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Buccicone

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[54] **SCISSORS-TYPE HOIST MECHANISM**

[75] Inventor: **Velio S. Buccicone,** Gary, Ind.

[73] Assignee: **Bucciconi Engineering Co., Inc.,** Gary, Ind.

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[21] Appl. No.: **103,709**

[52] **U.S. Cl.** .....**214/95 R,** 214/6 H

[51] **Int. Cl.**.....**B65g 47/00**

[58] **Field of Search**.....214/6 H, 95; 193/35 A, 35 SS; 198/34; 187/24

[56] **References Cited**

UNITED STATES PATENTS

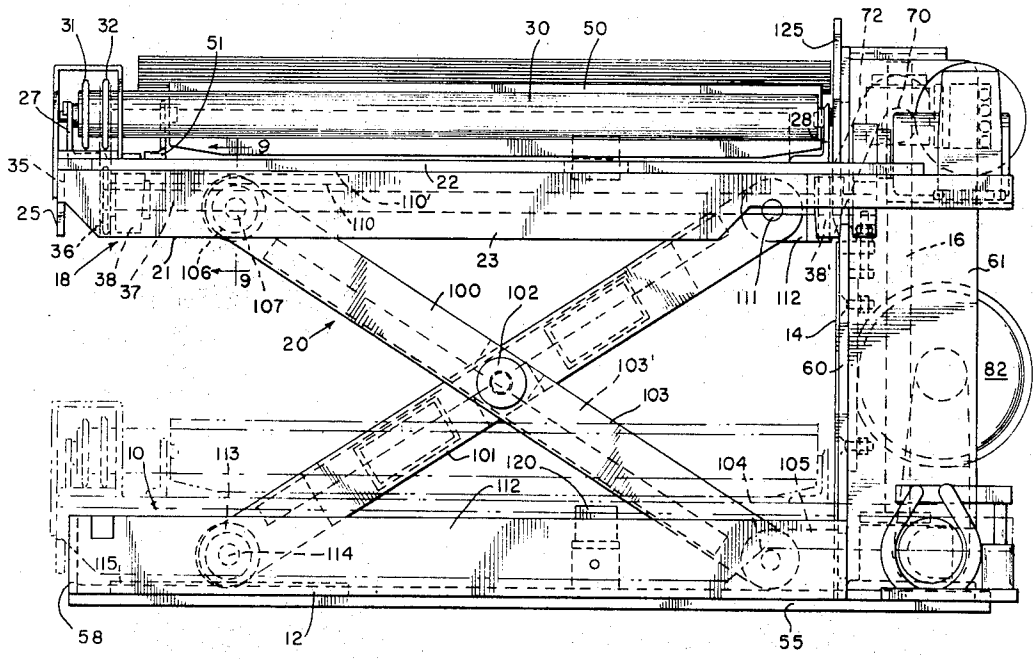
3,369,675	2/1968	Buccicone	254/126
1,101,598	6/1914	Wienke	187/24
2,924,323	2/1960	Holben	198/34
2,527,897	10/1950	Todd	187/25
3,394,792	7/1968	Aruidson et al.	198/24
2,306,101	12/1942	Zandt	193/35 A
2,052,119	8/1936	Tear	187/8.52
2,843,222	7/1958	Villars	187/24

Primary Examiner—Robert G. Sheridan
Assistant Examiner—Lawrence J. Oresky
Attorney—Guy A. Greenawalt

[57] **ABSTRACT**

A hoist for use in sheet piling operations or the like which comprises a base frame and a vertically movable platform supported thereon. The platform is raised and lowered by operation of a single power driven lift screw mounted in an upright end portion of the base frame with the platform being connected to a bottom, horizontally disposed portion of the base frame by a scissors mechanism which holds the platform in a plane parallel with the plane of the horizontal portion of the base frame as the platform is raised and lowered.

8 Claims, 9 Drawing Figures



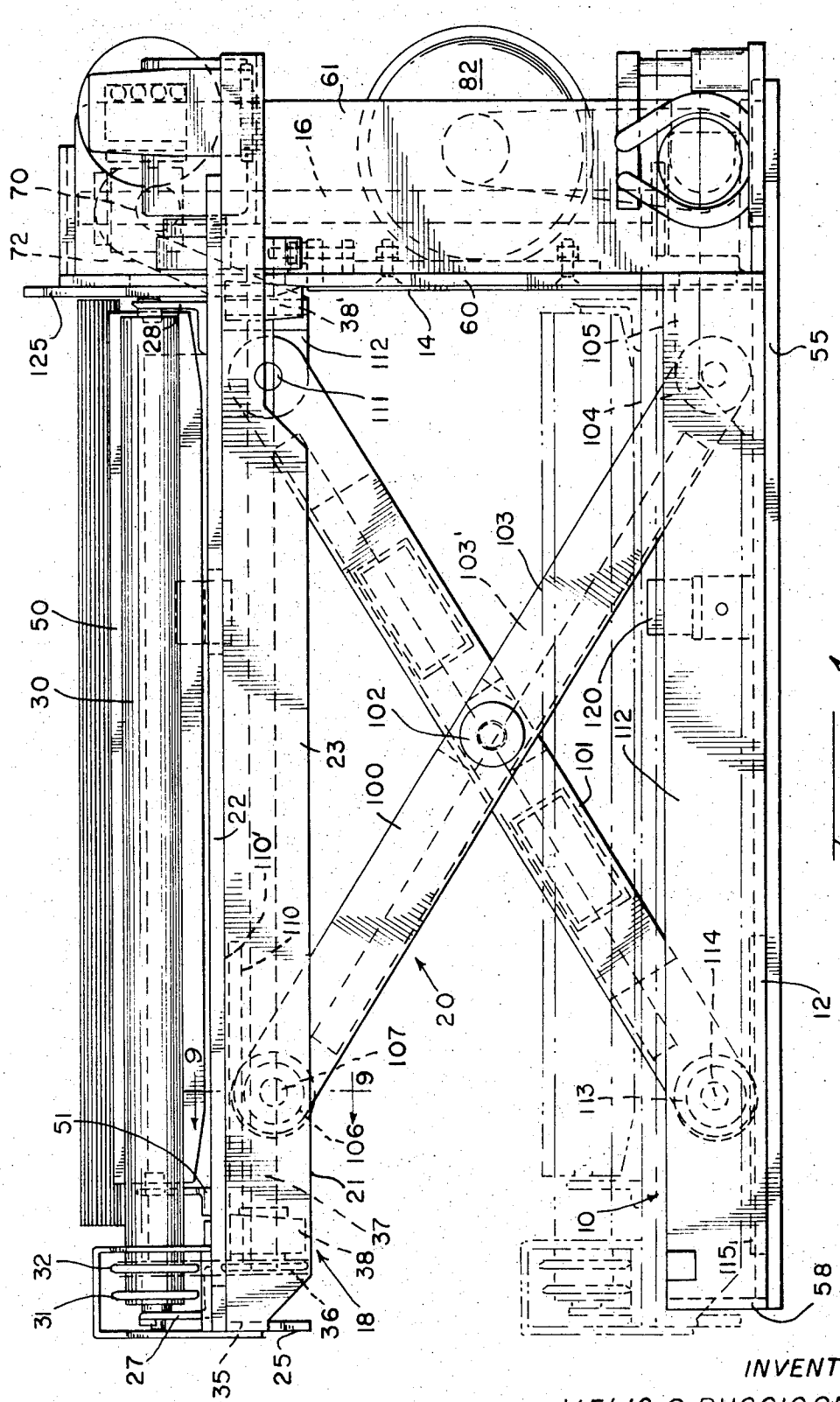


FIG. 1

INVENTOR
VELIO S. BUCCICONE
BY Greist, Lockwood, Granawalt & Dewey
ATT'YS

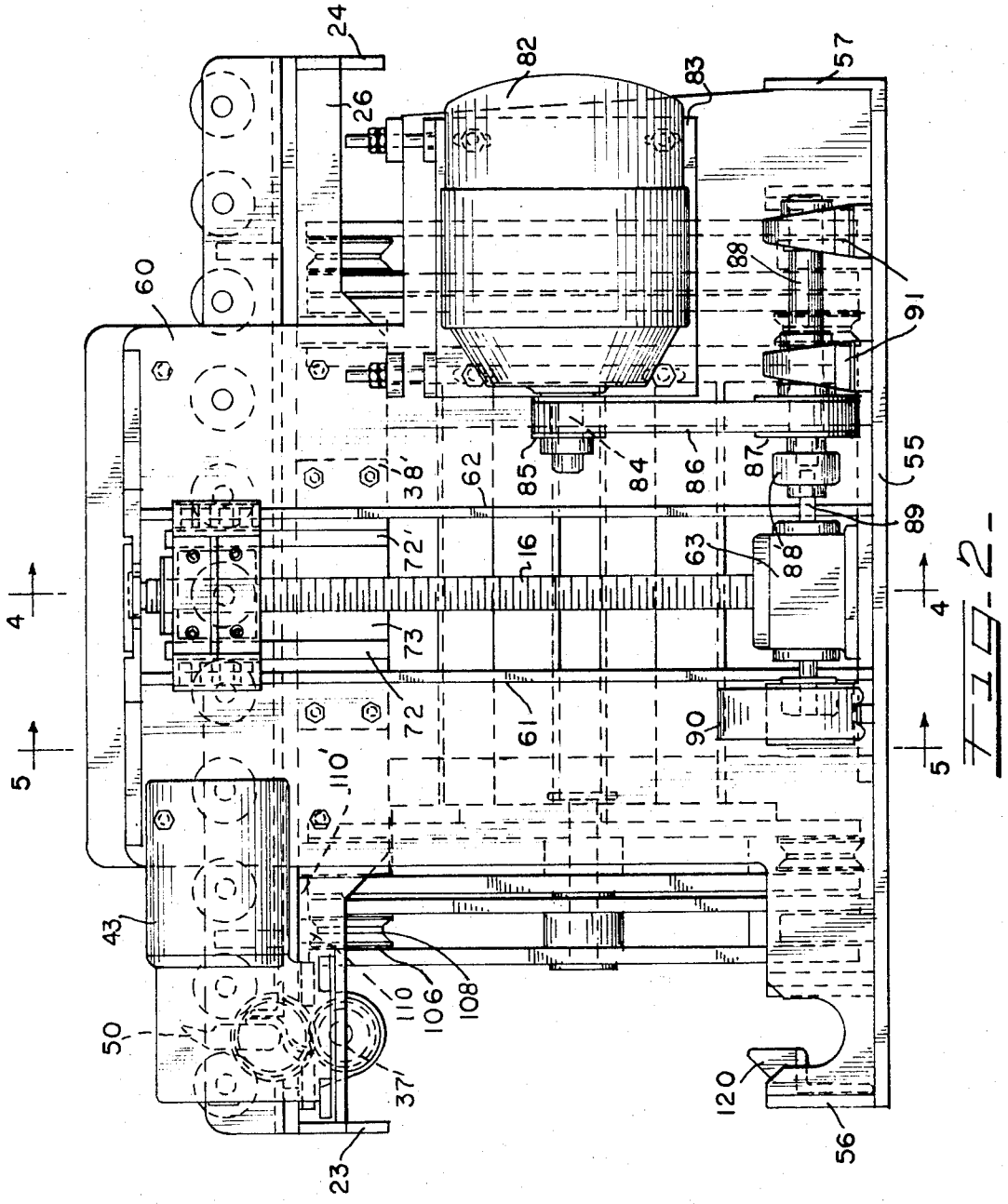


FIG. 2

INVENTOR
VELIO S. BUCCICONE
BY Brisebois, Lockwood, Greenawalt & Dewey
ATT'YS.

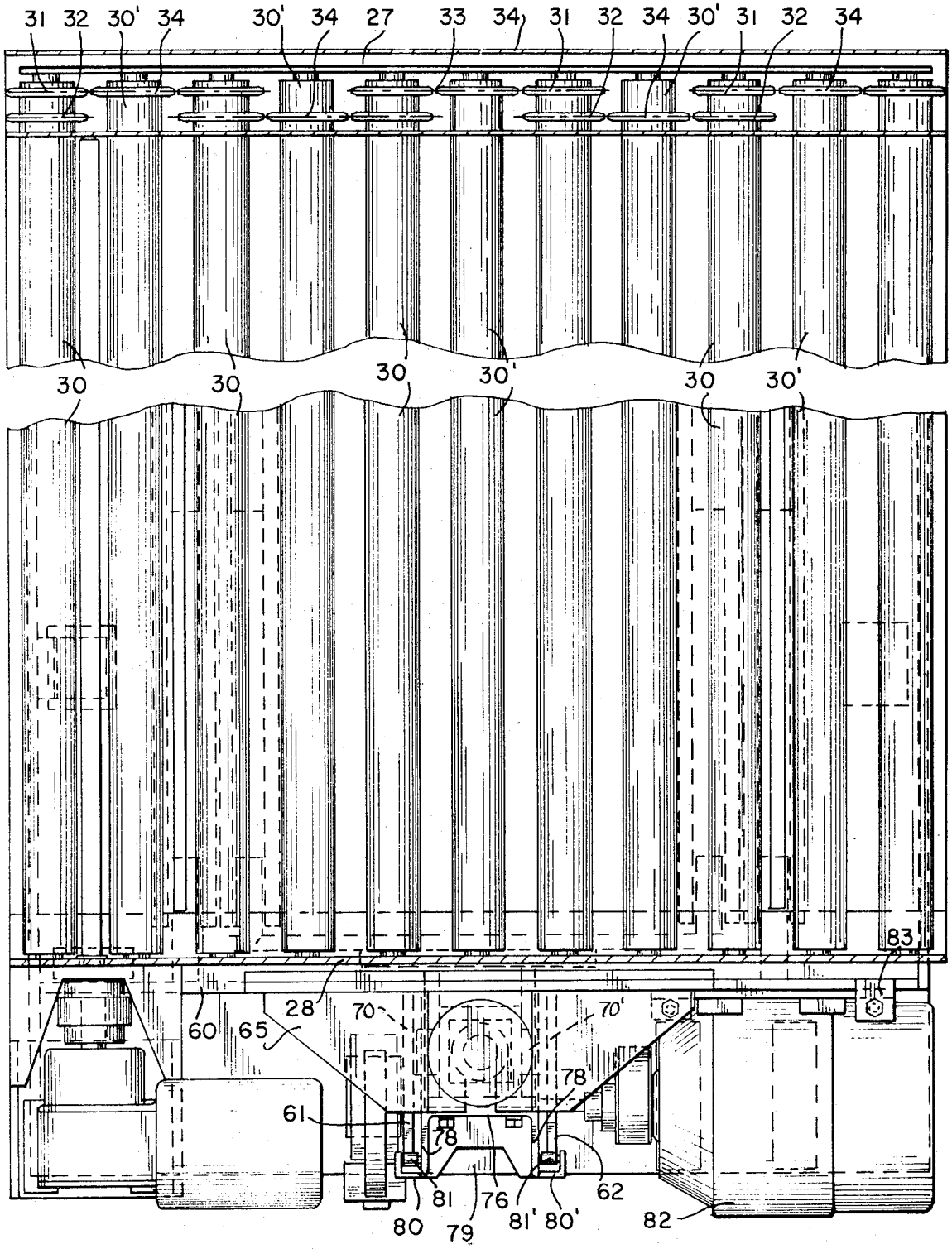


FIG. 3.

INVENTOR
VELIO S. BUCCICONE
BY Greist, Lockwood, Greenawalt & Dewey
ATT'YS.

FIG. 4

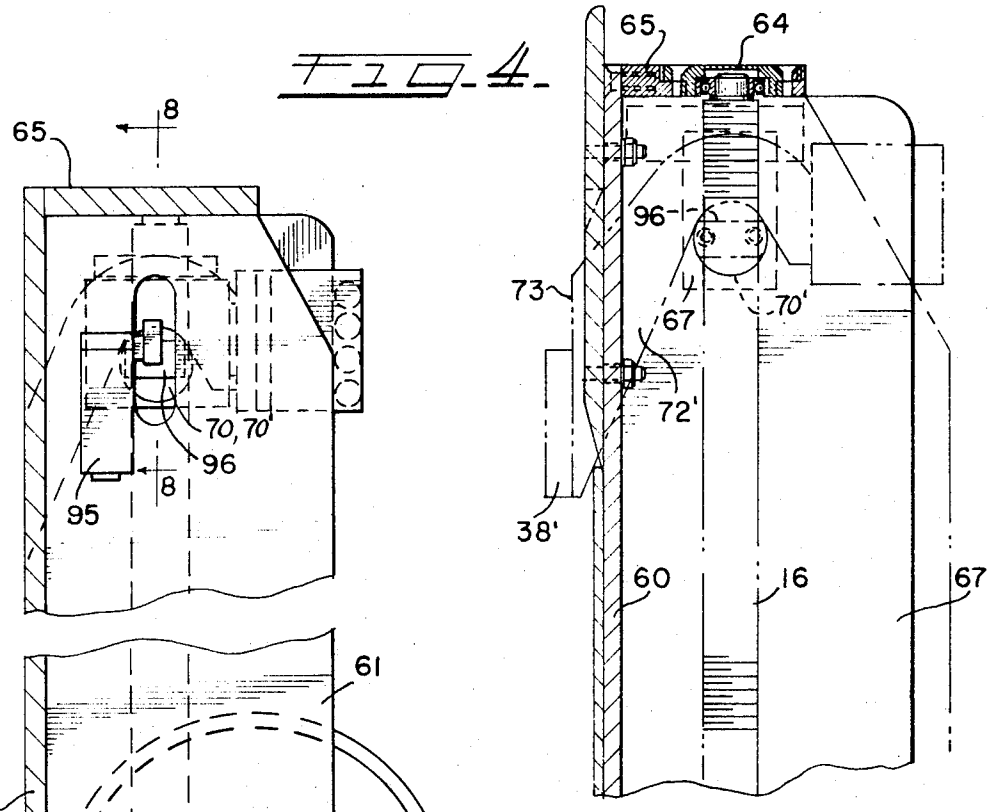


FIG. 5

INVENTOR
VELIO S. BUCCICONE
BY Dressler, Goldsmith, Clement & Gordon
ATT'YS.

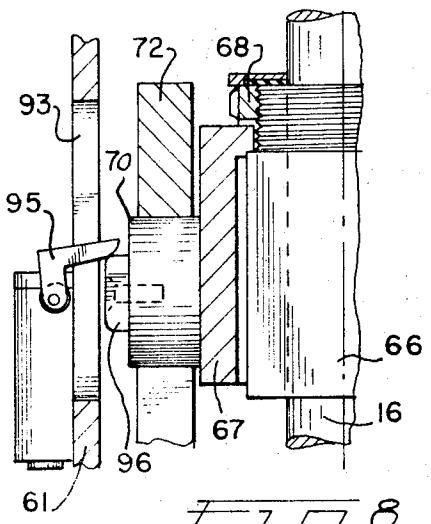


FIG. 8

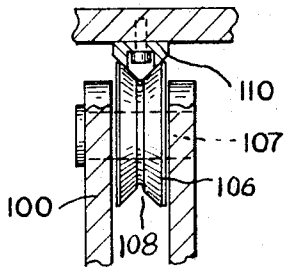


FIG. 9

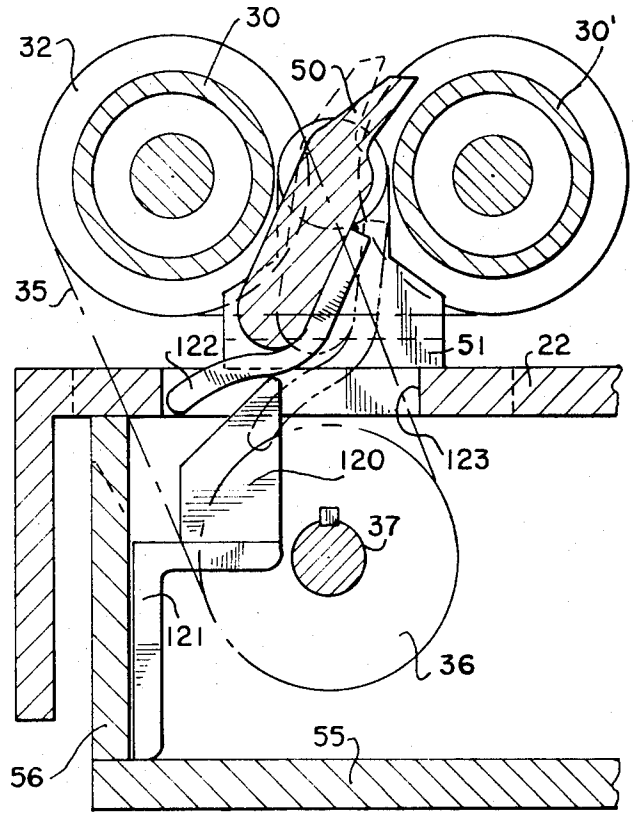


FIG. 7

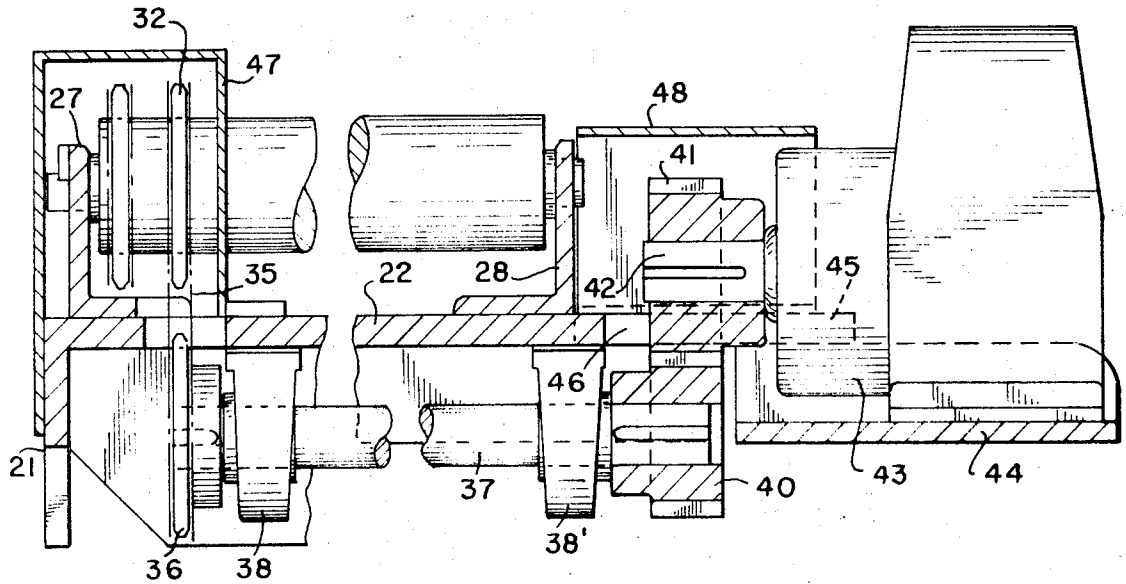


FIG. 6

INVENTOR
VELIO S. BUCCICONE
BY Dreist, Lockwood, Greenawalt & Dewey
ATT'YS.

SCISSORS-TYPE HOIST MECHANISM

This invention relates to apparatus for handling sheet materials and is more particularly concerned with improvements in a lift or hoist structure which is especially adapted for use in sheet piling operations for supporting a pile of metal sheets which are deposited thereon.

In the handling of metal sheets, apparatus has been developed for piling the sheets as they are advanced from an oscillating shear or the like by overhead magnetic conveyors which are operated to release the sheets for deposit in one or more piles with provision for stopping the advance of the sheets and guiding the same downwardly into a pile on a hoist or similar supporting structure. In some piling operations, it is desirable to provide a hoist arrangement on which the sheets can be piled or stacked with provision for adjusting the elevation of the top of the stack so that the distance a sheet must fall before coming to rest on the top of the stack may be maintained fairly constant by gradual lowering of the stack as the successive sheets are deposited thereon. Various types of hoist equipment have been used in prior piling machines. One such machine which employs a scissors-type hoist, is shown in Buccicone U.S. Pat. No. 3,369,675, dated Feb. 20, 1968. Experience with this machine has indicated that in some operations a simpler hoist construction would be advantageous particularly in the handling of sheets of lesser weight and/or size than those for which the hoist equipment in U.S. Pat. No. 3,369,675 has been designed. Accordingly, it is a general object of the present invention to provide a hoist construction suitable for use with a sheet piling machine which is relatively simple in design, which can be produced economically, and which will operate with a high degree of efficiency in handling sheets of relatively light weight and/or relatively small size.

It is a more specific object of the invention to provide a scissors-type hoist which is especially adapted for use in sheet piling or sheet stacking operations, which is of relatively light construction, which is easy to operate, which is economical to build and which has a high degree of stability when used for stacking relatively small, lightweight sheets.

It is a further object of the invention to provide a scissors-type hoist having a stack receiving frame which is mounted on a main support frame for vertical movement by means of a single lift screw and associated scissors-type arms, with the lift screw being mounted in an upright frame unit which forms a back stop or aligning surface for stacking sheets against it and with provisions for holding the stack against unintentional discharge by driven rollers on which the sheets are supported and which enable the stack, when desired, to be moved in a lateral direction from the hoist for transfer to another supporting means.

These and other objects and advantages of the invention will be apparent from a consideration of the hoist apparatus which is shown by way of illustration in the accompanying drawings wherein:

FIG. 1 is a side elevation of a hoist or lift apparatus which is especially adapted for use in connection with the stacking of metal sheets and which embodies therein the principal features of the invention;

FIG. 2 is an elevational view showing the end or side of the apparatus at which a power driven hoist screw and associated mechanism is mounted;

FIG. 3 is a plan view of the apparatus with portions broken away;

FIG. 4 is a partial vertical cross section, taken on the line 4—4 of FIG. 2, with portions broken away, and to an enlarged scale, the view showing the lift screw and associated mechanism;

FIG. 5 is a partial vertical sectional view, taken on the line 5—5 of FIG. 2, with portions broken away and to an enlarged scale;

FIG. 6 is a fragmentary sectional view taken on the line 6—6 of FIG. 2, to an enlarged scale and with portions broken away;

FIG. 7 is a fragmentary sectional view taken on the line 7—7 of FIG. 3, to an enlarged scale;

FIG. 8 is a fragmentary sectional view taken on the line 8—8 of FIG. 4, to an enlarged scale;

FIG. 9 is a fragmentary sectional view taken on the line 9—9 of FIG. 1, to an enlarged scale.

Referring to FIG. 1 particularly, the illustrated hoist structure comprises a base or support frame **10** having a horizontally disposed main frame portion **12**, of rectangular shape, and an upright frame portion **14** at one end in which a vertically disposed screw **16** is mounted for raising and lowering, by means of a connecting bracket and nut, a platform assembly **18** on which a plurality of sheets are adapted to be piled. The base frame **10** and the platform assembly **18** are vertically aligned and connected by a pair of laterally spaced, scissors-like arm assemblies **20** which collapse or fold when the platform assembly **18** is moved to its lowermost position on the base frame **10**.

The pile supporting platform or sheet supporting table assembly **18** includes a main frame **21** of rectangular shape corresponding approximately to the shape of the horizontally disposed portion **12** of the base frame structure **10** which frame **12** is mounted in vertically movable relation above the base frame portion **12**. The platform frame **21** includes a base or bottom plate **22** on the bottom face of which there are depending side plates **23, 24** (FIG. 2) and dependent end plates **25, 26** (FIGS. 1 and 2). A pair of angle members **27, 28** are mounted along the margins of the base plate **22** which form parallel, spaced bearing supports for a plurality of parallel pile supporting rollers **30**. The rollers **30** are arranged in parallel, closely spaced relation so as to provide a supporting table for the sheets. Alternately spaced rollers **30** carry at their outer ends sprockets **31** and **32** which are connected in driving relation by chains **33**. Sprockets **34** are provided on certain of the rollers indicated at **30'**, which are driven by the chains **33** connecting the sprockets **31, 32** on the adjacent rollers. The sprocket **32** on the one endmost roller **30** is connected in driving relation by a chain **35** (FIGS. **6** and **7**) with a sprocket **36** on the end of a drive shaft **37**. The drive shaft **37** is mounted in bearings **38, 38'** at one end or side of the platform main frame **21**. The drive shaft **37** carries at its opposite end a gear **40** which engages with gear **41** on the output shaft **42** of a drive motor **43**. The drive motor **43** is supported on a bracket or platform extension **44** at the end of the platform assembly **18**, the bracket **44** being attached to an extended portion **45** of the base plate **22** which is notched out at **46** to accommodate the gear **41**. The gear and chain drive at the free end of the platform assembly **18** is provided with a cover member **47** while a cover member or guard **48** is provided for the gears **40** and **41**.

At one side of the platform assembly **18** a guard or stop plate **50** (FIGS. **2** and **7**) is disposed between the two endmost rollers **30, 30'** which plate member **50** is pivotally supported at its opposite ends by an angle bracket **51** (FIG. **1**) and the roller supporting angle member **28**. The plate **50** is of generally rectangular shape and is pivotally supported offcenter so that it is normally biased by its own weight into a vertical plane where the top margin acts as a stop for the bottom sheets in a pile which is accumulated on the top of rollers **30, 30'** and provision is made for automatically swinging the plate **50** out of stop forming position when the platform **18** is dropped to its lowermost position as hereinafter described. The stop plate **50** may, of course, be of different cross sectional configuration and weighted or counterbalanced to normally swing into the desired position in a vertical plane when the platform **18** is raised.

The main base or supporting frame **10** comprises a bottom or base plate **55** and upstanding side plates **56, 57** with a cross plate **58** at the end opposite the upright frame portion **14**. The end frame **14** in which the vertical screw **16** is mounted comprises a vertically disposed base or back plate **60** which is set inwardly of the end or edge of the bottom frame plate **55** as shown in FIGS. **1** and **4**. Two parallel, laterally spaced plates **61** and **62** (FIGS. **1** to **4**) are mounted on the outer face of the vertical frame plate **60** which form with a center portion of the back plate **60** an outwardly opening housing for the screw **16** which extends upwardly from a right angle gear assembly **63** (FIGS. **2** and **4**). The gear drive assembly **63** is mounted on the bottom frame plate **55** with the top end of the screw **16** being supported in a bearing assembly **64** mounted in a top plate **65** which extends from the outer face of the vertical back plate **60** parallel with the marginal portion of the bottom plate **55**. A hoist nut **66** is carried in threaded relation on the vertically disposed screw **16** and a nut housing **67** encompasses the same. The housing **67** is secured thereon by a nut **68** on an exteriorly threaded extension on the top of the hoist nut **66**. The nut housing **67** has cylindrical bearing members **70, 70'** (FIGS. **1, 3, 4** and **8**) extending from the exterior surfaces of oppositely disposed side walls for receiving thereon parallel arms or plate members **72, 72'** of a bracket assembly **73** which extends from the side plate **38'** of the main frame **21** of the platform assembly **18** and serves to connect the latter for vertical movement with the hoist nut **66**. A guide roller assembly **75** is secured on the outer ends of the hook-shaped plate members **72, 72'** of the bracket **73**. The guide roller assembly **75**, which also serves to relieve the tilting stress on the nut **66**, comprises a generally U-shaped frame member **76** having a bight forming plate portion **76'** (FIG. **4**) attached to a mounting plate **77** which is in turn attached to the ends of the plate members **72, 72'**. The parallel legs **78, 78'** of frame member **76** extend outwardly in generally parallel relation adjacent the frame plates **61** and **62** and are connected by a cross brace or reinforcing plate **79**. Each of the legs **78, 78'** has a section of angle bar **80, 80'** mounted on the oppositely disposed, outside margins so that the one leg or flange thereof will cooperate with the marginal portions of the legs **78, 78'** in providing bearings for a plurality of anti-friction rollers **81, 81'** which are adapted to ride on the outside edges **61'** and **62'** of the parallel, vertical frame plates **61** and **62**.

A drive motor **82** (FIGS. **1** to **3**) is mounted by means of bracket **83** on the back plate **60** with an output shaft **84** carrying a pulley **85** which is connected by a drive belt **86** with a pulley **87** on the drive shaft **88**. The drive shaft **88** is connected by coupling **88'** to the input shaft **89** for the right angle gear box **63** which has an associated brake assembly **90**. The drive shaft **88** is mounted in suitable bearings **91** on the bottom plate **55**.

The one vertically disposed frame plate **61** is slotted at **92** and **93** (FIG. **5**) and limit switches **94** and **95** are mounted thereon with their operating arms extending through the slots **92** and **93** in the path of an operating shoe **96** carried on the side wall of the nut housing **67**. The limit switches **94** and **95** are connected into the electrical control circuit for the drive motor **82** so as to limit the movement of the platform assembly **18**.

The scissors arm assemblies **20** (FIGS. **1, 3** and **9**) which connect the platform assembly **18** and the base frame **10** are identical and each of these assemblies comprises two arm members **100, 101** which are connected intermediate their ends by a pivot **102**. Each of the arm members **100, 101** is fabricated of two plate or bar members **103, 103'** arranged in parallel relation and separated by suitable spacers or connectors which permit interleaving when the arm members are pivoted to a collapsed position. The one arm member **100** is pivotally connected at one end by pivot **104** to a bracket **105** secured on the bottom frame **10** at the base of the end frame **14**. A roller member **106** is mounted on a pivot **107** at the other end of the arm **100** which has a grooved periphery **108** for riding on a track **110** on a bearing plate **110'** which is secured on the bottom face of the platform plate **22**. The associated arm **101** is connected at the one end by pivot **111** to a bracket **112** secured on the bottom face of platform plate **22** adjacent the side frame member **38'**. A roller member **113** is mounted on a pivot **114** at the other end of arm **101** which rides on a track plate **115** mounted on the bottom frame plate **55**, the construction of roller member **113** and bearing or track plate member **115** being the same as roller member **106** and track plate member **110**. The two arm assemblies illustrated are spaced laterally of the base frame **10** and the platform assemblies **18** as shown and co-operate in supporting and maintaining the platform assembly **18** in a level position as it is raised and lowered by operation of the lift screw **16**.

The base or bottom frame **10** has a cam member **120** and supporting bracket **121** (FIGS. **1** and **7**) mounted on the side plate **56** which cam member **120** is in the path of a co-operating cam member **122** on the pivoted guard or stop rail **50** so as to swing the pile stop member **50** to an inoperative position as shown in solid line in FIG. **7** when the platform assembly is dropped to its lowermost position on the bottom frame **10**. The platform plate member **22** is apertured at **123** to accommodate the cam members **120** and **122**.

The vertical frame plate **60** is provided with a bumper stop forming plate member **125** (FIG. **1**) for engagement by the leading edges of the sheets when the hoist is used in a sheet piling operation where the sheets are deposited thereon by an overhead conveyor.

The use of the hoist or lift apparatus will be apparent from the foregoing description. The platform assembly **18** is raised or lowered as desired by operation of the

lift screw **16**. The limit switches **94** and **95** serve as safety devices to prevent damage to the apparatus. The driven rollers **30**, **30'** permit ready transfer of the pile from the apparatus when the platform assembly **18** is lowered onto the base frame **10**. The drive motors **43** and **82** may, of course, be operated through a suitable electric circuit controlling the current supplied to the same.

I claim:

1. A scissors-type hoist mechanism comprising a generally rectangular base support frame adapted to be positioned in a generally horizontal plane, an upright end support frame at one side of said base support frame, a single power driven, vertically disposed, lift screw mounted in said end support frame, a sheet supporting platform assembly disposed for movement in a vertical path above said base support frame, a nut carried on said lift screw which is driven in a vertical path by rotation of said lift screw, a housing encompassing said nut, said nut housing having laterally extending bearing forming means on oppositely disposed walls, a hook-shaped bracket on said platform assembly which extends at the side adjoining said lift screw, said bracket having a downwardly opening recessed bottom edge adapted to seat on said bearing forming means so as to detachably connect said bracket to said nut housing for movement therewith, a pair of scissors-like arm assemblies connecting said platform assembly and said base support frame for holding said platform assembly in a plane generally parallel with the plane of said base support frame during movement of said platform assembly, said platform assembly having a plurality of sheet supporting rollers thereon and power means carried on said platform assembly for driving said rollers so as to enable sheets thereon to be discharged from said platform assembly.

2. A scissors-type hoist mechanism adapted for use in supporting a pile of metal sheets which are dropped thereon by an overhead conveyor in a sheet piling machine, said hoist mechanism comprising a generally rectangular base support frame, an upright end support frame at one side of said base support frame, a single power driven, vertically disposed, lift screw mounted in said end support frame, a sheet supporting platform assembly disposed for vertical reciprocating movement above said base support frame, a lift nut carried on said lift screw which is driven by rotation of said lift screw, a hook-shaped bracket on said platform assembly which extends at the side adjoining said lift screw and is detachably connected to said lift nut for movement in a vertical path, said lift nut having a housing secured thereon with laterally extending bearing members, said hook-shaped bracket comprising parallel, spaced, vertically disposed plate members with recesses in their lower edges in which said bearing forming members are seated, a pair of scissors-like arm assemblies connecting said platform assembly and said base support frame for holding said platform assembly in a plane generally parallel with the plane of said base support frame during vertical movement of said platform assembly, said platform assembly having a plurality of sheet supporting rollers thereon and power means for driving said rollers so as to enable sheets thereon to be discharged from said platform assembly in a direction laterally of said end support frame.

3. A scissors-type hoist mechanism as set forth in claim **1** wherein said upright support frame has vertically disposed truck-forming members adjacent opposite sides of said lift screw housing and said hook-shaped bracket has a carriage forming frame mounted on the extended end thereof with laterally spaced anti-friction means which are positioned to engage and ride on said track forming members so as to hold said platform against twisting movement as it traverses a vertical path.

4. A scissors-type hoist mechanism as set forth in claim **1** wherein said end support frame includes parallel plate members mounted on opposite sides of said lift screw and having parallel track-forming outer edges extending along said screw, and said hook-shaped bracket comprising parallel end plate members with hook forming outer ends which seat on said bearing forming means and carriage forming means on the ends of said plate members having anti-friction rollers disposed to ride on the track-forming edges of said frame plate members so as to relieve the stress on said lift nut and lift screw resulting from the weight of said platform assembly.

5. A scissors-type hoist mechanism as set forth in claim **2** and said end support frame having a vertically disposed bumper pad mounted on the inside face thereof adjacent the top end so as to form a stop member for engagement by the leading ends of sheets which have a forward momentum when released from a conveyor for deposit on said platform assembly.

6. A scissors-type hoist mechanism for supporting sheets in a pile thereon which mechanism comprises a generally rectangular, horizontally disposed base support frame, an upright end support frame at one side of said base support frame, a power driven, vertically disposed lift screw mounted in said end support frame, a sheet supporting platform assembly disposed for movement in a vertical path above said base support frame, a nut carried on said lift screw which is driven in a vertical path by rotation of said lift screw, a housing carried on said nut, said nut housing having laterally extending cylindrical bearing members on opposite faces thereof, a hook-shaped bracket on said platform assembly which extends at the side adjoining said lift screw, said hook-shaped bracket having laterally spaced, parallel, side plate members which are recessed on the bottom to fit over said bearing members and detachably connect said bracket to said nut housing for vertical movement therewith, scissors-like arm assemblies disposed in spaced vertical planes and connecting said platform assembly and said base support frame for holding said platform assembly in a plane generally parallel with the plane of said base support frame during vertical movement of said platform assembly, said platform assembly having a plurality of sheet supporting rollers mounted thereon and power means carried on said platform assembly for driving said rollers in a direction to discharge sheets thereon at one side of said platform assembly.

7. A scissors-type hoist mechanism as set forth in claim **6** wherein said platform assembly includes a stop member disposed at the discharge side of said platform for normally preventing removal of sheets thereon by rotation of said sheet supporting rollers, which stop member comprises an elongate bar member mounted

for swinging movement on end pivots, means causing said bar member to swing to a position where the topmost edge normally extends above the plane of the sheet supporting top face of said platform assembly, and wherein a cam forming bracket is provided on said base support frame for biasing said bar member to an inoperative position where the topmost edge is ineffective as a stop member when said platform assembly is disposed in the lowermost position.

8. A scissors-type hoist as set forth in claim 6 wherein said platform assembly is provided with a stop member comprising an elongate bar which is pivotally mounted at its opposite ends along the discharge side of said platform assembly and said stop bar is balanced on its pivot mounting so that it normally pivots to a position where the top margin projects above the plane of the top face of said platform assembly, and wherein said base support frame has a cam forming member thereon which is disposed to engage said bar when said platform assembly is lowered to a position adjacent said base support frame and pivot the same from its normal operative position to an inoperative position where the top margin is below the plane of the top face of the said platform assembly.

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