March 2, 1954 J. BRESLAV 2,670,983

GRAPPLE

Filed Dec. 4, 1950 3 Sheets-Sheet 1

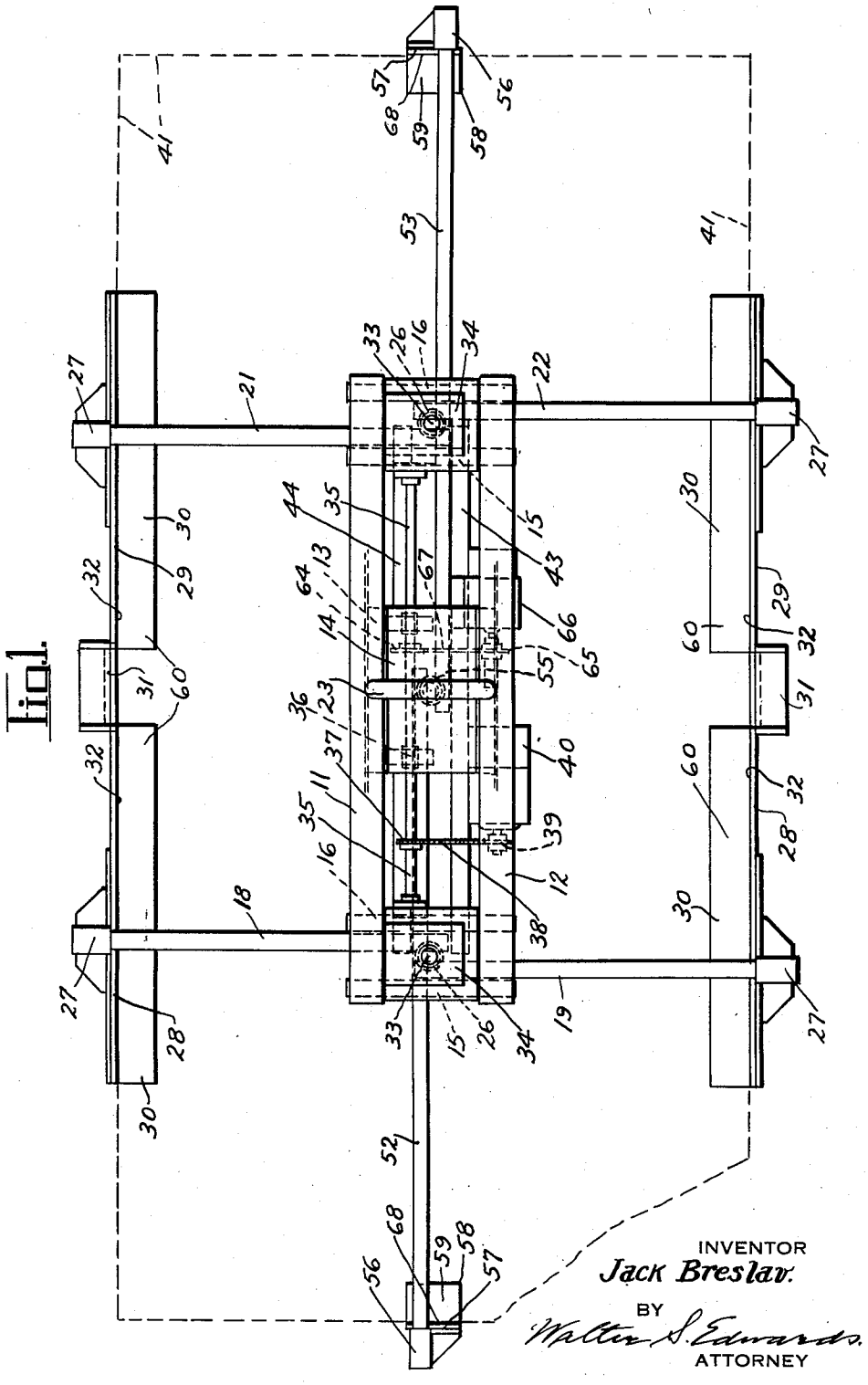


Fig. 1.

INVENTOR
Jack Breslav.
BY
Walter S. Edwards
ATTORNEY

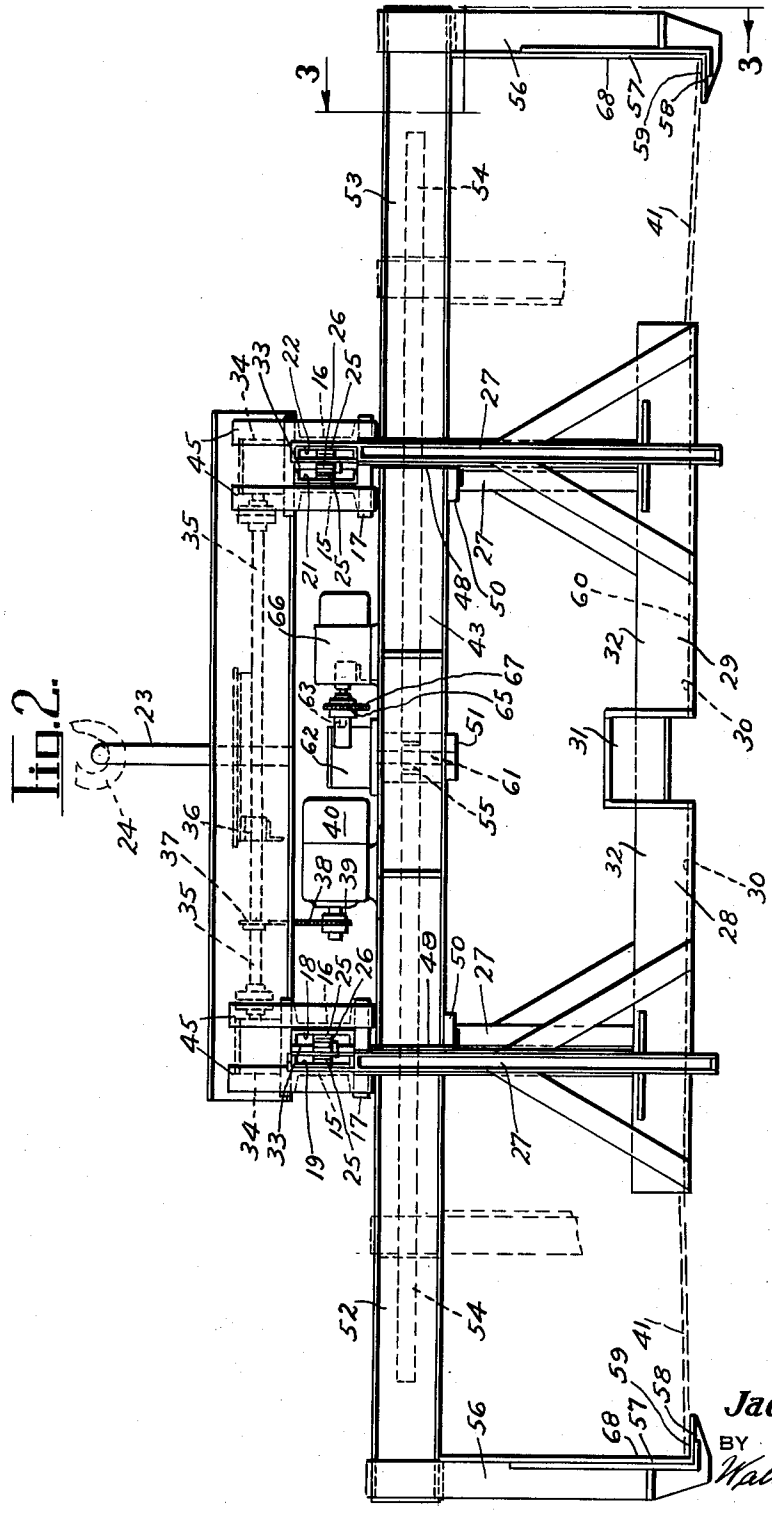
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3 Sheets-Sheet 2

Fig. 2.



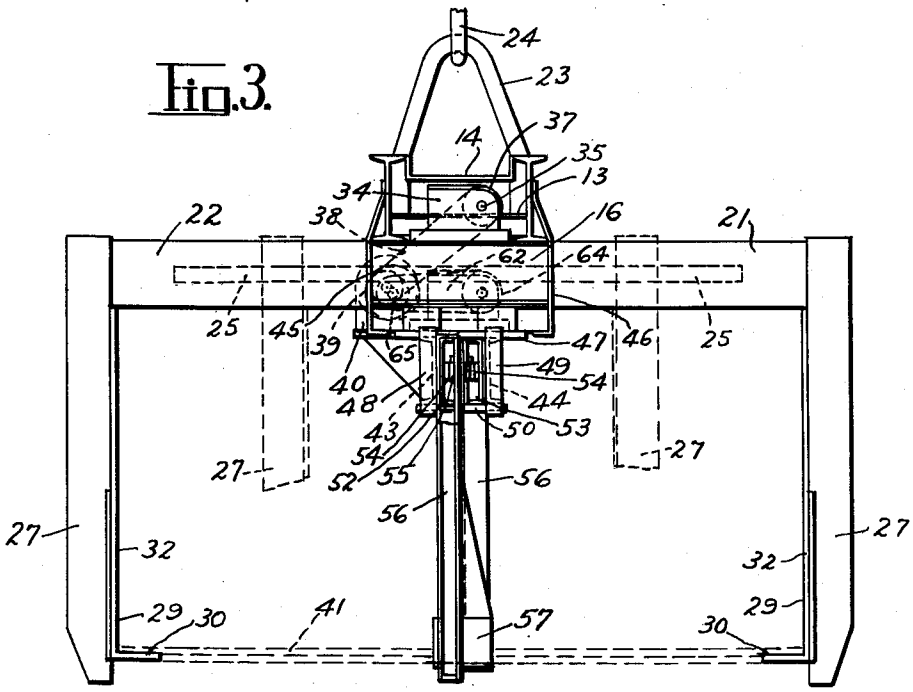
INVENTOR
Jack Breslav.
BY
Walter S. Edwards
ATTORNEY

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Fig. 3.



INVENTOR
Jack Breslav.
BY
Walter S. Edwards.
ATTORNEY

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GRAPPLE

Jack Breslav, New Haven, Conn.

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4 Claims. (Cl. 294—67)

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This invention relates to grapples and more particularly to improvements in grapples especially adapted to engage and lift sheet, or plate stock, either singly, or in piles, for transfer to another location.

Long and wide sheets, or plates, of relatively thin sheet stock are usually transported from one location to another by the use of grapples having opposing angles, or bars, which are moved in under the side edges of the sheet, or pile of sheets, and then raised to lift the stock and support it, while it is being transported. The ends of such sheets, or plates, not being supported often extend beyond the ends of the supporting bars and bend downwardly and occasionally slide lengthwise from the bars. In other instances the sheets, or plates, especially when they do not extend beyond the ends of the supporting bars, bend downwardly between these bars, occasionally slipping through and dropping.

One object of this invention is to provide a grapple having included in its structure the features and principles of this invention.

Another object is to provide in the structure of a grapple of the above type means to support the ends of relatively long sheets, or plates, of sheet stock while the same is lifted and transported from one location to another.

Another object is to provide in a grapple of the above nature sheet end supporting means which is adjustable lengthwise of the sheet stock and includes means to prevent the sheet, or sheets, from slipping lengthwise from the grapple.

A further object is to provide an improved 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 has been illustrated in the accompanying drawings one form of grapple 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 drawings:

Figure 1, is a top plan view of a grapple embodying the features and principles of this invention;

Figure 2, is a front side view of the same; and

Figure 3, is a cross-sectional view taken on the line 3—3 of Figure 2.

Referring now to the drawings wherein like

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reference numerals designate like parts throughout the several views, the reference numerals 11 and 12 denote lengthwise disposed main supporting beams which are transversely spaced apart. A cross plate 13 and a channel bar 14 are welded to the beams 11 and 12 intermediate the ends of these beams, and pairs of channel beams 15 and 16, with the channels of the beams of each pair directed outwardly, extend one pair across each end of the beams 11 and 12 and are welded thereto to the ends of beams 11 and 12 together. The pairs of beams 15, 16 depend from the beams 11 and 12 and with a cross plate 17 under each pair form guideways for oppositely laterally directed slide bars 18, 19, and 21, 22. A loop 23, having its ends welded one to each of the beams 11 and 12, provides means by which the grapple may be engaged by a hook 24 from a hoist (not shown), lifted, and transported from one location to another.

The slide bars 18, 19, 21 and 22 have a gear toothed rack 25 attached, as by welding, upon their inner faces, so that the racks 25 of each pair oppose each other. A gear pinion 26 is disposed between each pair of racks 25 with its teeth in mesh with the teeth of each rack, whereby rotation of the pinion 26 will slidingly move the bars of each pair in opposite directions within the guideways formed by the pairs of beams 15 and 16 and the plate 17 between and by which they are disposed and supported. An arm 27 is attached to the outer end of each of the slide bars 18, 19, 21 and 22 and depends therefrom. A sheet supporting member constituted herein by two lengths of angle bars 28 and 29 which are separated intermediate the arms 27 on each side of the grapple, is secured to and extends from each arm with one of the horizontal legs 30 of the angle bars at one side of the grapple extending toward the corresponding leg 30 of the angle at the other side of the grapple. The sheets to be lifted are supported on and extend between the legs 30 of the angle bars from one side of the grapple to the other. The opposing ends of the angle bars 28 and 29, at each side of the grapple are connected together by a member 31 which extends upwardly from the leg 30 in alignment with and extending above the vertical legs 32 of the angle bars 28 and 29. The member 31 reinforces the angle bars and may also act to prevent the ends of short sheets from swinging laterally out from between the arms 27. If desirable the angle bars 28 and 29 could be in one piece and not separate, as shown.

The pinion 26 is mounted on a shaft 33 which

extends upwardly into a speed reduction gear 34 wherein it is drivingly connected through suitable gearing with a shaft 35. The shaft 35 extends from one reduction gear 34 to the other, below the upper surface of the beams 11 and 12, and has an intermediate bearing 36. A sprocket wheel 37 is secured on the shaft 35 and a chain 38 drivingly connects this wheel 37 to a sprocket 39 mounted on the shaft of a motor 40. The motor 40 when desirably operated will cause the arms 27 to move toward or away from each other to position the legs 30 in under the side edges of the sheet stock 41, or to move the same from under said sheet stock.

It has been noted that sheet stock will not tend to bulge downwardly between the opposing legs 30 if the ends of the sheets bend downwardly even a slight amount. However, if the sheets are allowed to bend downwardly too much and without some support, or control, the sheets may slip lengthwise out of the grapple and cause considerable damage, or injury to a workman. There has, therefore, been included in the grapple of this invention, new and useful means to control the sheet stock lying between the arms 27 on the legs 30 against having its end bend downwardly to an undesirable degree and to prevent lengthwise slippage thereof and such means is adjustable lengthwise to accommodate various lengths of sheet stock.

The means for supporting and controlling the sheet stock 41 as above described is herein shown as being constituted by laterally spaced apart lengthwise extending channel beams 43 and 44 which are supported below and from the beams 11 and 12 by straps 45 and 46, a pair of such straps being used at each end of the beams 43 and 44. The straps 45 and 46 are connected to a cross-bar 47 which extends from one strap to the other in under the beams 15 and 16. Other straps 48 and 49 attached to the bars 47 support a cross-bar, or plate, 50 at each end of the beams 43 and 44. The beams 43 and 44 lie on and are secured to, as by welding, the cross-bars, or plates 50.

The channels of the beams 43 and 44 are directed outwardly and with the plates 50 form a guideway for oppositely directed slide bars 52 and 53. Each of the slide bars 52 and 53 has a gear toothed rack 54 attached upon its inner face, so that the racks 54 of each bar oppose each other. A gear pinion 55 is disposed between the racks 54 with its teeth in mesh with the teeth of each rack, whereby rotation of the pinion 54 will slidingly move the bars 52 and 53 in opposite directions within the guideway formed between the beams 43 and 44. An arm 56 is attached to the outer end of each bar 52 and 53 and depends therefrom. An angle piece 57 is attached to the lower end of each arm 56, with the horizontal leg 58 of the other. The upper and sheet engaging, and supporting, surface 59 of the legs 58 is preferably slightly below the upper and sheet engaging, and supporting, surface 60 of the legs 30 of the sheet side supporting angle bars 28 and 29. In a grapple adapted to engage and support sheet stock about eight feet long the surface 59 is one and one-half inches below the surface 60.

A shaft 61, to which the pinion 55 is secured, extends upwardly from a bearing plate 51 and into a speed reduction gear 62 wherein it is drivingly connected through suitable gearing to a shaft 63. The shaft 63 has a sprocket wheel 64 secured thereon which is connected to a sprocket wheel 65 on the shaft of a motor 66 by a chain 67. By proper operation of the motor 66 the slide bars 52 and 53 may be moved to draw the opposing arms 56 toward, or away, from each other, to dispose the legs 58, one in under each end of the sheet stock 41.

The grapple of this invention is lowered over a sheet, or pile of sheets, with the sheet side engaging legs 30 separated to clear the sides of the sheet, or pile of sheets, and with the sheet end engaging legs 58 separated to clear the sheet ends. The motor 40 is now actuated to move the legs 30 in under, and the vertical legs 32 against, the side edges of the sheet, or pile of sheets, and then the motor 66 is actuated to move the legs 58 in under, and the vertical legs 68 of the angle piece 57 against, the end edges of the sheet, or pile of sheets. The grapple is now raised whereby the supported sheet, or pile of sheets, is raised and may be transported to another location. As soon as the sheet, or pile of sheets, is raised the ends of same bend downwardly slightly to rest on the legs 58 and thus prevent the sheet, or pile of sheets, from bowing downwardly between the opposing side legs 30, and by the sheet ends engaging the vertical legs 68 the sheets are prevented from sliding lengthwise from the grapple.

While there has been shown and described herein one form in which the features and principles of this invention are practically embodied, it will be understood that the same may be embodied in other specific forms without departing from the spirit and essential attributes thereof, and it is therefore desired that the present embodiment be considered 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 described the invention, what is claimed as new and for which it is desired to obtain Letters Patent, is:

1. In a grapple, an elongated supporting frame, a pair of bars directed transversely of the frame and supported thereby, said bars being movable lengthwise in opposite directions, an arm rigid with and depending from the outer end of each of said bars and having an inwardly extending flange at the lower end thereof, a pair of bars extending longitudinally of the frame and supported thereby, said last-mentioned bars being movable lengthwise in opposite directions, an arm rigid with and depending from the outer end of each of said last-mentioned bars and having an inwardly extending flange at the lower end thereof, means to move the laterally movable bars, and means to move the longitudinally movable bars.

2. In a grapple, an elongated supporting frame, a pair of vertically disposed arms one at each side of the frame and supported thereby, said arms being movable toward and away from each other in a direction transversely of the frame, a second pair of vertically disposed arms one at each end of the frame and supported thereby, said arms being movable toward and away from each other in a direction longitudinally of the frame, load-engaging-and-supporting means at the lower end of each of the first pair of arms, load-engaging-and-supporting means at the lower end of each of said second pair of arms and disposed a distance below the first-mentioned load-engaging-and-supporting means, means to move said first pair of arms toward and away

from each other, and means to move said second pair of arms toward and away from each other.

3. In a grapple for engaging and supporting sheet stock to be raised and transported from one location to another, laterally spaced apart main supporting beams, laterally extending guideways in under and at each end of said main beams, a pair of oppositely movable slide bars in each of said guideways, an arm depending from each slide bar, a horizontal leg on the lower end of each arm and extending toward each other, a lengthwise extending guideway in under said laterally extending guideways, a pair of slide bars oppositely slidable in said lengthwise guideway, each of said last mentioned slide bars having an arm in fixed relation thereto and extending downwardly therefrom, said last mentioned arms each having a horizontal leg extending from the lower end thereof and extending toward each other, means to move the laterally slidable slide bars, and means to move the lengthwise slidable slide bars.

4. In a grapple for engaging and supporting sheet stock to be raised and transported from one location to another, laterally spaced apart main supporting beams, laterally extending guideways in under and at each end of said main

beams, a pair of oppositely movable slide bars in each of said guideways, an arm depending from each slide bar, a horizontal leg on the lower end of each arm and extending toward each other, a lengthwise extending guideway in under said laterally extending guideways, a pair of slide bars oppositely slidable in said lengthwise guideway, each of said last mentioned slide bars having an arm extending downwardly therefrom, said last mentioned arms each having a horizontal leg extending from the lower end thereof and extending toward each other, means to move the laterally slidable slide bars, and means to move the lengthwise slidable slide bars, the upper surface of the legs on the arms extending downwardly from said lengthwise movable slide bars being below the upper surface of the legs on the arms extending downwardly from said laterally movable slide bars.

JACK BRESLAV.

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