series of fingers thereof, means carried by said stationary clamping unit and connected with the upper end of said movable clamping unit for rocking the latter in one direction to cause the fingers thereof to clamp the sheets against the two series of fingers of said stationary clamping unit, and spring means acting to normally rock said movable clamping unit in the opposite direction to move the fingers thereof out of gripping engagement with the sheets.

11. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, means for connecting the two series of fingers together in transverse alignment with one another, the sheets to be handled extending between the two series of fingers and received within the space between the fingers of each series, a movable clamping unit including a series of spaced movable clamping fingers between which the sheets are also received, means for rockably mounting said movable clamping fingers intermediate the upper and lower ends thereof upon said stationary clamping unit between the two series of stationary fingers and intermediate the upper and lower ends thereof, means carried by said stationary clamping unit and connected with the upper end of said movable clamping unit for rocking the latter in one direction to cause the fingers thereof to move relative to said stationary fingers to clamp the sheets against the two series of fingers of said stationary clamping unit, and spring means acting to normally rock said movable clamping unit in the opposite direction to move the fingers thereof out of gripping engagement with the sheets and into substantial alignment with said stationary fingers.

12. In a sheet handling device of the character described, a stationary clamping unit embodying two transversely spaced series of stationary clamping fingers, means for connecting the fingers of each series in spaced relation, transverse plates extending between and secured to the two series of fingers intermediate the upper and lower ends thereof for maintaining the two series of fingers in transverse alignment with one another, bolts passing through said plates between the two series of fingers, the sheets to be handled extending between the two series of fingers beneath said plates and received within the spaces between the fingers of each series, a movable clamping unit including a series of spaced movable clamping fingers received between the two series of stationary fingers and rockably mounted upon said bolts intermediate their upper and lower ends, the sheets also being received between said movable clamping fingers, means for rocking said movable clamping fingers in one direction upon said bolts to cause said fingers to clamp the sheets against the two series of fingers of said stationary clamping unit, and spring means acting to normally rock said movable clamping fingers in the opposite direction to move them out of gripping engagement with the sheets and into substantial alignment with said stationary clamping fingers.

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