April 28, 1942. J. BRESLAV 2,281,348

GRAPPLE

Filed Oct. 3, 1941

Fig.1.

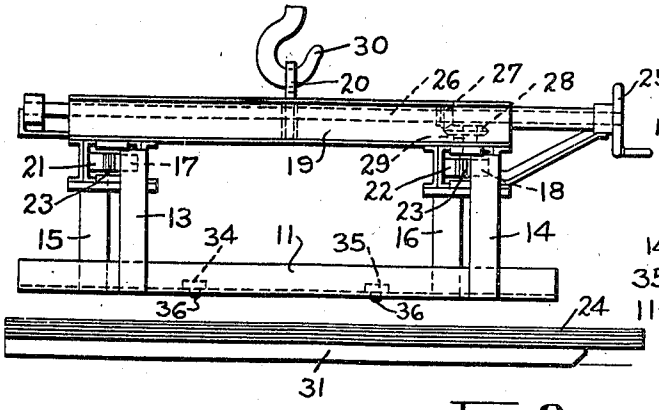



Fig.2.

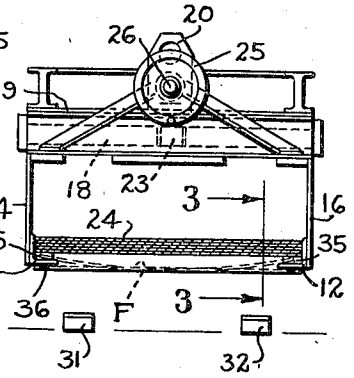



Fig.3.

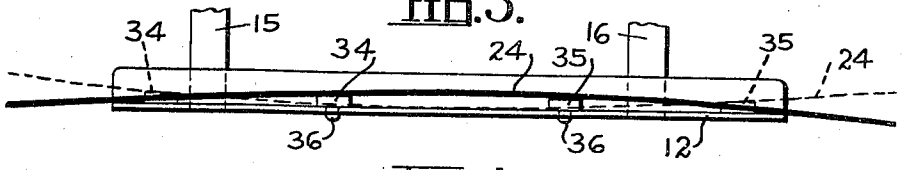



Fig.4.

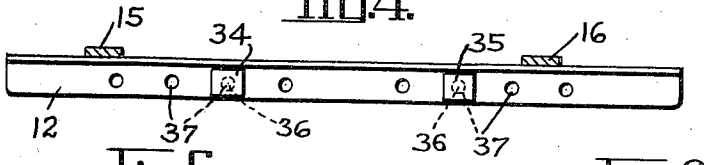



Fig.5.

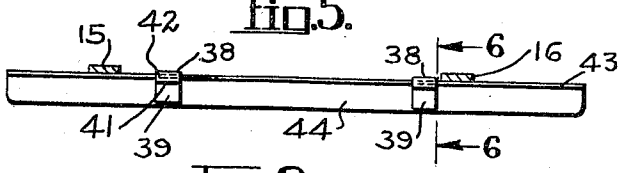



Fig.6.

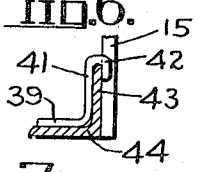



Fig.9.

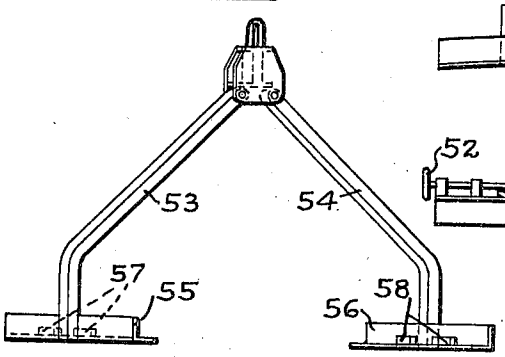



Fig.7.

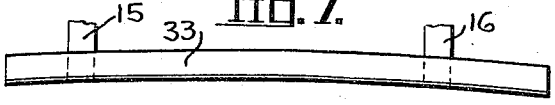
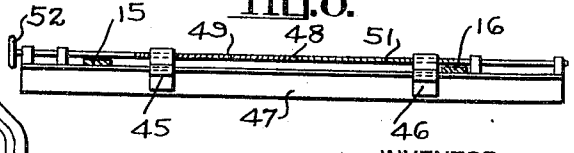



Fig.8.




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# UNITED STATES PATENT OFFICE

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## GRAPPLE

Jack Breslav, New Haven, Conn.

Application October 3, 1941, Serial No. 413,421

15 Claims. (Cl. 294—67)

This invention relates to grapples and more particularly to improvements in grapples especially adapted to engage and lift a pile of sheet stock for transfer to another location.

In grapples of this nature there is generally provided a pair of opposed carrying bars, or angles, between which the pile of sheet stock extends with its opposite side edges resting upon said bars. These bars are usually arranged to either be positively moved, or to be swung, toward and away from each other. When piles of sheet stock, the opposed edges of which are resting on spaced apart relatively narrow bars, are lifted from stationary supporting means by such grapples to be transferred to another location, the sheet stock flexes downwardly between the support points at its side edges, which action tends to either cause these edges to slide off from the bars and the pile to fall from the grapple, to dispose a force upon the bars tending to spread them apart to release their gripping or supporting action on the pile, or to impose undue strain thereon and upon any mechanism associated therewith to move them toward and away from each other. Usually the grapples are used to lift piles of sheet stock longer than their width by having the opposed bars disposed in under the edges of the sheet stock at its smaller dimension, or width, and these bars extend lengthwise along the stock substantially the greater part of its length.

It has been found that the direction of flexing of a sheet, or pile of sheets between its side edges may be controlled by inducing a tendency in the sheet to curve upwardly or downwardly between its ends before it is lifted from its stationary support and that in so doing, the sheet, or pile of sheets, will be prevented from flexing downwardly between its sides and therefore the disadvantages referred to above will be obviated.

One object of this invention is to provide an improved form of grapple wherein the above disadvantages will not be present.

Another object is to provide, in a grapple of the above nature, means to obviate any tendency for a sheet, or pile of sheets, to flex downwardly between spaced apart supporting bars upon which the side edges of the sheet, or pile of sheets, is being supported.

Still another object is to provide, in a grapple of the above nature, means to induce a tendency for a sheet, or pile of sheets, supported along each of its side edges to curve between its unsupported ends.

A further object of this invention is to provide an improved form of grapple which will be relatively simple in construction, inexpensive to manufacture, readily manipulated, compact, and very efficient and durable in use.

With these and other objects in view, which will appear as the description proceeds, there have been illustrated in the accompanying drawing several forms in which the features and principles of this invention may be conveniently embodied in practice, it being understood that various changes may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the drawing:

Figure 1 is a side view of a grapple adapted to engage, lift, and carry a pile of sheets resting on a stationary support to a new location, and in which the features and principles of this invention are embodied;

Figure 2 is an end view of the grapple shown in Figure 1 after the pile of sheets has been gripped and lifted from its support, the pile of sheets being sectioned in order to clearly show the structure of the grapple;

Figure 3 is an enlarged broken sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a top plan view of one of the grapple bars shown in Figure 3;

Figure 5 is a top plan view of a grapple bar of modified form;

Figure 6 is an enlarged sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a side view of still another modified form of grapple bar with the curvature therein exaggerated;

Figure 8 is a top plan view of another modification of this invention; and

Figure 9 is a perspective view of a simpler form of grapple in which the features and principles of this invention may be embodied.

The sheet stock lifting grapple selected to illustrate, in Figures 1 and 2, the features and principles of this invention is of the type fully shown and described in a patent, Number 1,807,124, issued May 26, 1931, to Frederick H. Meyer. Such a grapple generally includes a pair of opposed sheet supporting bars 11 and 12, each supported by pairs of drop legs 13 and 14, and 15 and 16 respectively. The pair of drop legs 13 and 14 supporting the bar 11 are each secured, as by welding, to the end of a cross-bar 17 or 18, these cross-bars being suitably supported on a frame 19 to slide crosswise in respect thereto. The pair of drop legs 15 and 16 are likewise secured to cross-bars 21 and 22 also supported on the

frame 19 for crosswise sliding movement. Each of the adjacent cross-bars 17 and 21, and 18 and 22 have rack gear teeth formed therein to be in mesh with a spur gear 23 disposed therebetween whereby the bars 11 and 12 may be moved toward and away from each other to support a sheet, or pile of sheets, 24 or to release them, by means of a hand-wheel 25 drivingly connected to the spur gears 23 through a shaft 26, bevel gears 27 and 28, and stud shafts 29 to which the spur gears 23 are suitably secured. The frame 19 is provided with a member 20 adapted to be engaged by a hook 30 depending from a crane, or like machine, whereby the frame 19 and the supported sheets 24 may be lifted.

Without the provision of the novel features and principles of this invention the sheet, or pile of sheets, 24, when lifted from the stationary supports 31 and 32, for instance suitable parallelly disposed and spaced apart wooden beams, would assume a downwardly flexed position between the bars 11 and 12, as indicated at F in dotted lines in Figure 2. As referred to above, such a condition would tend to permit the side edges of the sheets to slip by the bars 11 and 12 whereby the pile of sheets would fall and at the same time impose a strain on the bar adjusting mechanism by the urge on the bars 11 and 12 to spread them apart. In order to insure that such downward flexing of the sheet, or pile of sheets, 24 does not take place when the same are lifted from the stationary supports 31 and 32, the sheet, or pile of sheets, 24 is acted upon in accordance with the features and principles of this invention whereby it is urged to curve upwardly or downwardly intermediate its unsupported ends.

The means whereby such a condition is made possible, is, in its simplest form, the provision in a grapple of a pair of opposed and similarly formed sheet supporting bars 33, see Figure 7, which, in this instance, are bowed upwardly a slight amount between their ends. Bars of such form, when disposed under the side edges of a sheet, or pile of sheets 24 will induce an upward flex in the sheet as it is raised from its support whereby any tendency for it to flex downwardly between the bars will be obviated.

The same, or a similar, effect may be produced by providing spaced apart blocks 34 and 35, see Figures 1–4 inclusive, on each of the bars 11 and 12. Preferably, though not necessarily, provision is made whereby the spacing between the blocks 34 and 35 may be varied to vary the effect thereof on the sheets. For such a purpose the blocks 34 and 35 are provided with studs 36 adapted to enter any one of a series of holes 37 formed in the bars 11 and 12. The blocks 34 and 35 when spaced apart, are preferably equidistant from the center of the bars 11 and 12, will cause the sheets 24 being lifted to curve upwardly as indicated by the full line in Figure 3, or to curve downwardly as indicated by the dotted line in Figure 3. By placing the blocks closer together a greater degree of flex, or curve, will be obtained and, conversely, the farther apart the blocks are placed the less will be the amount of upward curve until a point is reached when the curve will be downward. The blocks 34 and 35 therefore constitute adjustable means to vary the degree of and the direction of curvature induced between the ends of, and in the sheet, or pile of sheets, 24 when they are lifted.

Instead of providing studs 36 on the blocks 34 and 35 and holes 37 in the bars 11 and 12, the bars may be left unaltered and the means to flex the sheets lengthwise may be constituted by members formed as shown in Figures 5 and 6. The members 38 are provided with a sheet edge engaging portion 39 having a portion 41 extending upwardly therefrom with its end 42 hooked over the upstanding flange 43 of the bars, or angle, 44. In this form the members 38 may be slid along the bars 44 to adjust them lengthwise thereon to vary the degree or direction of the curve induced in the sheets as they are lifted by the grapple from a stationary support.

In Figure 8 means is illustrated whereby members 45 and 46 similar to the members 38 of Figures 5 and 6, are simultaneously adjusted lengthwise along a sheet edge supporting bar 47. This means is constituted by a rod 48 threaded on its intermediate portion partly with left-hand threads, at 49, and partly with right-hand threads, at 51. The threaded parts 49 and 51 respectively threadingly engage the members 45 and 46 as they pass therethrough, and, when the rod 48 is rotated, as by a hand wheel 52 secured thereto, the members 45 and 46 will be simultaneously drawn together or separated, as is desired.

The form of grapple shown in Figure 9 includes a pair of swinging arms 53 and 54 pivoted at separate points to a common support. Bars 55 and 56 similar in every respect to the bars 11 and 12 are shown provided with curvature-inducing blocks 57 and 58 similar to the blocks 34 and 35.

All of the forms illustrated will efficiently cause the sheet, or sheets, 24 to tend to flex, or curve, between the unsupported edges thereof, whereby any tendency of the sheet, or sheets, 24 to flex, or curve downwardly between the supported side edges will be prevented. While there has been illustrated in the drawing a form of mechanism embodying the features and principles of this invention wherein the sheets are flexed along their greater dimension, or length, to prevent objectionable bending along their shorter dimension, or width, it is obvious that the sheets to be lifted may be wider than they are long, or they may be square thus of equal dimension in width and length. For instance the bars 11 and 12 may be disposed in under the edges of the sheet sides of shorter dimension and the means to induce the curve therein will act to curve the sheets along their shorter dimension to prevent objectionable bending along their longer dimension. In instances where the sheets are square the induced curve is between their unsupported ends and prevents objectionable bending between their supported end, or side, edges.

It will be understood that the novel features and principles of this invention may be embodied in other specific forms without departing from the spirit and essential attributes thereof, and it is therefore desired that the present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

Having thus fully disclosed the invention, what is claimed as new and for which it is desired to secure Letters Patent, is:

1. In a sheet lifting grapple, means to support a sheet along each side edge thereof, and means on each of said supporting means to induce a curve in the supported sheet intermediate its unsupported ends.

2. In a sheet lifting grapple, means to support a sheet along each of its side edges, and means

on each of said supporting means to raise the intermediate portion of the sheet slightly out of a horizontal plane before its unsupported ends are raised.

3. In a sheet lifting grapple, means to support a sheet along each of its side edges, and means on each of said supporting means to lower the intermediate portion of the sheet slightly out of a horizontal plane before its unsupported ends are raised.

4. In a sheet lifting grapple, means to support a sheet along each side edge thereof, and means adjustable along the sheet supporting means to induce a curve in the supported sheet intermediate its unsupported ends.

5. In a sheet lifting grapple, means to support a sheet along each side edge thereof, and means adjustable along the sheet supporting means to move the intermediate portion of the sheet slightly out of a horizontal plane before its unsupported ends are raised.

6. In a sheet lifting grapple, means to support a sheet along each side edge thereof, and means adjustable along and being disposed on each of said supporting means to induce a curve in the supported sheet intermediate its unsupported ends.

7. In a sheet lifting grapple, spaced apart bars adapted to be disposed below and along opposite side edges of a sheet to be lifted, and means on each of the bars to first engage the sheet to cause it to curve from one of its unsupported ends to the other.

8. In a sheet lifting grapple, spaced apart bars, said bars being movable toward each other and in under opposite side edges of a sheet to be lifted, and members on each of said bars to space the sheet portion engaged by these members above the surface of the bars as the sheet is lifted to cause a curve to be induced in the sheet between its unsupported ends.

9. In a sheet lifting grapple, spaced apart bars, said bars being movable toward each other and in under opposite side edges of a sheet to be lifted, members on each of said bars to space the sheet portion engaged by these members above the surface of the bars as the sheet is lifted to cause a curve to be induced in the sheet between its unsupported ends, and means to adjust said members along said bars to vary the amount of curve induced in the sheet being lifted.

10. In a sheet lifting grapple, spaced apart bars movable toward each other and in under the sheet to be lifted, means to support each of said bars from a common carrier, said bars being curved from end to end to induce a curve in the sheet being lifted from one of its unsupported ends to the other.

11. In a sheet lifting grapple, spaced apart bars, said bars being movable toward each other and in under opposite edges of a sheet to be lifted, the bars having holes spaced apart along the length thereof, and a pair of blocks on each bar to cause a curve to be induced in the sheet between its unsupported ends, said blocks having studs adapted to enter the holes in said bars whereby the blocks may be detachably secured to the bars in various positions to vary the curve induced in the sheet.

12. In a sheet lifting grapple, spaced apart bars, said bars being movable toward each other and in under opposite edges of a sheet to be lifted, and a pair of clips slidable on each bar and extending above the surface thereof to cause a curve to be induced in the sheet between its unsupported ends.

13. In a sheet lifting grapple, spaced apart bars, said bars being movable toward each other and in under opposite edges of a sheet to be lifted, a pair of clips slidable on each bar and extending above the surface thereof to cause a curve to be induced in the sheet between its unsupported ends, and means to simultaneously adjust the clips on each bar to vary the curve induced in the sheet.

14. In a sheet lifting grapple, means to support a sheet along opposite edges thereof, and means on each of the sheet supporting means and adapted to be disposed thereon to induce an upwardly directed curve in the sheet between its opposite unsupported edges where in one position on the supporting means and to induce a downwardly directed curve in the sheet between its unsupported edges when in another position on the supporting means.

15. In a sheet lifting grapple, a pair of members spaced apart along opposite edges of a sheet to be lifted, to engage said sheet edges to support the sheet and to induce a curve in the sheet between its unsupported edges when said members are raised, and means to simultaneously raise the pairs of members, the members of each pair of members being movable relatively to each other to vary the amount of curvature induced in the sheet.

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