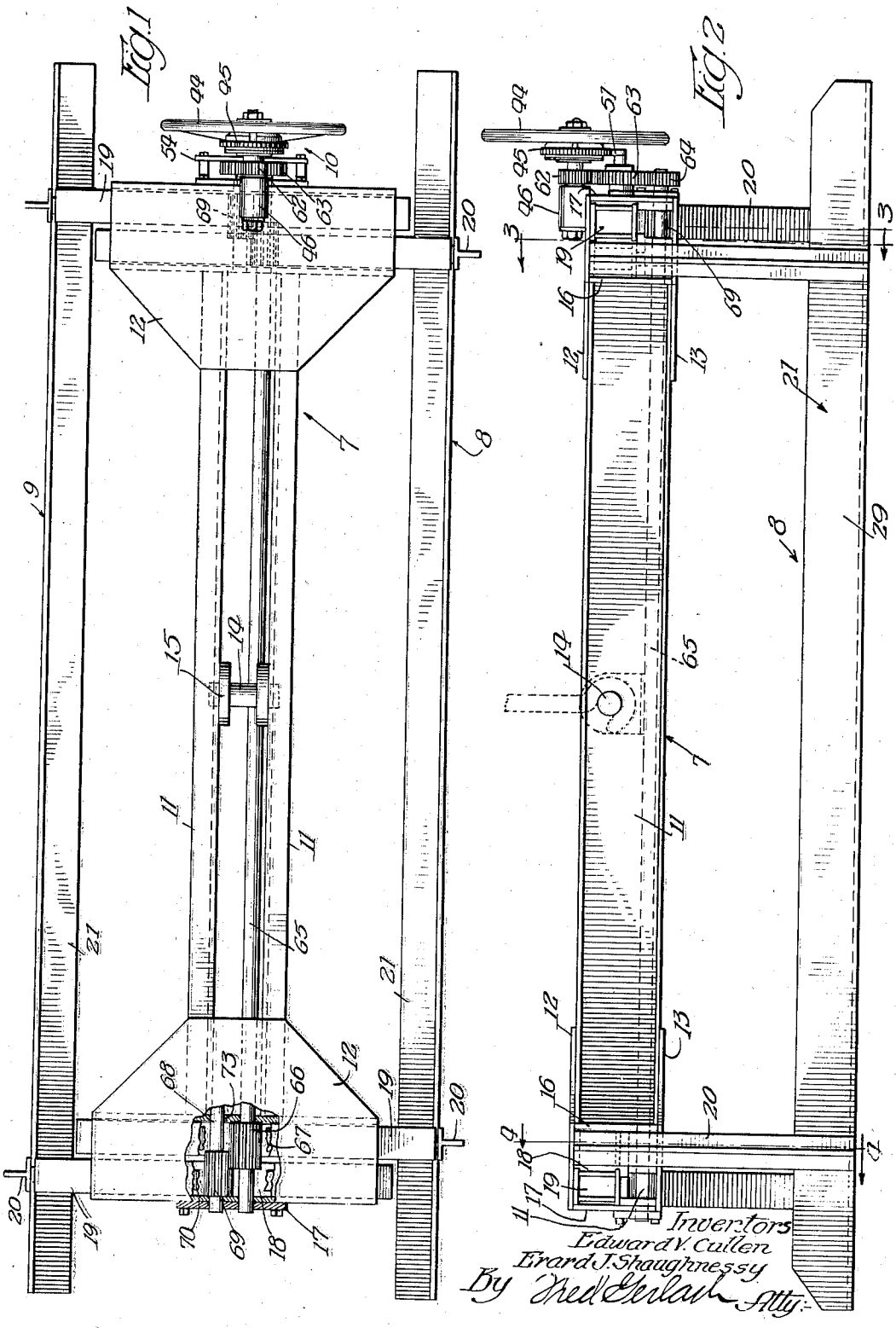
April 30, 1940. E. V. CULLEN ET AL 2,198,652

SHEET LIFTER

Filed Aug. 5, 1937 3 Sheets-Sheet 1



April 30, 1940. E. V. CULLEN ET AL 2,198,652

SHEET LIFTER

Filed Aug. 5, 1937 3 Sheets-Sheet 2

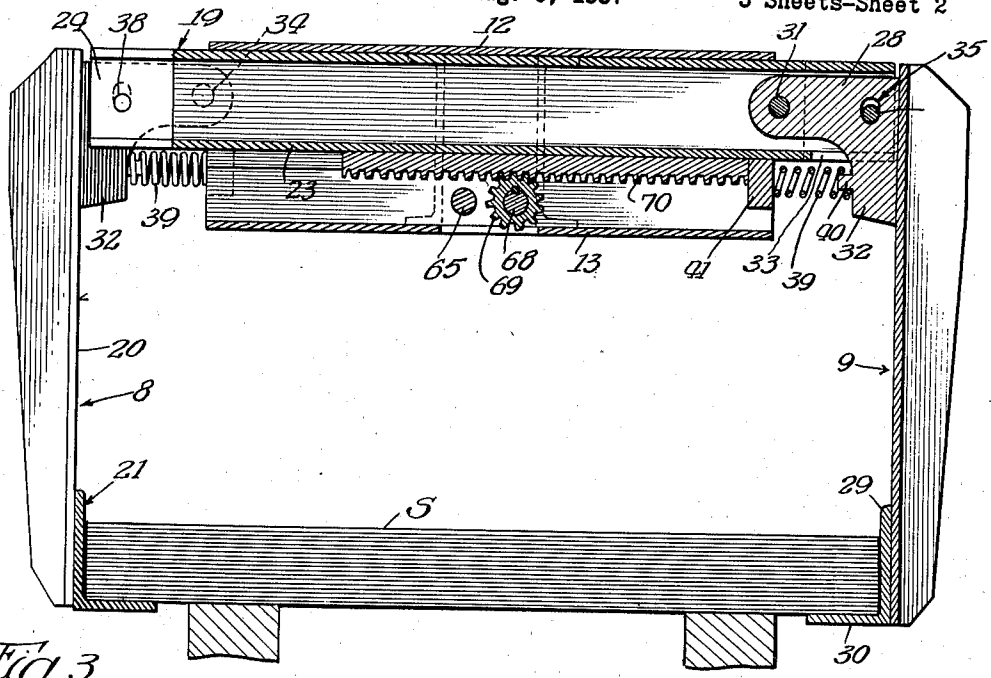


Fig. 3

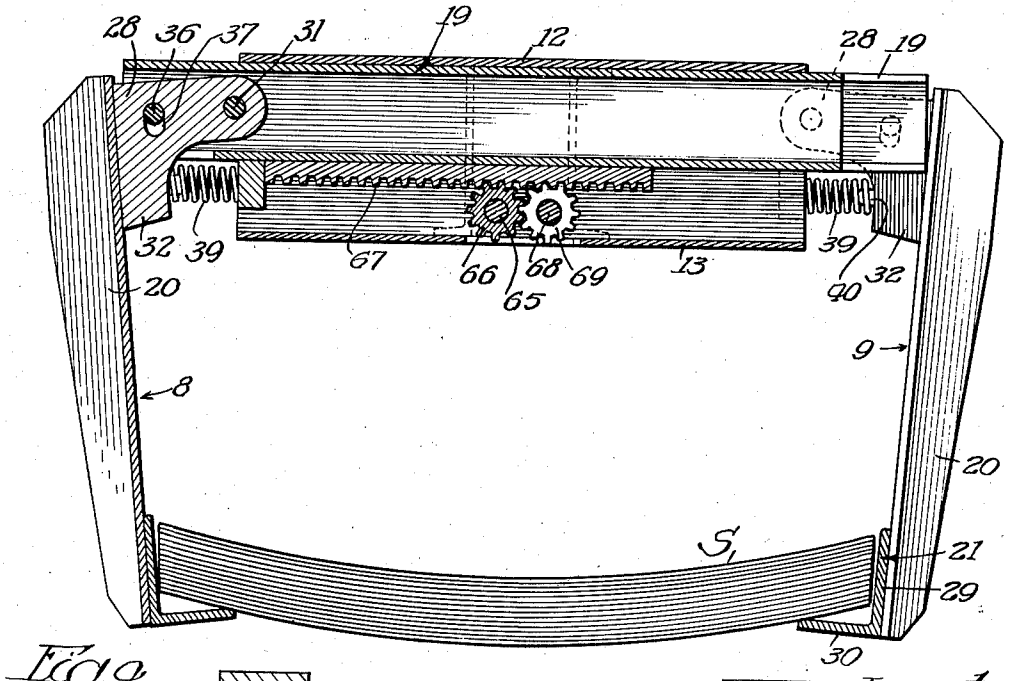


Fig. 4

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SHEET LIFTER

Filed Aug. 5, 1937 3 Sheets-Sheet 3

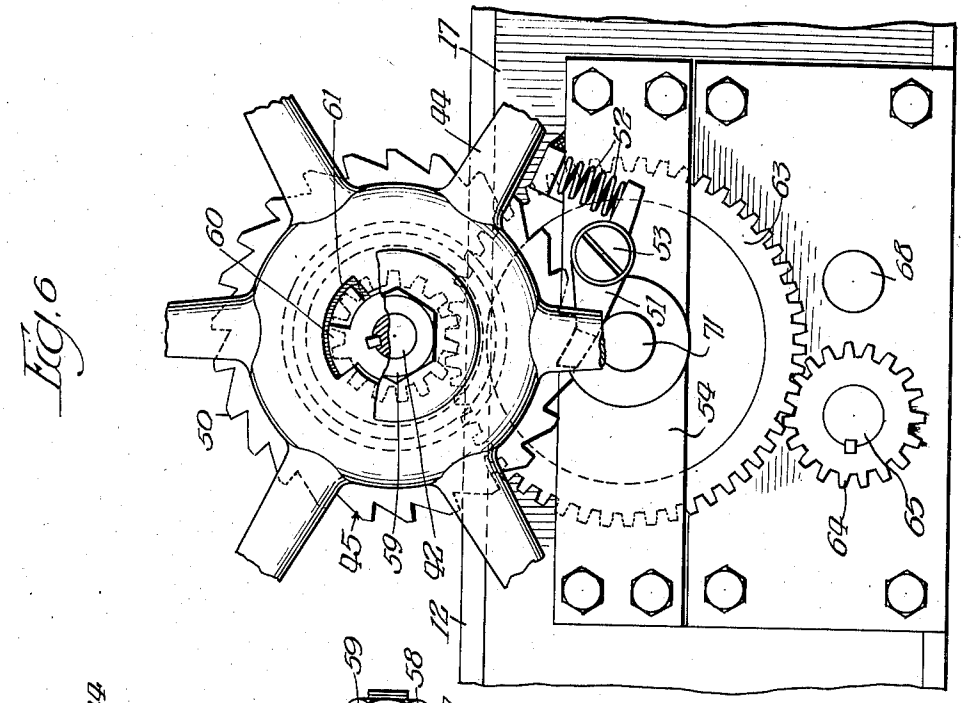

Fig. 6

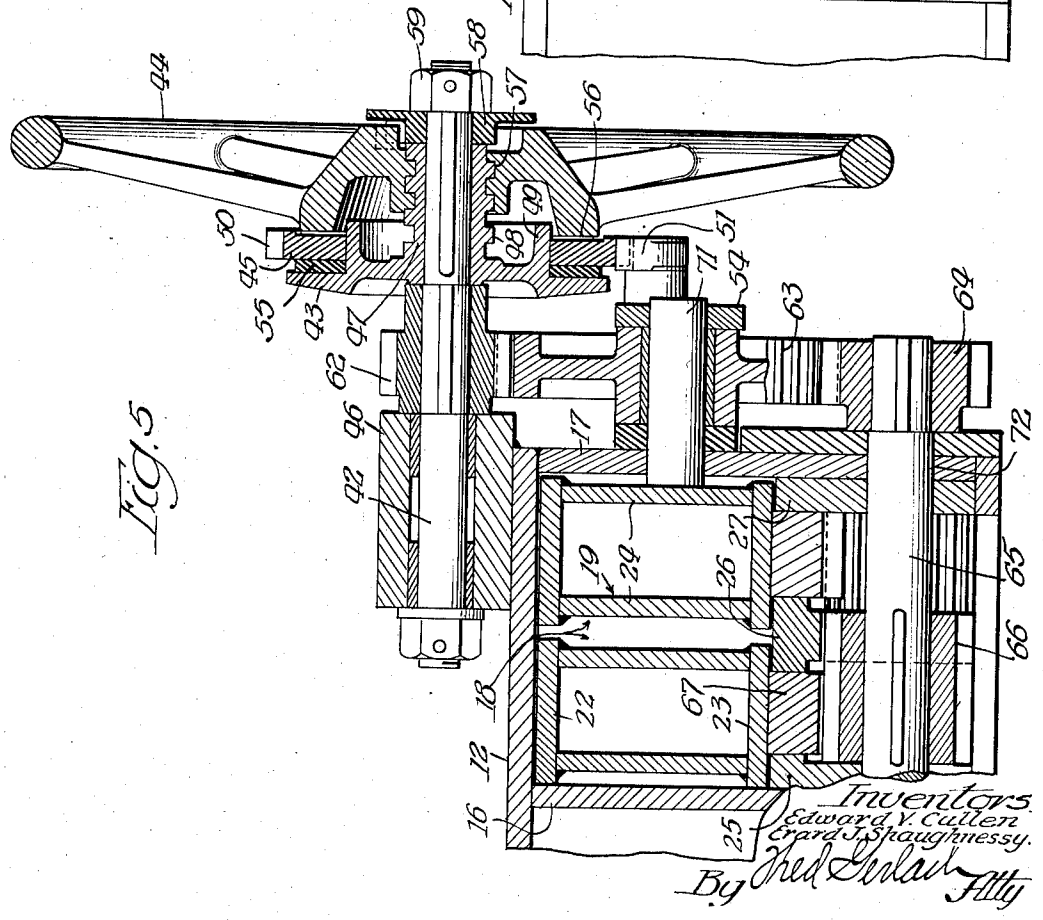

Fig. 5

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Patented Apr. 30, 1940

2,198,652

UNITED STATES PATENT OFFICE

2,198,652

SHEET LIFTER

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Application August 5, 1937, Serial No. 157,462

17 Claims. (Cl. 294—113)

The present invention relates generally to lifters for handling stacks of metallic sheets or like articles. More particularly the invention relates to that type of sheet lifter which is adapted to be hoisted and moved from place to place by a crane or overhead hoist and comprises (1) an elongated supporting element which is adapted normally to extend horizontally and has means whereby it may be attached to a hook or other connecting device on the operating end of the crane or hoist with which the lifter is used; (2) a pair of opposed horizontally elongated complemental jaws which are carried by the supporting element so that they are shiftable to and from one another into and out of engagement with the side margins of the sheets; and (3) gear mechanism which is associated with and carried by the supporting element and operates upon actuation thereof conjointly to shift the jaws to and from one another.

One object of the invention is to provide a sheet lifter of this type which is generally an improvement upon, and is more simple to operate than, previously designed lifters of the same general character and for the same purpose.

Another object of the invention is to provide a sheet lifter of the type under consideration in which the opposed horizontally elongated complemental jaws comprise upper members which are movably connected to the supporting element and connected for shift to and from one another by the gear mechanism and substantially vertical members which are provided at the bottom portions thereof with inwardly extending means for underlying the side margins of the sheets and are pivotally connected at their upper ends to the upper members so that they are free to swing inwards to a limited extent in order to compensate for the sag in the sheets when the latter are hoisted or lifted by the lifter.

Another object of the invention is to provide a sheet lifter of the last mentioned character which includes simple and novel means for limiting or restricting inward swinging movement of the lower members of the jaws, and also includes springs between the ends of the lower jaw members and the contiguous ends of the upper members for urging the lower members in their normal or substantially vertical position.

A further object of the invention is to provide a sheet lifter of the aforementioned type and character or in which the gear mechanism for shifting the jaws to and from one another operates not only in an efficient manner and easily but also includes a brake device whereby the jaws are automatically locked against outward movement except in response to actuation of the mechanism.

A still further object of the invention is to provide a sheet lifter which is generally of new and improved construction and may not only be manufactured at a low and reasonable cost but is extremely efficient in operation.

Other objects of the invention and the various advantages and characteristics of the present sheet lifter will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a plan view of a sheet lifter embodying the invention, parts being broken away and shown in section for purposes of illustration;

Figure 2 is a side elevational view of the lifter;

Figure 3 is an enlarged vertical transverse sectional view taken on the line **3—3** of Figure 2 and showing the jaws in their operative position with respect to the side margins of a stack of sheets and before lifting of the sheets by the lifter;

Figure 4 is an enlarged vertical transverse sectional view taken on the line **4—4** of Figure 2 and illustrating the manner in which the lower members of the jaws as a result of their pivotal connection with the upper members swing inwards and compensate for sag after lift of the stack of sheets by the lifter;

Figure 5 is an enlarged vertical longitudinal sectional view of the brake equipped gear mechanism for shifting the jaws to and from one another; and

Figure 6 is a fragmentary front view of the gear mechanism.

The lifter which is shown in the drawings constitutes the preferred embodiment of the invention. It is adapted in connection with a crane or overhead hoist to lift and move from one place to another a stack of sheets S and comprises an elongated supporting element **7**, a pair of opposed elongated complemental jaws **8** and **9**, and gear mechanism **10** for conjointly shifting the jaws to and from one another. The supporting element **7** is adapted normally to extend horizontally. It carries the jaws **8** and **9** and the gear mechanism **10** and comprises a pair of channel beams **11**, a pair of top plates **12**, and a pair of bottom plates **13**. The beams **11** are positioned

in parallel and laterally spaced relation, as shown in Figure 1, and are coextensive. They are arranged so that the flanges thereof project outwardly and are cross-connected and fixedly secured together by the plates 12 and 13. A stud 14 extends between the central portions of the beams 11 and serves as a medium whereby the lifter may be attached to a hook or other connecting device on the operating end of the crane or hoist with which the lifter is used. This stud is carried by a pair of lugs 15 and is so positioned or located with respect to the beams 11 that the lifter when suspended thereby is properly balanced and assumes a substantially horizontal position. The lugs 15 fit against and are welded or otherwise fixedly secured to the inner faces of the central portions of the beams 11. The plates 12 overlie the bottom plates 13 and have the inner portions thereof fitting against and welded to the ends of the upper flanges of the channel beam 11. The bottom plates 13 are the same in shape as the top plates and have the inner portions thereof fitting against and welded to the ends of the bottom flanges of the beams 11. In addition to the beams 11 and the top and bottom plates 12 and 13, the elongated supporting element 7 comprises a pair of inner end plates 16 and a pair of outer end plates 17. The inner end plates extend vertically between the top and bottom plates and are welded or otherwise fixedly secured to the ends of the beams 11. They are the same in length as the top and bottom plates are in width and together with the outer portions of the top and bottom plates define horizontal transversely extending slideways 18 at the ends of the supporting element 7. The outer end plates 17 are positioned in parallel and spaced relation with the inner end plates and extend between and are welded to the outer end margins of the top and bottom plates.

The opposed horizontally elongated complemental jaws 8 and 9 are adapted, as hereinafter described, to be shifted to and from one another in response to operation of the gear mechanism 10. They extend lengthwise of the supporting element 7 and comprise upper horizontally extending members 19, lower vertically extending members 20, and horizontally extending angle iron bars 21. The upper members 19 extend transversely with respect to the supporting element 7 and fit within the slideways 18 for longitudinal sliding movement. They are hollow, as shown in Figure 5, and consist of top pieces 22, bottom pieces 23, and side pieces 24. These pieces are coextensive and are welded or otherwise fixedly secured together so that the upper members of the jaws are rigid from end to end. The top pieces 22 of the jaws fit slidably against the bottom faces of the outer portions of the top plates 12 of the supporting element. The upper members 19 of the jaw 8 are disposed inwardly of, and are arranged in lapped relation with, the upper members of the jaw 9 and are supported by inner slide blocks 25 and intermediate slide blocks 26. The inner slide blocks are located in the bottom portions of the slideways 18. They fit and are suitably secured against the outer faces of the inner end plates 16 of the supporting element 7 and underlie and form sliding supports for the inner portions of the bottom pieces 23 of the upper members of the jaw 8. The intermediate slide blocks 26 are centrally positioned in the lower portions of the transverse slideways 18 and underlie and form sliding supports for the outer portions of the bottom pieces 23 of the upper members of the jaw 8. The upper members 19 of the jaw 9 are located in the upper outer portions of the slideways 18 and are slidably supported for movement to and from the members 19 of the jaw 8 by way of the intermediate slide blocks 26 and also by outer slide blocks 27. The latter, as shown in Figure 5, are located in the outer lower portions of the slideways 18 and fit against and are suitably secured to the inner faces of the outer end plates 17 of the supporting elements 7. The outer portions of the intermediate slide blocks 26 underlie and form sliding supports for the inner portions of the bottom pieces 23 of the members 19 of the jaw 9 and the outer slide blocks 27 underlie and form slidable supports for the outer portions of said bottom pieces. The lower members 20 project downwardly from the outer ends of the upper members 19. They are preferably formed of T-iron and have pivot lugs 28. The angle iron bars 21 are applied to the lower ends of the members 20 and consist of substantially vertical legs 29 and substantially horizontal legs 30. The legs 29 are welded or otherwise fixedly secured to the inner faces of the lower ends of the members 20 and are adapted when the jaws are shifted inwards, as hereinafter described, into hoisting relation with the sheets S to abut against the side edges of the lowermost sheets (see Figure 3). The legs 30 are formed integrally with and project inwardly from the bottom portions of the legs 29 and are adapted to underlie the side margins of the sheets. The pivot lugs 28 are welded to, and project inwardly from, the upper ends of the lower jaw members 20 and fit within the outer ends of the upper jaw members 19. They have pivot pins 31 extending therethrough and have bottom portions 32 which project downwards through longitudinally extending slots 33 in the outer ends of the bottom pieces 23 of the jaw members 19. The pivot pins 31 extend through the inner ends of the pivot lugs 28 and have the ends thereof fixed in aligned holes 34 in the side pieces 24 of the upper members of the jaws. They extend horizontally and together with the pivot lugs form pivotal connections between the upper ends of the lower jaw members 20 and the contiguous ends of the upper jaw members whereby the lower jaw members are permitted to swing inwards to a small extent and then back to their normal position. Swinging movement of the members 20 relatively to the upper jaw members 19 is limited by way of pin and slot connections 35. These connections are positioned outwardly of the pivot pins 31 and consists of pins 36 and slots 37. The slots 37 are formed in the outer portions of the pivot lugs 28 and extend vertically. The pins 36 extend through the slots 37 and have the ends thereof fixed in aligned holes 38 in the outer ends of the side pieces 24 of the jaw members 19. The pin and slot connections 35 are so arranged that the lower jaw members 20 when swung outwards to their fullest extent extend substantially vertically and, as shown in Figure 4, permit said members to swing inwards but a comparatively small extent. The arms are normally held in their outer or substantially vertical position by means of a set of compressions springs 39. The latter are disposed beneath the outer ends of the upper jaw members 19 and extend between projections 40 on the lower portions 32 of the pivot lugs 28 and blocks 41 on the bottom pieces 23 of the upper jaw members 19. When the lifter is hoisted or raised after the jaws 8 and 9 are

first brought into gripping relation with the sheets S, as shown in Figure 3, the sheets are supported on the angle iron bars 21 and sag downwards, as shown in Figure 4. Because of the frictional grip between the abutting portions of the bottom sheet and the substantially horizontal legs 30 of the angle iron bars 21 the lower jaw members 20 are caused to swing inwards in response to the sag and hence compensate for the sag and cause the angle iron bars to retain substantially their original relation or position with respect to the adjacent side margins of the sheets. The pivot pins 31 are located inwards of the angle iron bars 21 and hence turning moment resulting from sagging of the sheets causes inward swing of the jaw members 20 against the action of the springs 39. During inward swing of the members 20 the springs 39 are compressed. As a result of this, when the load of the sheets S is removed from the angle iron bars 21 the springs urge the members outwards into their normal or substantially vertical position. The pivot pins 31 and the pin and slot connections 35 constitute simple means for permitting the lower members 20 of the jaws to swing inwards to a slight extent in order to compensate for sag in the sheets when the latter are hoisted or lifted by the lifter.

The gear mechanism 10 for conjointly shifting the jaws 8 and 9 to and from one another comprises a horizontally extending shaft 42, a brake plate 43, a hand wheel 44 and a ratchet wheel 45. The shaft 42 extends longitudinally of the supporting element 7. It is positioned over and projects outwardly from one end of the element and has the inner end thereof journaled in a bearing block 46 on one of the top plates 12. The brake plate 43 is mounted on and keyed to the outer central portion of the shaft 42 and embodies an elongated outwardly projecting hub 47. The latter terminates inwardly of the extreme outer end of the shaft 42 and embodies an external screw thread 48. In addition to the hub 47 the brake plate embodies an annular flange 49. This flange surrounds and projects in the same direction as the hub 47 and has the ratchet wheel 45 mounted thereon. The ratchet wheel is provided on the periphery thereof with ratchet teeth 50. It is axially movable to a slight extent on the flange 49 and is confined to rotation in one direction that is clockwise rotation on the flange 49 by a pawl 51 which is pressed into engagement with the ratchet teeth 50 by a spring 52 and is rotatably mounted on a stud 53. This stud, as shown in Figures 5 and 6, is fixed to and projects outwardly from a bracket 54 on the outer end plate 17 which is beneath the shaft 42. A flat ring-shaped brake strip 55 surrounds the annular flange 49 and is mounted between the ratchet wheel 45 and the peripheral portion of the brake plate so that when the ratchet wheel is moved axially toward the plate it is locked for rotation with the latter. The hand wheel 44 is mounted on the outer end of the hub 47 of the brake plate and is provided with an annular portion 56 for engaging the outer face of the ratchet wheel 45. In addition to the portion 56 the hand wheel is provided with an internal screw thread 57 which engages the external screw thread 48 on the hub 47 and coacts therewith to cause the wheel to shift axially when it is turned relatively to the hub. The external screw thread 48 of the hub and the internal screw thread 57 of the hand wheel are so pitched or arranged that when the hand wheel is rotated in a clockwise manner relatively to the hub it moves towards the brake plate 43 and when reversely rotated, that is, rotated in a counterclockwise manner relatively to the hub it moves axially away from the brake plate. When the hand wheel is rotated in a clockwise manner it first turns relatively to the hub 47 until the annular wheel engaging portion 56 thereof strikes against the ratchet wheel and jams the latter against the brake strip 55 and into locked relation with the brake wheel. When the hand wheel is rotated in a counterclockwise manner relatively to the hub it moves away from the brake plate 43 and releases the ratchet wheel 45 so that the brake plate is free to rotate relatively thereto. Counterclockwise rotation of the hand wheel relatively to the hub 47 is limited by means of a thrust washer 58. This washer is mounted on a threaded stem on the outer end of the shaft 42 and is clamped against the outer end of the hub 47 of the brake plate by means of a nut 59 on the stem. As shown in Figure 6, the thrust washer 58 has a radially extending lug 60. This lug fits in an arcuate slot 61 in the hub portion of the hand wheel and is adapted after such counterclockwise turning of the hand wheel relatively to the hub 47 as to release the wheel from the ratchet wheel and thus free the brake plate for rotation relatively to the ratchet wheel to abut against one end of the slot 61 and form a driving connection between the wheel and the washer element for imparting counterclockwise rotation to the shaft 42. When the hand wheel is jammed against the ratchet wheel and is hence locked to the brake plate the brake plate and shaft 42 are free to be turned in a clockwise manner by the hand wheel. The shaft and brake plate are, however, locked by the ratchet wheel 45 against counterclockwise rotation. When the hand wheel is released from locked relation with the brake plate the shaft and brake plate are free from the ratchet wheel and hence may be rotated in either direction. When the hand wheel is turned in counterclockwise manner it first rotates relatively to the hub 47, as previously pointed out, and releases the brake plate from the ratchet. Thereafter the slotted portion of the hub thereof encounters the lug 60 and a driving connection is effected between the wheel and the washer whereby counterclockwise rotation of the wheel is transmitted to the shaft 42. When the wheel is connected to the shaft 42 for counterclockwise drive of the latter through the medium of the washer 47 the ratchet wheel is ineffective to prevent counterclockwise rotation of the shaft because it is free with respect to the brake plate.

In addition to the previously described parts the gear mechanism 10 for shifting the jaws 8 and 9 to and from one another comprises a pinion 62, a gear 63, a pinion 64, a shaft 65, a pair of pinions 66, a pair of racks 67, a shaft 68, a pair of pinions 69 and a pair of racks 70. The pinion 62 is keyed to the shaft 42 and is disposed between the bearing block 46 and the brake plate 43. The gear 63 meshes with and is driven by the pinion 62. It is located beneath the latter, as shown in Figures 5 and 6, and is rotatably mounted on a stub shaft 71 which is carried by the bracket 54. The pinion 64 meshes with and is driven by the gear 63 and is keyed to one end of the shaft 65. The latter extends longitudinally of the supporting element 7 and is disposed between the channel beams 11. The ends of the shaft 62 extend through and are journaled in aligned holes 72 in the inner and outer end plates 16 and 17 of the

supporting element. The pinions 66 are keyed to the end portions of the shaft 65 and are located at the inner lower portions of the slideways 18, as shown in Figure 5. The racks 67 are welded or otherwise fixedly secured to the bottom pieces 23 of the upper members 19 of the jaw 8 and mesh with the pinions 66. They fit between the upper portions of the inner and intermediate slide blocks 25 and 26 and cause longitudinal shift of the jaws in response to turning of the pinions 66. The gearing between the racks 67 and the shaft 42 is such that the jaw 8 is moved outwards in response to counterclockwise rotation of the shaft 42 by the hand wheel and inwardly in response to clockwise rotation of the shaft 42 by the hand wheel. The shaft 68 is in the nature of a countershaft. It extends parallel with the shaft 65 and is located between the beams 11 of the elongated supporting element 7. The ends of the shaft extend through and are journaled in aligned holes 73 in the inner and outer end plates of said element. The pinions 69 are keyed to the ends of the shaft 68. They are disposed in the outer lower portions of the slideways 18 and are arranged so that the inner ends thereof mesh with the outer ends of the pinions 66. As a result of this arrangement the pinions 69 together with the shaft 68 are driven in response to drive or rotation of the pinions 66. The racks 70 extend lengthwise of and are welded or otherwise fixedly secured to the bottom faces of the bottom pieces 23 of the upper members 19 of the jaw 9. They mesh with the pinions 69 and operate to shift the jaw 9 in response to turning or drive of said pinions 69. By reason of the fact that the pinions 69 are driven by the pinions 66 the shaft 68 rotates reversely to the shaft 65 and hence in response to turning of the shaft 42 the jaws 8 and 9 move conjointly either to or from one another. As shown in Figure 5, the racks 70 fit slidably between the upper portions of the intermediate and outer slide blocks 26 and 27.

The operation of the lifter is as follows: When it is desired to hoist or move the stack of sheets S the jaws 8 and 9 are first shifted apart so that the angle iron bars 21 thereof are spaced apart a distance slightly greater than the width of the sheets. Outward shift of the jaws is accomplished by rotating or turning the hand wheel 44 in a counterclockwise manner. When the hand wheel is turned in such manner, it first rotates relatively to the hub 47 of the brake plate 43 out of engagement with the ratchet wheel 45. As soon as the wheel moves outwards into driving relation with the thrust washer 58 it operates through the medium of the latter to turn the shaft 42 in a counterclockwise direction. Such turning or rotation of the shaft 42 operates through the medium of the pinion 62, the gear 63, the pinion 64, the shafts 65 and 68, the pinions 66 and 69 and the racks 67 and 70 to shift the jaws outwards in opposite directions. The extent of outward shift of the jaws is controlled by the number of revolutions of the hand wheel. When the jaws are shifted outwards to the proper or desired extent counterclockwise rotation of the hand wheel is stopped and the lifter is lowered by the crane or hoist with which it is associated until the angle iron bars 21 at the lower ends of the vertically extending lower members 20 of the jaws are properly positioned with respect to the side edges of the sheets S. In order to move or shift the jaws 8 and 9 inwardly into engagement with the sheets, the hand wheel 44 is turned in a clockwise manner. During such rotation or turning, the hand wheel first turns relatively to the hub 47 of the brake plate and jams the ratchet wheel 45 into locking relation with the brake plate. After jamming of the ratchet wheel into such relation with the brake plate continued or further clockwise rotation of the hand wheel operates through the medium of the ratchet wheel and brake plate to turn the shaft 42 in a clockwise manner. Such turning of the shaft 42 operates through the medium of the gearing between the shaft and the horizontally extending upper members 19 of the jaws to swing the jaws toward one another. As soon as the angle iron bars 21 come into proper position with respect to the sheets S clockwise turning of the hand wheel 44 is stopped and the lifter is thus in its operative position with respect to the sheets S and upon lift by the crane or hoist raises the sheets S. If the sheets S tend to sag, as shown in Figure 4, during hoist or raising of the lifter the vertically extending lower members 20 of the jaws 8 and 9 swing inwards and hence compensate for any sag. When the jaws 8 and 9 are shifted inwards into their operative position with respect to the sheets they cannot be moved outwards except by counterclockwise rotation of the hand wheel 44. This is attributable to the fact that any outward shift of the jaws operates through the medium of the screw thread connection between the hub 47 of the brake plate and the hub of the hand wheel to shift the hand wheel into engagement with the ratchet wheel and cause the latter to lock itself to the brake plate. When the ratchet wheel is so locked it, together with the shaft 42 is held against counterclockwise movement as the result of the action of the pawl 51 and the ratchet teeth 50.

The herein described sheet lifter consists of a comparatively small number of parts and hence may be manufactured at a low and reasonable cost. It is extremely efficient in operation due to the fact that the lower members 20 of the jaws are free to move inwards to a small extent and hence there is no possibility of the sheets dropping or falling as the result of sag during a hoisting or lifting operation.

Whereas the lifter has been described as being particularly adapted for use in lifting sheets or transporting them from place to place it is to be understood that it may be used in connection with other articles. It is also to be understood that the invention is not to be restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent is:

1. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing complemental jaws mounted to move to and from one another and embodying substantially horizontal upper members and also substantially vertically extending lower members having inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and pivotally connected at their upper ends to the outer ends of the upper members so that they are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, means for limiting swinging movement of the lower members relatively to the upper members, and means applied to said

upper members for conjointly shifting the jaws to and from one another.

2. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws mounted to move to and from one another and embodying substantially horizontally extending slidably mounted upper members and also substantially vertically extending lower members having inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and pivotally connected at their upper ends to the outer ends of the upper members so that they are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, means between the upper jaw members and said upper ends of the lower members for limiting swinging movement of the lower members relatively to the upper members, and means applied to said upper members for conjointly shifting the jaws to and from one another.

3. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws mounted to move to and from one another and embodying substantially horizontal upper members and also substantially vertical lower members having inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and pivotally connected at their upper ends to the upper members so that they are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, means for limiting swinging movement of the lower members, spring means for urging the lower jaw members outwards into their normal substantially vertical position, and means applied to the upper jaw members for conjointly shifting the jaws to and from one another.

4. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing complemental jaws mounted to move to and from one another and embodying upper members and also substantially vertical lower members having inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and pivotally connected at their upper ends to the upper members so that they are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, means between the upper members and said upper ends of the lower members for limiting inward swing of the lower members, compression springs between the upper and lower members for urging said lower members outwards into their normal substantially vertical position, and means for conjointly shifting the jaws to and from one another.

5. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying substantially horizontally extending slidably mounted upper members and also substantially vertically extending lower members provided with inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and having inwardly projecting lugs at their upper ends pivotally connected to the upper members so that said lower members are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, means applied to said upper members for conjointly shifting the jaws to and from one another.

6. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying substantially horizontally extending slidably mounted upper members and also substantially vertically extending lower members provided with inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and having inwardly projecting lugs at their upper ends pivotally connected to the upper members so that said lower members are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, pin and slot connections between the upper members and the lugs for limiting inward swing of the lower members, and means applied to said upper members for conjointly shifting the jaws to and from one another.

7. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying substantially horizontally extending slidably mounted upper members and also substantially vertically extending lower members provided with inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and having inwardly projecting lugs at their upper ends pivotally connected to the upper members so that said lower members are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, means for limiting inward swing of the lower members, spring means between the upper members and the lugs for urging the lower members outwards into their normal substantially vertically extending position, and means applied to said upper members for conjointly shifting the jaws to and from one another.

8. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying substantially horizontally extending slidably mounted upper members and also substantially vertically extending lower members provided with inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and having inwardly projecting lugs at their upper ends pivotally connected to the upper members so that said lower members are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter, pin and slot connections between the upper members and the lugs for limiting inward swing of the lower members, compression springs between the upper members and said lugs for urging the lower members outwards into their normal substantially vertically extending position, and means applied to said upper members for conjointly shifting the jaws to and from one another.

9. A lifter adapted for use in handling sheets and like articles and to be attached to a crane

or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying transversely disposed substantially horizontally extending slidably mounted hollow upper members and also substantially vertically extending lower members provided with inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and having inwardly projecting lugs at their upper ends extending into the outer ends of the upper members and pivotally connected to the latter so that said lower members are permitted to swing inwards to a limited extent in response to sagging of the sheets during hoist of the latter by the lifter, and means applied to said upper members for conjointly shifting the jaws to and from one another.

10. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and consisting of transversely disposed substantially horizontally extending hollow upper members mounted for sliding movement and having slots in the bottom portions of the outer ends thereof and substantially vertically extending lower members provided with inwardly extending means at the lower ends thereof for underlying the side margins of the sheets and having inwardly projecting lugs at their upper ends embodying upper parts projecting into the outer ends of the upper members and pivotally connected to the latter so that the lower members are permitted to swing inwards in response to sagging of the sheets during hoist of the latter by the lifter and also embodying lower portions extending downwardly through the aforesaid slots, means for limiting inward swing of the lower members, compression springs between the upper jaw members and the lower portions of the lugs for urging the lower members outwards into their normal substantially vertically extending position, and means applied to said upper jaw members for conjointly shifting the jaws to and from one another.

11. A lifter adapted for use in handling sheets and like articles and comprising in combination a horizontal supporting element having means for attachment to a crane or hoist and provided at the ends thereof with transverse slideways, a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying horizontal transversely disposed upper members fitting slidably in and extending longitudinally through the slideways and having longitudinally extending racks, and also embodying lower members connected to and depending from the outer ends of the upper members and provided at their lower ends with inwardly extending means for underlying the side margins of the sheets, and means for conjointly shifting the jaws comprising a shaft carried by and extending longitudinally of the supporting element and having pinions thereon meshing with the racks of the upper members of one of the jaws, and pinions having portions thereof meshing with the aforementioned pinions and other portions meshing with the racks of the upper members of the other jaw.

12. A lifter adapted for use in handling sheets and like articles and comprising in combination a horizontal supporting element having means for attachment to a crane or hoist and provided with transverse slideways, a pair of oppositely facing horizontally elongated complemental jaws shiftable to and from one another and embodying horizontal transversely disposed upper members fitting slidably in and extending longitudinally through the slideways and having fixed racks extending longitudinally thereof, and also embodying lower members connected to and depending from the upper members and provided at their lower ends with inwardly extending means for underlying the side margins of the sheets, and means for conjointly shifting the jaws to and from one another comprising a shaft extending longitudinally of the supporting element and having pinions thereon positioned in the slideways and meshing with the racks of the upper members of one of the jaws, and a countershaft carried by and extending longitudinally of the supporting element and having pinions thereon disposed in said slideways and having portions thereof meshing with portions of the aforementioned pinions and other portions meshing with the racks of the upper members of the other jaw.

13. A lifter adapted for use in handling sheets and like articles and comprising in combination a horizontal supporting element having means for attachment to a crane or hoist and provided with transverse slideways with laterally spaced slide blocks in the lower portions thereof, a pair of oppositely facing horizontally extending complemental jaws shiftable to and from one another and embodying horizontal transversely disposed upper members extending longitudinally through and mounted for sliding movement on the slide blocks and having racks on their bottom portions extending longitudinally thereof and fitting between the blocks and also embodying lower members connected to and depending from the outer ends of the upper members and provided at their lower ends with inwardly extending means for underlying the side margins of the sheets, and means for conjointly shifting the jaws to and from one another comprising a shaft carried by and extending longitudinally of the supporting element and having pinions thereon disposed in the lower portions of the slideways and meshing with the racks of the upper members of one of the jaws, and a second shaft carried by and extending longitudinally of the supporting element and having pinions thereon disposed in said lower portions of the slideways in staggered relation with the aforementioned pinions and meshing with the racks of the upper members of the other jaw.

14. A lifter adapted for use in handling sheets and like articles and comprising in combination a horizontal supporting element having means for attachment to a crane or hoist and provided with transverse slideways with laterally spaced slide blocks in the lower portions thereof, a pair of oppositely facing horizontally extending complemental jaws shiftable to and from one another and embodying horizontal transversely disposed upper members extending longitudinally through and mounted for sliding movement on the slide blocks and having racks on their bottom portions extending longitudinally thereof and fitting between the blocks and also embodying lower members connected to and depending from the outer ends of the upper members and provided at their lower ends with inwardly extending means for underlying the side margins of the sheets, and means for conjointly shifting the jaws to and from one another comprising a

shaft carried by and extending longitudinally of the supporting element and having pinions thereon disposed in the lower portions of the slideways and meshing with the racks of the upper members of one of the jaws, and a second shaft carried by and extending longitudinally of the supporting element and having pinions thereon disposed in the lower portions of the slideways and having portions thereof meshing with portions of the first mentioned pinions and other portions meshing with the racks of the upper members of the other jaw.

15. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing jaws mounted to move to and from one another and having inwardly extending means at the lower ends thereof for underlying the side margins of the sheets, one of said jaws comprising an upper member and an upstanding lower member pivotally connected at its upper end to the upper member so that it is permitted to swing inward to a limited extent in response to sagging of the sheets during hoist of the latter by the lifter, means between the upper member and the upper end of the lower member for limiting swinging movement of said lower member relatively to the upper member, and means applied to the other jaw and the upper member of the one jaw for conjointly shifting said jaws to and from one another.

16. A lifter adapted for use in handling sheets and like articles and to be attached to a crane or hoist and comprising in combination a pair of oppositely facing depending jaws mounted to move to and from one another and having inwardly extending means at the lower ends thereof for underlying the side margins of the sheets, one of said jaws comprising an upper member and an upstanding lower member connected pivotally at its upper end to the upper member so that it is permitted to swing inward to a limited extent in response to sagging of the sheets during hoist of the latter by the lifter, means for limiting swinging movement of said lower member of the one jaw relatively to the upper member, spring means for urging said lower member in one direction relatively to the upper member, and means applied to the upper jaw member and to the other jaw for conjointly shifting the jaws to and from one another.

17. A lifter for use in handling sheets and other articles, comprising a pair of oppositely facing horizontally elongated complemental jaws mounted to move to and from one another and provided at their bottom portions with means for gripping the sheets or articles, and operating mechanism for the jaws consisting of a shaft member operatively connected to the jaws so that when it is rotated in one direction it operates conjointly to open the jaws and when it is rotated in the other or opposite direction it operates conjointly to close the jaws, a plate type brake member fixedly connected to the shaft member, a ratchet wheel positioned around the shaft member and adjacent one side of the brake member and movable axially toward and away from said brake member, a spring pressed pawl coacting with the teeth of the ratchet wheel to prevent rotation of said wheel in said one direction, a rotary wheel type actuating element positioned around the shaft member and adjacent said one side of the brake member and outwardly of the ratchet wheel and having a hub connected to one of the members by a screw thread connection of such type that when the element is rotated in said other direction relatively to the shaft and brake members it moves toward the brake members, clamps the ratchet wheel between it and said brake member and establishes a driving connection whereby further rotation in said other direction results in rotation of the shaft in said other direction and closing of the jaws, and when the element is rotated in said one direction relatively to the two members it backs away from the brake member and releases the ratchet wheel from the latter, and coacting lugs between the hub of the element and one of the members operative after backing away of the element from the brake member to form a driving connection between the element and the shaft member whereby rotation of the element in said one direction serves to rotate the shaft member in said one direction and effect opening of the jaws.

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