April 18, 1944. W. G. SHACKELFORD ET AL 2,346,948

ROLL LIFT STAND

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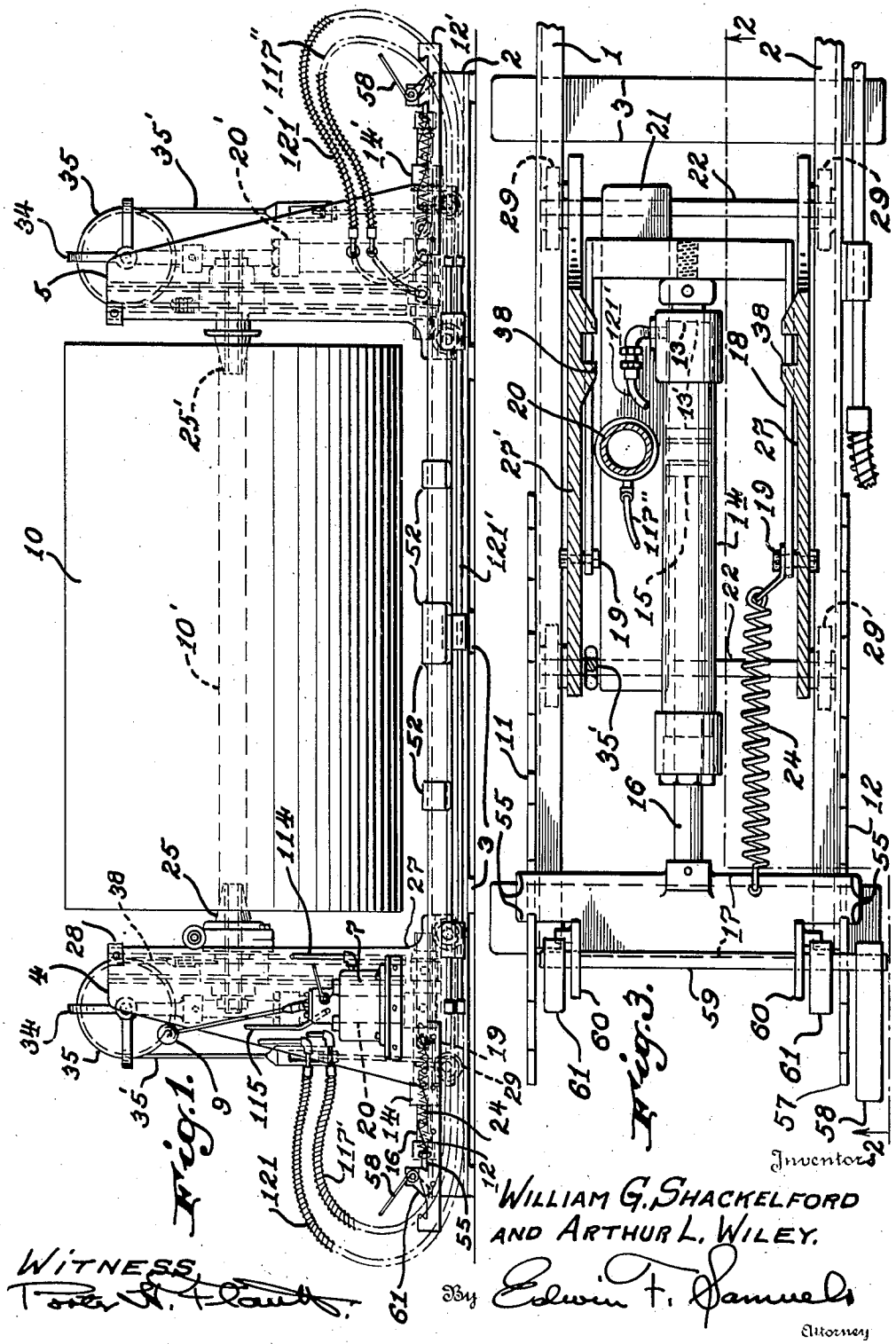


Fig. 1.

Fig. 3.

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ROLL LIFT STAND

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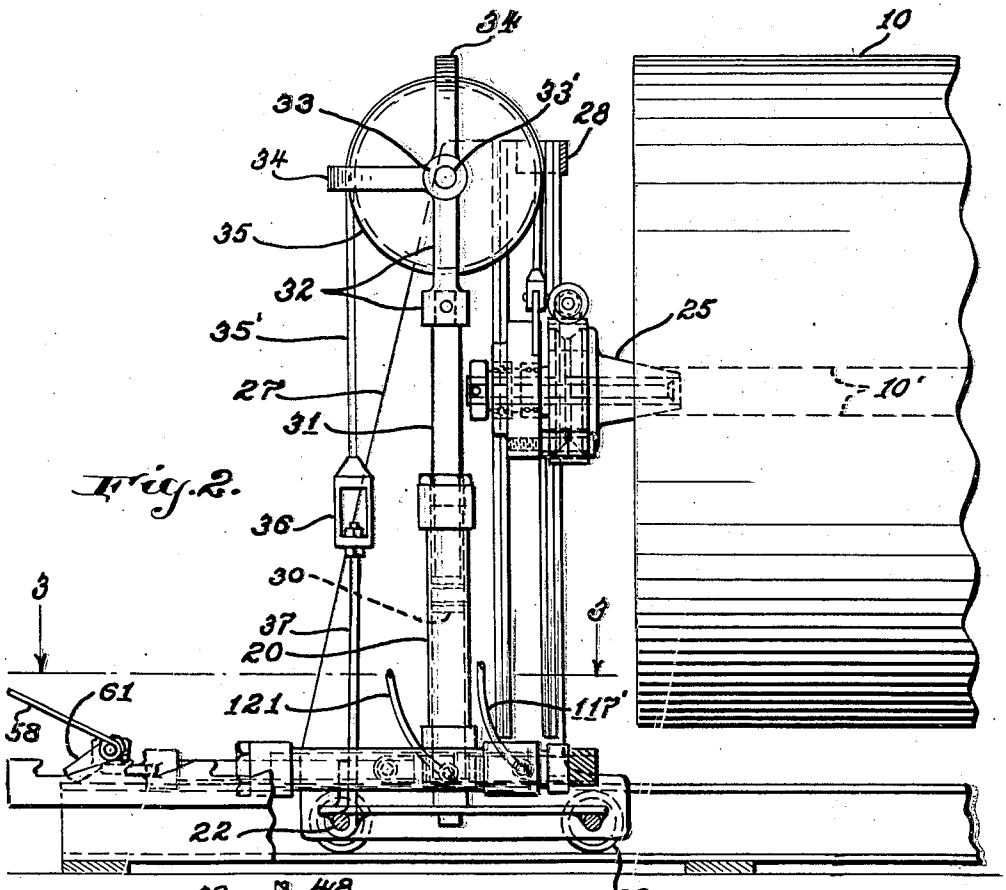


Fig. 2.

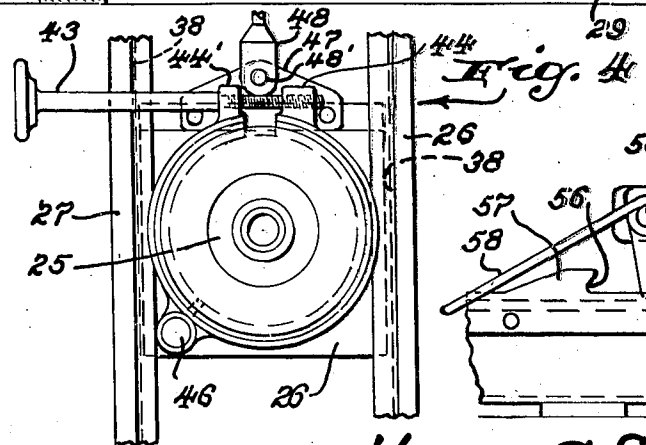


Fig. 4

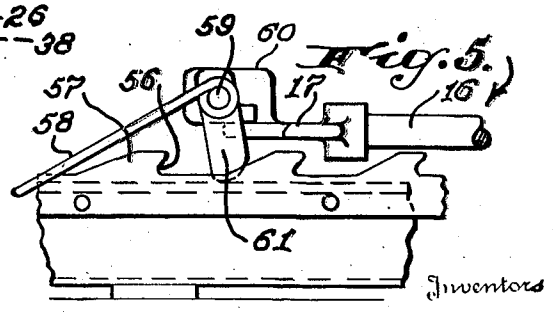


Fig. 5.

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ROLL LIFT STAND

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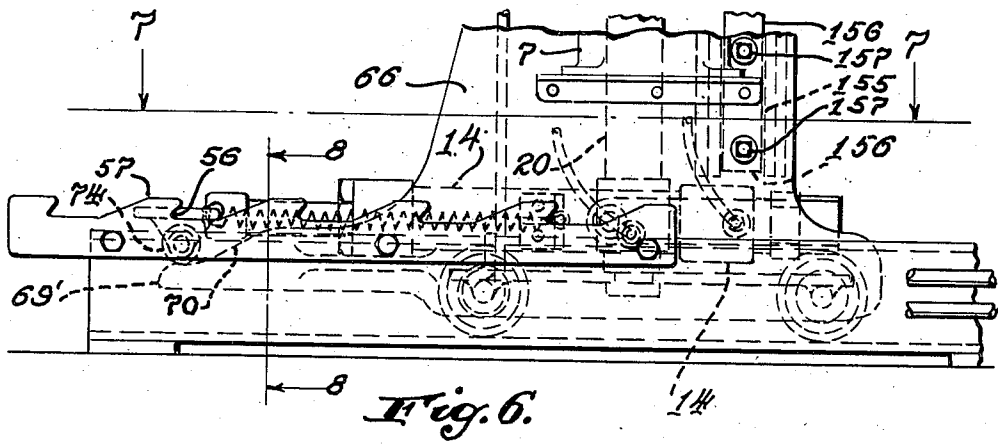


Fig. 6.

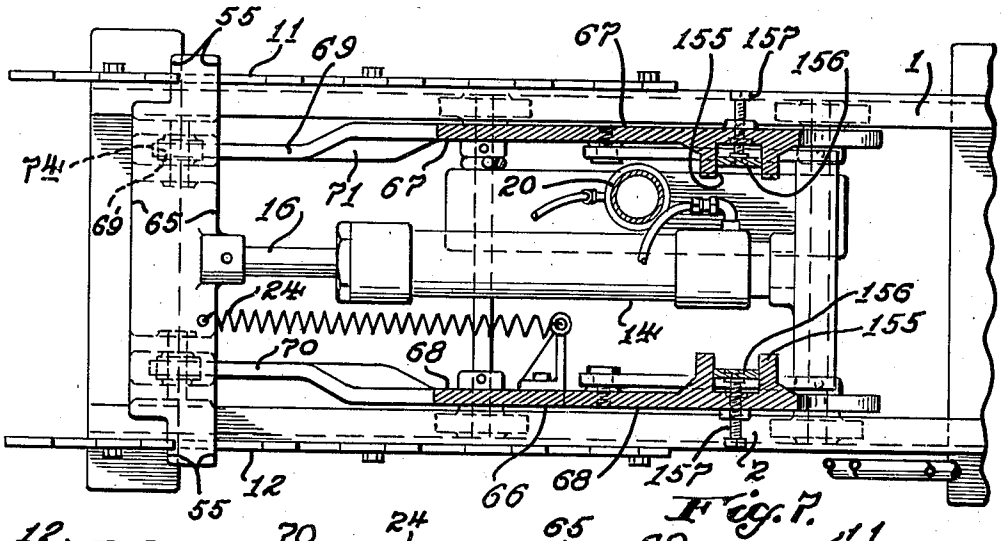


Fig. 7.

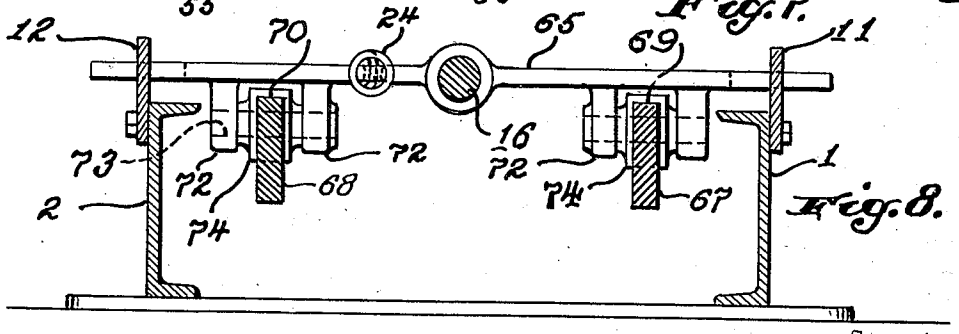


Fig. 8.

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ROLL LIFT STAND

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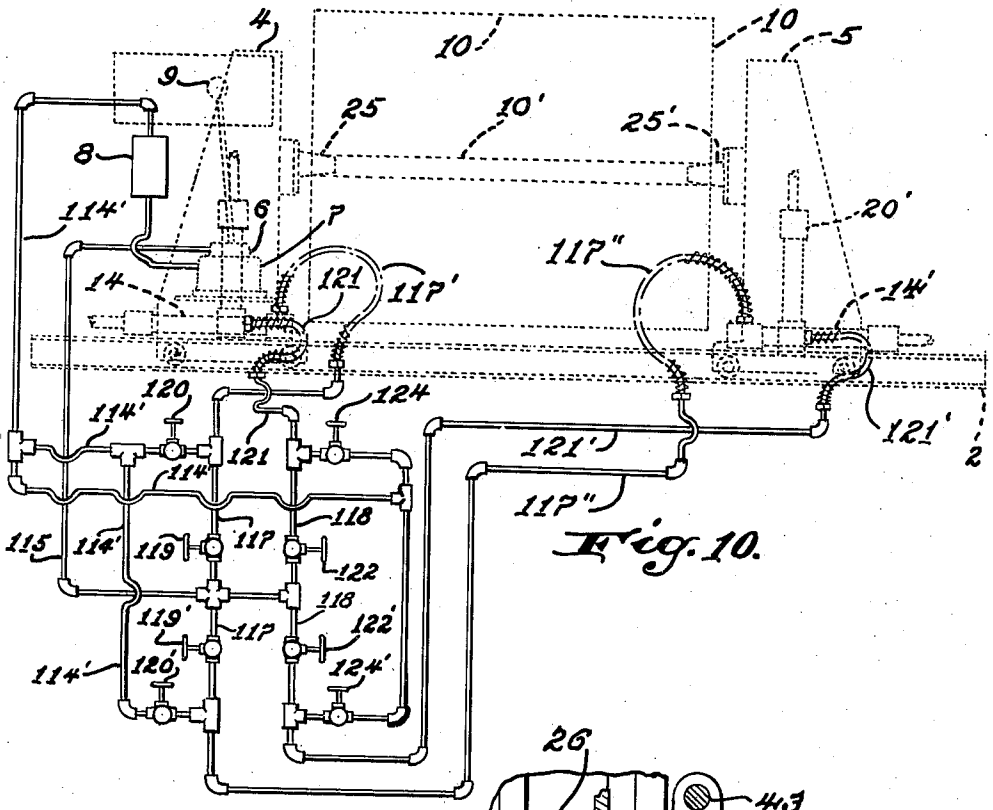


Fig. 10.

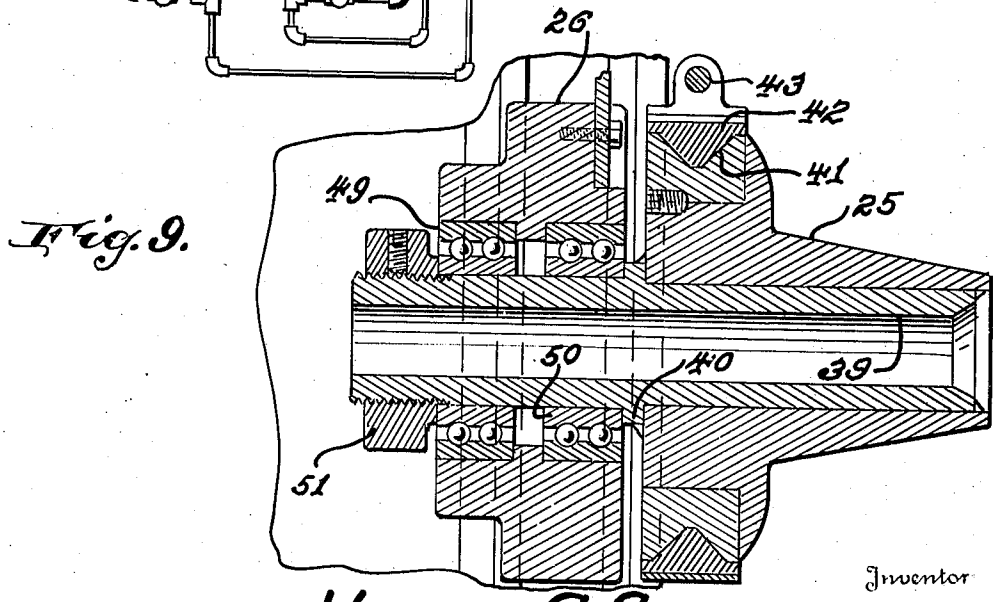


Fig. 9.

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ROLL LIFT STAND

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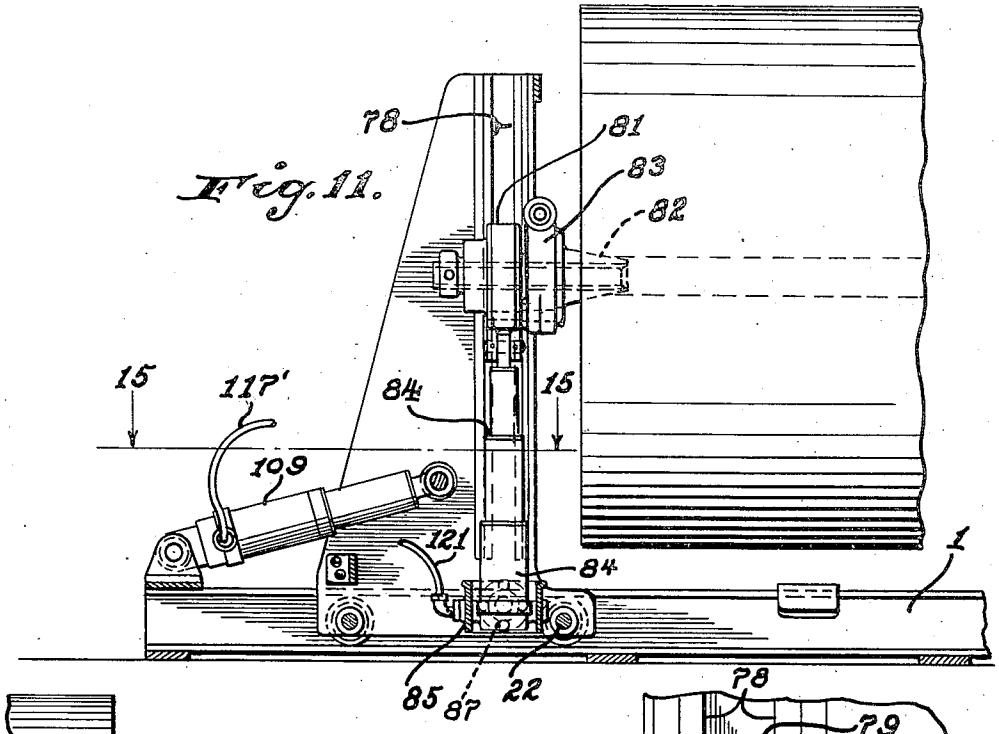


Fig. 11.

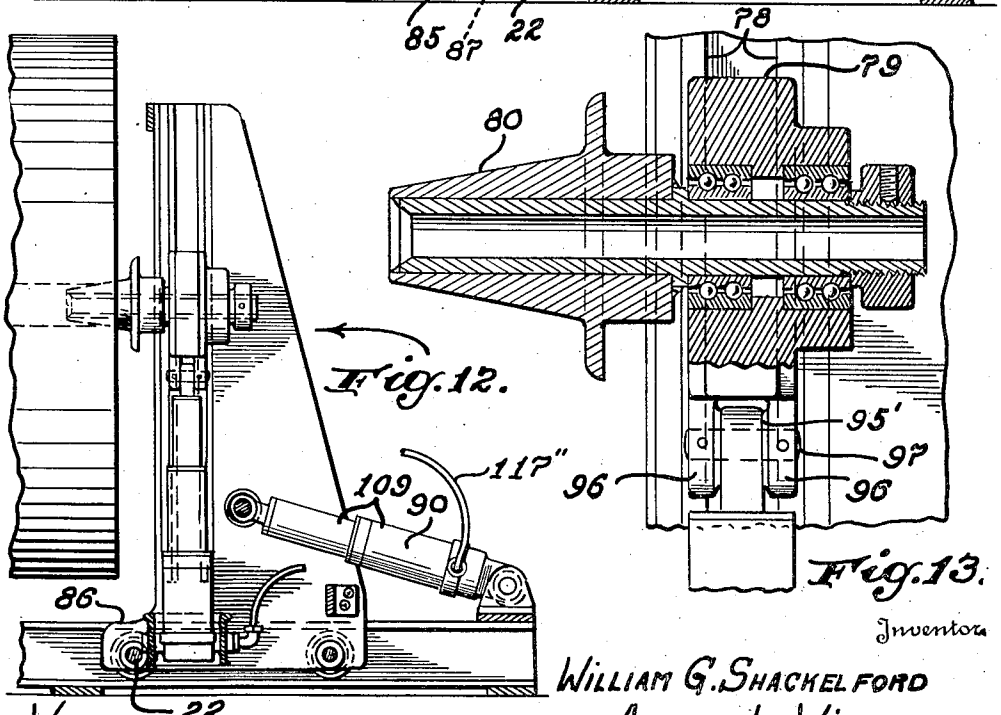


Fig. 12.

Fig. 13.

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ROLL LIFT STAND

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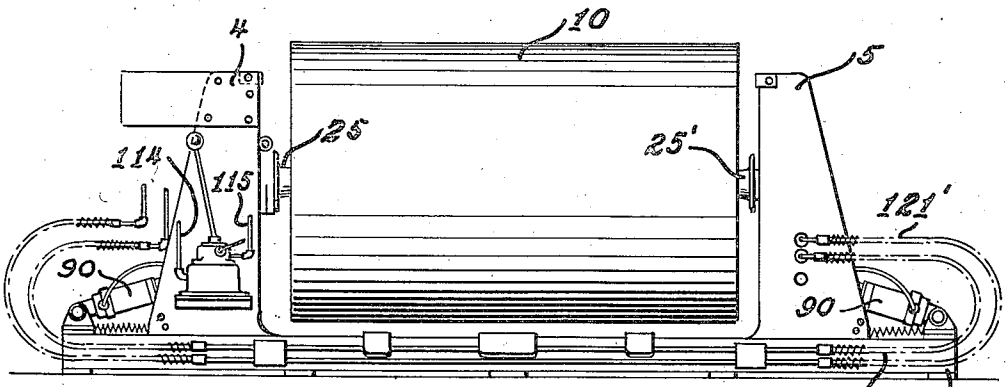


Fig. 14.

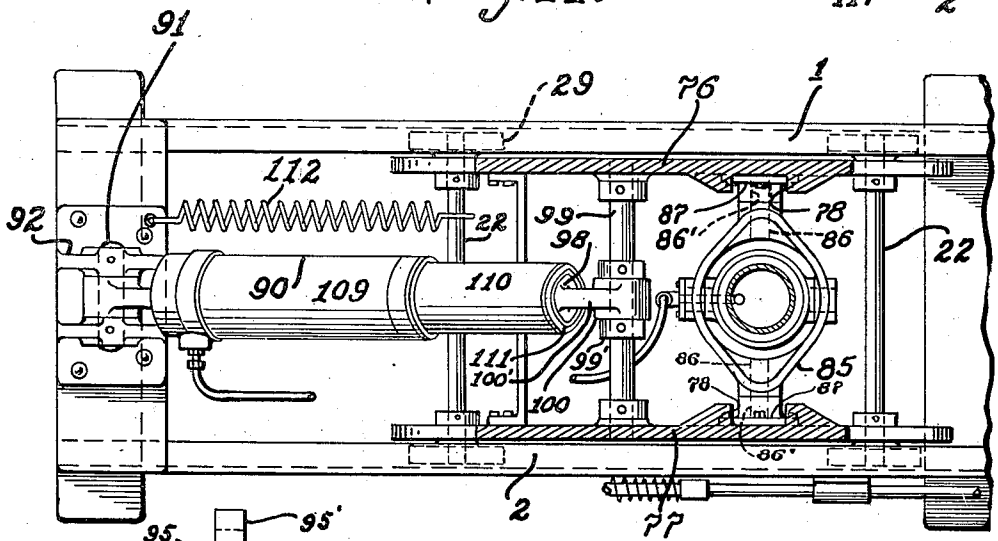


Fig. 15.

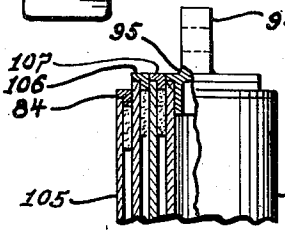
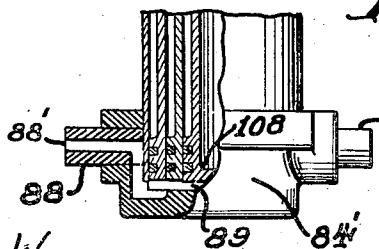


Fig. 16.



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ROLL LIFT STAND

Filed Feb. 4, 1942 7 Sheets-Sheet 7

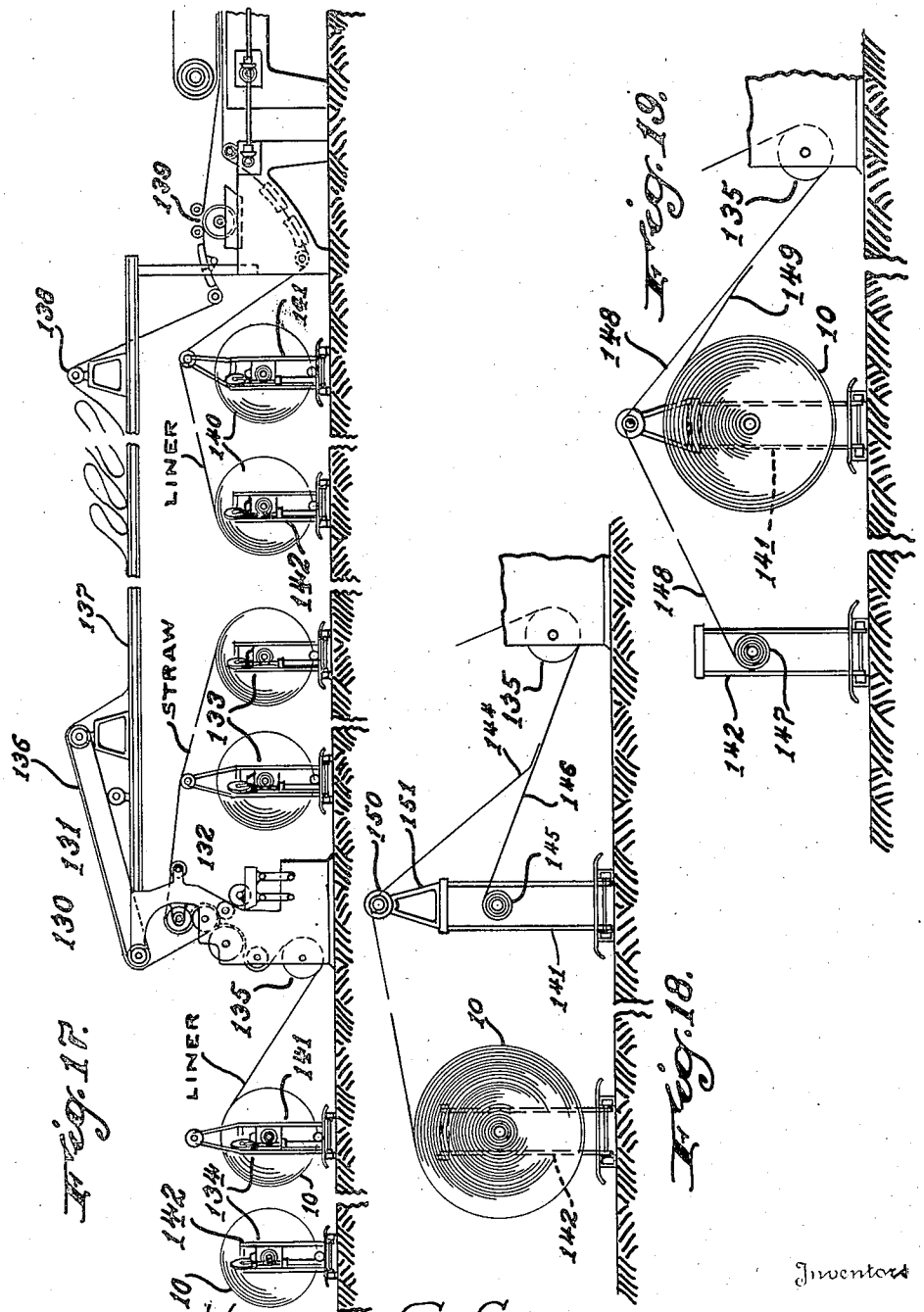


Fig. 17.

Fig. 18.

Fig. 19.

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Patented Apr. 18, 1944 2,346,948

UNITED STATES PATENT OFFICE

2,346,948

ROLL LIFT STAND

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Application February 4, 1942, Serial No. 429,558

28 Claims. (Cl. 242—58)

The invention relates to a roll lift stand for use as an element of a corrugating machine in the production of corrugated paper board.

The full rolls used in these machines may have a weight of approximately three tons and in the operation of the machine such rolls have been mounted on and unrolled or fed from a heavy shaft, which may weigh in the vicinity of 200 pounds. In the operation of the prior roll lift stands for this purpose the roll centering and controlling mechanism is assembled on the shaft after it is inserted in the roll and the rolls are lifted to feeding position on the stand by screws, levers, and/or the like which require a large force of attendants with tools which are frequently mislaid.

In the practice of the present invention, the heavy shafts are eliminated, the rolls being let off from centering members inserted in the axially placed holes in the ends of the rolls by hydraulic pressure. In the improved machine, the centering members are not only advanced into engagement with the rolls but raised in lifting the rolls by hydraulic means.

While hydraulic lifting of the rolls and hydraulic advancement of the cones or other suitable centering members has been known in the handling of various coils and printing paper rolls for a considerable period, the hydraulic features as thus employed are combined with various complicated mechanical devices and are in other ways unsuited to the purposes of this invention. No one of the prior machines is believed to be adapted to satisfactory use as a roll stand in connection with a corrugating machine in the manufacture of corrugated paper or corrugated board.

The following disclosure includes the details of a unit for handling a single roll. The complete roll stand for use in the corrugated paper art is normally adapted to the support and handling of a plurality of rolls, one of which is a spare roll, the other being connected to the web which is being run through the machine, the units being arranged in tandem. This arrangement is shown diagrammatically in connection with a diagrammatic illustration of a corrugation machine.

In operation, the web from the more remote unit of the roll stand is led upwardly and over the unit nearer the machine so that the web from the nearby stand is applied from beneath in splicing, the web from the remote stand being spliced or applied from above.

The invention relates to the adaptation of hydraulic principles to the production of a roll stand which is satisfactory for use as an element of a corrugating machine.

Further improvements include the provision of a hydraulic lift arranged and adapted to present for feeding to the machine to better advantage than heretofore either rolls of full diameter, i. e., a three ton or six thousand pound roll or rolls which are partially used and of small diameter, accomplishing this and other changes without tools and instantaneously.

It is regarded as an important accomplishment of the invention that the improved machine rests on the floor being all above the floor level, thus not requiring a pit or other provisions for extending the lifting appliance below the floor on which the machine stands. This improved construction and arrangement is of importance in that it provides for convenient shifting and rearrangement of the machines in a plant, including the roll stands, and places the various elements in accessible position for adjustment, lubrication and repair.

It is also an accomplishment of the invention that ample adjustment and cone motion in an axial direction to adapt the machine to a wide range of width or axial length of the roll and for web alignment purposes is provided in a machine which occupies comparatively little floor space or width in the direction of the roll axis.

The hydraulic units employed are of the cylinder and piston type and to best advantage single acting, either the cylinder member or the piston member being connected to a slidable element of the stand, the other said member being connected to a back thrust base, the respective points of connection being herein referred to as the opposite ends of the hydraulic element.

When it is desired to remove a partly used roll, as in changing the product of the previously existing corrugators, such partly used roll may be replaced by a full roll of paper required for the new operation, the change being accomplished in about one half a minute, the cones in this operation requiring a relatively long vertical shift; on the other hand, the improved operation requires only about fifteen seconds to replace a used roll with a full roll of the same size. The reduced effort and improved conditions in changing rolls and the reduction of the space required, effect a net saving of great importance as compared with the cost of maintaining operating and housing corrugating machines and roll stands, according to the existing practice.

In order to attain the desired lift to accommodate the largest diameter roll and at the same time to make it possible to pick up a small diameter roll which may have been reduced by being in a considerable proportion consumed, it has been found necessary to multiply or increase the motion resulting from the normal stroke of the piston in a single hydraulic cylinder. This has been done, in one instance by applying the motion of the piston, or cylinder, to a pulley which carries a cable, one end of

which is anchored, the other end of the cable being connected to a suitable sliding block or other support for a cone or other roll center to be lifted, in centering and aligning the web. In this way the cones or centers are brought down to or near the floor to engage a small roll and raised to a considerable heighth suitable to engage the largest roll when supported on the level of the dolly, and to lift the roll, the motion being increased or multiplied relatively to the length of the hydraulic cylinder employed, which is thus permitted to be comparatively short and need not be extended below the floor.

To give the desired horizontal adjustment to accommodate rolls of different axial length, the piston, for example, engages at one end of a movable thrust base which may be mounted on a horizontal toothed rack or other locking support, the cylinder being connected to an upright sliding frame or head which carries the roll centers or cones. In the form shown, a spring is arranged to collapse the cylinder space drawing the base up to the frame when the release is opened. Thus, the hydraulic pressure can be applied merely to insert the cone, the upright frames or heads being freely shifted by hand to conform to the length of the roll. The thrust base is automatically engaged with the rack as soon as the hydraulic thrust is applied, being released automatically or by a foot lever for the purpose of shifting the upright frame or head to adjusted position.

Another method of extending or increasing the motion obtained from the hydraulic element to exceed the stroke of the pistons in a cylinder of a suitable length as above defined, without employing the pulley and cable to multiply the motion due to the piston stroke and without the shiftable feature of the thrust base as above outlined, is by employing in either or both capacities, i. e., to attain the desired horizontal and vertical motions of the roll centers or cones, a telescoping hydraulic device for extending the hydraulic piston stroke automatically up to a predetermined limit; the amount of extension being, as in the other form, determined by the opening of a control valve.

To this end the applicant provides a telescoping device composed of two or a series of short cylinders, one within the other, the cylinders used in lifting being of suitable length, i. e., sufficiently short to give the desired low point of engagement to pick up a small diameter roll and where fully extended giving a high point of engagement to register with and lift a large full roll suitably supported on the level with a truck or dolly. In other words, the cylinder must be of a length less than the diameter of the small roll plus the height of the dolly which may be three to six inches. The stroke of the piston in such a cylinder would not reach to the height of the center of a full roll when thus supported, or serve to lift the roll. By the improvement referred to the desired result is accomplished.

The horizontal adjustment and the thrust engagement of the cones are achieved hydraulically by extending the piston stroke of a short cylinder by means of one or more additional cylinders telescoped therewith. In this way a stationary thrust base may be used or employed at the same time avoiding the use of an extremely long horizontal cylinder which tends to give excess width of the machine and dispensing with the rack and lock.

In the accompanying drawings, we have illustrated a machine of the invention in forms representing the variations above outlined.

In the drawings:

Fig. 1 is a front elevation of a single roll lift stand element embodying the invention and including the pulley suspension above outlined,

Fig. 2 is an enlarged sectional elevational of a fragmentary nature, showing the left hand upright frame or lifting head the same being taken from line **2—2**, in Figure 3, looking away from the observer,

Fig. 3 is a horizontal section looking downwardly from the line **3—3** in Fig. 2,

Fig. 4 is a detail view in the nature of an elevation of the sliding block carrying the cone or center above set forth, as used in the type of machine Figs. 1, 2 and 3, the brake also being included, the view being taken from the right in Fig. 2,

Fig. 5 is a fragmentary elevation of the foot lever type of thrust base release,

Fig. 6 is a fragmentary elevation corresponding to Fig. 2, showing an automatic release of the thrust base,

Fig. 7 is a section looking downwardly from the line **7—7** in Fig. 6,

Fig. 8 is a vertical section on the lines **8—8** in Fig. 6, looking to the left in said figure,

Fig. 9 is a vertical section through a cone or roll center of the type used in this machine, being particularly adapted to suspension as in Figs. 1 and 2, the same including the bearings and brakes and vertically sliding block or carrier on which the cone is mounted,

Fig. 10 is a diagrammatic view illustrating an arrangement of pipes, tubes and valves suitable to the operation of either type of hydraulic roll lift stand, a separate control being necessary for each lifting element comprising a complete stand for a spare roll and a roll being consumed.

Fig. 11 is a fragmentary elevation showing the left end of a roll lift stand element having the telescoping hydraulic device referred to for both lifting and horizontal adjustment and thrust,

Fig. 12 is a fragmentary view of the left hand end of this roll lift stand element,

Fig. 13 is a vertical section through the slide block or carrier, also showing cone or center and the manner of supporting the same on the lifting piston or cylinder,

Fig. 14 is a front elevation of a complete roll lift stand element of the kind shown in Figs. 11 and 12,

Fig. 15 is a section looking downwardly from the line **15—15** in Fig. 11,

Fig. 16 is an elevation broken away to show a section of the upright cylinder and telescoping device,

Fig. 17 is a diagrammatic view of a corrugator shown in side elevation and equipped with the roll lift stands necessary in making double face corrugated board,

Fig. 18 shows the method of splicing the roll from the remote roll stand unit, and

Fig. 19 shows the method of splicing the web from the nearby roll stand.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the several forms of the invention referred to will be described in detail in order that the practice of the invention may be understood.

The construction shown in Figs. 1 to 5 and Fig. 9 is a single roll lift stand unit. In the form shown, it comprises a base consisting of parallel

front and rear channels 1 and 2 of a length corresponding approximately to the overall width of the machine as shown in Fig. 1. These channels, as shown, have their flanges turned inwardly and they are in the form shown connected together by transverse bottom plates or strips 3, the shapes used being subject to wide variation and the details being shown and described mainly to complete the disclosure of a machine embodying the features of the invention.

The unit being described also comprises two upright frames or lifting heads referred to as the left and right heads or frames indicated by reference characters 4 and 5. The left hand lifting head, in the form shown, supports a pump 6 for supplying hydraulic fluid as oil under pressure to the hydraulic cylinders to be described. This pump has a sump 7 in its base which serves as a receptacle for the supply of liquid usually at atmospheric pressure though the diagram Fig. 10 shows an additional storage tank 8 to which the released liquid is returned and from which the liquid descends by gravity into the base or sump 7. In the form of the invention shown, the pump is operated by a hand lever 9 and this arrangement has some advantages for small installations, however, an electric or other power pumping system to supply hydraulic fluid under pressure to a number of roll stands is regarded as a feature of the apparatus. A full roll to be supported on the stand unit is indicated by reference character 10.

In accordance with the construction, Figs. 1 and 5, each base channel 1 is provided with a longitudinally extending rack plate 11, 12, at the left end. Two similarly placed rack plates at the right hand end of the machine are indicated by reference character 12'.

The machine, in the form shown, also includes a horizontal cylinder 14, 14' at each end of the machine, each cylinder containing a piston 15 and piston rod 16. The latter is secured or suitably connected to a movable thrust base 17 and the cylinder 14, in the form shown, abuts against and is secured to a yoke 18, which is pivotally connected at 19 to each side 27, 27' of the corresponding upright frame 4, 5. The cylinder 14 is connected to the pump or other suitable supply of hydraulic liquid under pressure in a manner to be further described, a suitable piping diagram being shown in Fig. 10.

Each upright head or frame 4, 5, is also provided with an upright cylinder, the left hand upright cylinder being shown in horizontal section in Fig. 3 and indicated by reference character 20. These upright cylinders 20, 20' constitute the lifting elements; they may be supported, in the upright position described, on steel plates 21 mounted on the axles 22 of the respective heads or carriages 4, 5. Each of these carriages, in the form of the invention shown, also includes a spring 24 connected to the corresponding movable thrust base 17 and to the carriage as at 19 to collapse the cylinders 14 and withdraw the thrust bases in a manner to be described.

The rolls 10 are supported on centers or cones 25 and 25', adapted to be inserted in the ends of the center hole in each roll. These cones also referred to as centering means are mounted on, or in, vertically sliding block 26, as best shown in Fig. 9.

The upright frames or heads 4, 5, in the form shown, consist each of two upright side plates 27, 27', the side plates being shown as tapered toward the top and braced at the top by cross bars 28 or in any suitable manner. The side plates are also shown as connected and/or braced at the bottom by axles or shafts 22. These shafts carry at their outer ends outside the plates 27, 27' rollers 29, see Fig. 3, which, as shown, ride on the bottom or lower flanges of the channel bars 1 and 2, being located inside the channels. This is a convenient arrangement but any suitable tracks and followers may be employed, and other details may be changed.

In the form shown, each upright cylinder 20 supported in any suitable manner as on a horizontal plate 21 resting on the two axles 22 and suitably secured contains a piston 30, Fig. 2, having an upwardly disposed piston rod 31, provided at its upper end with any suitable upward extension 32 which may be forked, as shown, and adapted to support at the upper end of said extension two journal bearings 33, preferably provided with guards 34, which may be U shaped and the journal bearings 33 carry rotatively mounted therein the journals 33' of pulleys 35 which rotate approximately in a vertical plane of the axis of the roll 10 and of centers 25, 25' being partially enclosed in guards 34.

In the form shown, this pulley carries bent about and supported on its upper arc a cable 35' which may be anchored at one end to one of axles 22 in any suitable manner as by means of stirrup 36 and metal rod 37.

The sliding block or carrier 26, to be further described, is mounted to slide in a vertical direction in upright guideways 38, i. e., the sliding block or carrier 26 is mounted to slide in upright guideways 38 formed on the respective inner sides of the side plates 27, 27', preferably near the edges of the same, i. e., adjacent the corresponding ends of the roll 10 being handled. See Fig. 3.

In the form shown, see Fig. 9, each cone or center 25 is secured on a core or tube 39 which may be flanged at 40 to position the cone, which, as shown, is provided with a peripheral brake seat 41, which is grooved to receive a brake band 42 which may be tightened by means of a screw 43 engaging suitably threaded lugs 44, 44', Fig. 4, on the opposite ends of said brake band. The brake band is shown in two parts pivotally connected at 46, the pivot 46, as shown, is seated in the block or carrier 26, to prevent rotation of the brake band.

The end of the cable 35' opposite the end secured by the anchoring means 36, 37, is connected to the upper end of block 26 in any suitable manner as by means of bracket 47 and jaw plates 48 and pin 48'. Carrier block 26 is formed with an opening near its center to receive and contain ball bearings 49 and 50 in which the tubular core 39, which carries the cone 25 rotates. In the form shown, the tube 39 is held and positioned in relation to the carrier block 26 by means of a collar 51 threaded thereon and suitably locked.

The principle whereby the stroke of pistons 30 and piston rods 31 in the cylinder 20 is multiplied by two, permitting the carrier 26 and each cone center 25 to move downwardly near the floor where it can engage the center of the smallest roll as has already been set forth, the same principle provides for the lifting of the cone or center by twice the length of the piston stroke permitting said center to be raised beyond the height of the center of the largest full roll when mounted on a suitable dolly. It may also be of interest to note at this point, that, in the

form shown, the base channels 1 and 2 are provided intermediate the upright frames 4, 5, with suitable roll supports or saddles 52 which are at about the height of the dolly used for moving the rolls from the store room to the machine.

It will be easily understood by those familiar with the handling of rolls in connection with the operation of corrugating machines that the centers or cones 25, 25' may be raised and lowered at the will of the operator either separately or together as occasion may require. By cracking the proper release valves to give a slight motion, they may be lowered, by gravity, as desired, a short distance to engage a full roll after consuming one of the same size; and by closing the release and opening the pressure valves, the roll may be raised to operative position. At other times they may be lowered by a longer distance to engage a partly used roll and correspondingly raised to bring it to operative position. A valve arrangement and piping diagram which is regarded as a satisfactory example of the various arrangements contemplated for this purpose is to be later described in connection with Fig. 10. It is also noted that either cone may be moved in vertical direction separately from or oppositely to the other for leveling or aligning the roll, all of which will be easily understood by one skilled in the art having the machine before him, the valves being, if desired, marked with their respective functions and the control valves being preferably arranged with the respective valves in the sequence in which they are frequently operated. Upright cylinders 20 are shown as of the single action type, the fluid being expelled by gravity, i. e., by the weight of the parts and of the rolls supported thereby. The fact that the arrangement of the upright cylinders 20 and their connection to cones 25 give the necessary lift with a downward traverse of the cones to points sufficiently close to the floor for the purposes stated, without extending below the floor, is important in that it enables the cylinders and cones to be supported on the frames or carriages 4, 5, and to be moved therewith in the horizontal adjustment and horizontal thrust application, without the disadvantage of pits below the floor which for this purpose would be extensive making the parts inaccessible, is of great importance. Such pits, if they could be provided, would add greatly to the expense of the equipment and would be inconvenient in that they would prevent shifting of the stands without elaborate preparation. These and other considerations have prevented the use of the hydraulic features in the corrugating art.

The horizontal motion will now be discussed. The horizontal cylinders, referred to as cylinders or hydraulic units include cylinders 14, 14', pistons 15, and piston rods 16. While reversal of the manner of connecting the hydraulic elements would be, in theory, unimportant, it is found most convenient in this construction to have the cylinders 14, 14' connected to the upright frames in any suitable manner as by means of yoke 18, pivoted at 19, 19, the piston rod 16 being connected to the movable thrust base 17 at each end of the machine, and serving as a guide therefor.

In the form shown, each thrust base 17 is an approximately horizontal plate extending transversely to and across the frame members or channels 1, 2 and formed or provided at its ends with engaging members 55 shown as of less width than the base and adapted to enter and engage the notches 56 between the rack teeth 57 of the longitudinal racks 11, 12 already identified. These teeth are preferably inclined toward the center of the roll supporting unit, i. e., toward the center of the axial length of the supported roll 10 so that they support the thrust bases 17 taking up the reaction of the piston thrust which tends to advance the respective frames toward the said roll center, i. e., toward the center of the machine. These teeth being thus inclined, and preferably undercut at 56, have little or no tendency to prevent the contraction or collapse of the cylinder space, i. e., the advance of the pistons 15 toward the heads 13 of the cylinders and toward the center of roll 10. This collapse or contraction of the cylinder space 13', in the form shown, is effected by the springs 24 which tend to draw the thrust bases 17 toward the heads or frames 4, 5 and toward the roll 10. The horizontal cylinders 14, 14', as well as the upright cylinders 20, are preferably single acting, as shown, and the upright frames or heads 4, 5 are, particularly, in the form of machine being discussed, advanced toward the center of the machine for purposes of adjustment and are withdrawn for purposes of adjustment to the length of the roll, and particularly to remove the centers or cones 25, 25' from engagement with the roll by manual operation. The horizontal hydraulic thrust may be utilized for purposes of adjustment but it is of advantage mainly to apply the final maximum thrust to the cones or centers 25 whereby they are enabled to support and center the heavy rolls employed in this art and for alignment of the rolls with the web running through the machine. The position of the cones thus reached is maintained throughout the operation of each roll by closing the valves controlling the cylinders. A further fine adjustment of the rolls as to alignment with the web being consumed or with the machine is attained by slight operation of the cylinders 14, 14' or the pistons therein in the proper direction as by cracking the pressure valve of one cylinder and similarly cracking the release valve of the other cylinder and supplying the necessary pressure. This pressure may be continuous as by a power pump or it may be obtained by operating the hand lever 9 of the pump 6. In the latter instance, the operation of the pump may be controlled to regulate the extent of movement.

In releasing a roll, i. e., withdrawing either or both heads, both heads being usually withdrawn to release a roll, and for adjustment of the machine to longer rolls than the one being consumed, it is desirable to completely release the movable thrust base 17 in order that it may be moved backwardly opposite to the inclination of the rack teeth 57.

In the form shown in Figs. 1 and 5, the thrust bases or back thrust bases 17 which extend transversely to the piston axis across the base channels 1, 2, are raised above or freed of the rack teeth 57 to permit heads 4 and 5 to be moved backwardly away from the central position defined for adjustment or for release of a roll. This release is accomplished by pressing downwardly as with the operator's foot on foot levers 58 at each end of the machine or unit, see Figs. 1, 3 and 5. Each lever 58 is secured to a shaft 59, Fig. 5, which, in the form shown, see Fig. 3, extends across the machine transversely to the axis of cylinders 14, 14', being mounted, i. e., having a bearing at its respective ends in brackets 60 extending upward-

ly from the back thrust bases 17. This shaft 59 has two cam dogs 61 secured to it adjacent its opposite ends, or formed thereon and in alignment with the top flanges of channels 1, 2, so that the dogs 61 operatively engage said flanges.

In the position shown in Figs. 1 and 2, these dogs are released, permitting the back thrust bases 17 to engage the corresponding racks 11, 12, 12'. The operative or lifting position of dogs 61 is shown in Fig. 5, the foot lever 58 having been pressed downwardly.

In this position, the dog 61 is swung to the right, i. e., in left handed rotation about the axis of the shaft 59 through and beyond the central vertical depending position so that the weight of the thrust base which latter is thus raised out of engagement with the rack tends to hold these cam dogs 61 in this position. When the thrust bases are thus raised they may be moved with their corresponding heads or upright frames 4, 5, in either direction along the channels 1, 2, freely and independently of the racks. For this purpose anti-friction means as rollers 29 is provided.

When the heads are released, the cones having been suitably aligned are partially inserted in the ends of the center hole in a roll on the supports 52 by manual advancement of the heads or upright frames 4, 5. Then back thrust bases 17 are dropped by kicking upwardly the respective foot levers 58, and pressure is applied.

Assuming that a roll has been consumed, the pressure in cylinders 14, 14' will first be released by opening the respective relief valves controlling the cylinders 14, 14'. The foot levers 58 are then depressed raising the back thrust bases 17 above the teeth 57 of the respective racks 11, 12, 12' and assuming that a new roll of the same size as the one just consumed is to be inserted, both heads 4, 5 are withdrawn by a little more than the length of the cones inserted in the previous roll. The new roll having been brought up on a dolly is rolled or transferred on to the supports 52 which are at approximately the height of the dolly to be used or vice versa. Then the cones or centers 25, 25' are slightly lowered by operation of cylinders 20, 20', i. e., a sufficient amount of fluid is released to lower the center or cones 25, 25' to alignment with the ends of the hole 10' in the center of roll 10, i. e., the amount of the clearance of the rolls relative to support 52.

The heads or upright frames 4, 5, are then advanced, preferably by manual operation, causing the cones 25, 25' to enter the ends of the hole 10' at the center of roll 10 with which these cones have been previously aligned. The back thrust bases 17 which are in part guided by piston rods 16 in pistons 14, 14' are then lowered by raising the levers 58 and the pressure valves leading to cylinders 14, 14' are opened sufficiently and held open sufficiently long to further advance the cones 25, 25', applying sufficient pressure to center and support the roll 10. The valves controlling cylinders 14, 14' are then closed and the roll is lifted to operative position by opening the pressure valves leading to cylinders 20, 20' and thus operating said cylinders to raise the roll and level it. This is done by properly manipulating the pressure and release valves of the latter cylinders. the cones being moved downwardly by gravity collapsing the cylinder spaces when the respective release valves are opened. When a full roll is substituted for a completely used full roll of the same size, the roll is only raised sufficiently to provide clearance which is usually an inch or an inch and one-half. In connection with the right hand cone 25' the brakes 41, 42, 43, Fig. 9, may be omitted. The let off being controlled by a single brake for each roll.

The lateral alignment of the roll with the web is attained by alternate manipulation as cracking of the pressure and release valves of the horizontal cylinders, in a manner already suggested. If a hand pump is used, the degree of motion is largely controlled by the operation of the pump lever indicated at 9 in Fig. 1; an electric pump may be similarly controlled or the operation may be controlled entirely by the valves where constant pressure is employed. It is of importance that the base, composed of channels 1 and 2 and cross plates 3 or otherwise, is freely movable along the floor and that there is no extension below the floor.

The piping diagram, Fig. 10, shows a piping and valve arrangement which may be regarded as workable in connection with the different forms of the invention disclosed. This diagram will be hereinafter described. In the construction of the machine, the valves are preferably located at the top of the upright frame or head 4, being conveniently grouped in the sequence in which they are most frequently operated. The piping shown in Figs. 1 and 2 is arranged for the purposes of such location of the valves.

Figs. 6, 7 and 8 illustrate an automatic release of the back thrust base indicated at 17 in Figs. 1 and 5. In these figures the back thrust bases 65, only one being shown, engage the racks 11, 12, etc., in a manner similar to that already described in connection with the previous figures and the manner of operating the cylinders 14, 14', is the same as that previously described; likewise the operation of cylinders 20. In this instance, however, the upright heads or frames, the one shown being indicated by reference character 66, have upright sides or side plates 67, 68 which serve an additional function as compared to those previously described, i. e., these sides 67, 68 are provided or the frames as a whole are provided in any suitable manner with cam surfaces 69 and 70. These cam surfaces, as shown, are inclined upwardly toward the center of the roll lifting unit, i. e., toward the center of roll 10 and, in the form shown, the cam surfaces as shown are on the edges of the side plates and for the purpose of providing these cams each side plate is extended at the bottom outwardly away from the center of the machine, identified as the center of the axis of the roll supported on the unit. These cam surfaces 69, 70 are inclined upwardly from the extreme outer bottom end of each side plate 67, 68 and toward said center. It may be noted that in the drawings the portions of the side plates on which surfaces or cams 69, 70 are formed are offset inwardly from the upright planes of said plates 67, 68 in order to locate the cams in planes convenient for the operation of cam followers to be described. The offset is indicated in plan in Fig. 7 at 71.

The back thrust bases 65 engage the racks in a manner already described or in any suitable manner and they may be connected to the piston rods 16 or otherwise connected and guided by a member actuated by the pressure in cylinders 14 and 14'. The back thrust bases or base plates 65, in the form shown, are provided with depending lugs 72 which are apertured to form journal bearings for the axles or shafts 73 of cam follower rollers 74 which are spaced outwardly from the centers of said thrust bases 65 to register with

the upwardly disposed cam surfaces or cam members 69 and 70.

It may be noted in this connection that the back thrust supports 65 are to a large extent guided and controlled by the corresponding piston rods 16 and that the motion of said bases relative to frames 66 is thus so limited that the extreme right hand ends of the cam surfaces 69, 70 in Figs. 6 and 7 is somewhat to the left of the beginning of the offset 71. The cylinders 14, 14' being pivotally mounted as by means of the yokes 18 already described provide for the raising of the back thrust supports 65 or permit them to be raised when the pressure in cylinder 14 is released permitting the members 55 to escape the teeth 56 as the back thrust base 65 is raised.

The cam surfaces 69, 70 with their cooperating followers 74 mounted on the said members 65 provide for the automatic release of the engagement of said members 65 with the teeth 56 when the pressure in cylinders 14, 14' is released. The operation is as follows: On release of the pressure in said cylinders, as aforesaid, the springs 24 tend to collapse the compression space in cylinders 14, 14' indicated at 13' in Fig. 3 and the upright frames 66 being relatively heavy and the base 65 being free for movement to the right as shown in Fig. 7, this base or back thrust base 65 moves to the right in said figure, the opposite base, not shown, moving to the left toward the center of the axis of said roll 10. This motion causes the cam rollers 74 to ride up on cam surfaces 69, 70 raising the back thrust bases 65 above the top surfaces of teeth 56.

In this position the said back thrust bases are entirely free of the rack and the upright frames 66, or carriages as they might be termed, may be moved freely in either direction. Except for the automatic release, the structure of Figs. 6, 7 and 8 may be approximately identical with that shown in Figs. 1 to 5 and Fig. 9.

The remainder of the operation of the construction, Figs. 6, 7, and 8, is believed to be clear in view of the description of the operation of the construction in Figs. 1 to 5 and Fig. 9. The operation of the construction in the last three figures mentioned differs mainly in that the manipulation of foot lever 58 and the cam 61 is eliminated in favor of an automatic cam motion which takes place immediately on the release of the pressure in cylinders 14, 14'. As soon as pressure is introduced into these cylinders the expansion of the pressure space therein 13' and the movement of piston rod 15 outwardly moves the cam rollers 74 outwardly and downwardly along their cooperating cam surfaces 69, 70, returning the engaging ends or members 55 of said bases into engagement with the racks 11, etc., so that they immediately engage the next tooth 57 which thus takes up the back thrust from the corresponding cylinder 14, 14' providing for the advancement of the corresponding upright frame or head 66 which has previously been moved by hand along the channels 1, 2 to proper position for engagement of the centers or cones 25, 25' when duly aligned with the ends of the hole 10' in roll 10. Pressure in cylinder 14, with a roll in place, holds the thrust base in engagement with the rack tooth till released.

Figs. 11, 12, 13, 14, 15 and 16 show a roll lift stand element in which both the lifting and the horizontal motion are extended beyond the length of the hydraulic element when fully contracted by additional hydraulic means instead of by mechanical means as in Figs. 11 to 16. An object in both instances being to obtain the convenience and power of hydraulic lift and horizontal thrust and the full extent of adjustment and lift necessary in this art without unduly increasing the overall width of the machine or extending it below the floor.

Referring now to the specific construction of Figs. 11 to 16, these figures show base channels 1 and 2, as in the previous construction, suitably connected and movable along the floor. The opposite upright frames, heads or carriages 4, 5, supported thereon may be mounted on rollers 29 which, in the form shown, are mounted on shafts or axles 22 as in the previous figures. These rollers, as shown, run in channels 1, 2, on the bottom flanges thereof. The upright frame or carriage 4, 5, at each end of the machine, may consist each of side plates 76, 77 with suitable upright ways 78 in which ways suitable carrier blocks 79 are mounted to slide. The sliding engagement of blocks 79 with ways 78 and the construction of the blocks 79 and cones or centers 80, may to advantage be similar to that already described in connection with Figs. 1 to 9, the right hand carrier 79 and cone 80 being shown as without a brake, the left hand carrier block 81 and cone 82 being provided with a brake 83, as shown in Fig. 9.

The upright hydraulic elements 84 in this type of machine may be supported in seat members 85. These seat members 85 are provided with journal pins or journals 86 seated in journal bearings 86' in brackets 87, secured to the respective side frames 76, 77 at the bottom end of ways 78 and below the normal downward traverse of the carrier blocks 79 and 81. Each upright hydraulic member or cylinder 84 has a base 89' with projecting journals 88 at right angles to journals 86 and engaging suitable bearings 89, see Fig. 15, in seat members 85. One journal 88 is hollow providing a passage 88' leading to the head cavity 89. Passage 88' is connected to the pressure and to the discharge by way of suitable valves as hereinafter described. Figs. 13 and 16 show a convenient manner of connecting the pistons 95 in cylinders 84 to the sliding or carrier blocks 79 and 81, Figs. 13 and 11. In the form shown, this connection consists of an upwardly projecting eye lug 95 on the pistons and two depending eye lugs 96 on the carrier blocks, the same being connected by a hinge pin 97.

The horizontal hydraulic elements 90 are pivotally mounted at the opposite ends of the base channels 1, 2, by means of journals indicated by reference character 91. Each journal 91 has suitable bearings in upright brackets 92 secured to a suitable cross bar or bridge 93 which spans the ends of the channels 1, 2, one said hydraulic element 90 being preferably mounted at each end of the machine.

The pistons 98 in each said cylinder 90 at the opposite ends of the channels 1, 2, in the form shown, are pivotally connected to the corresponding upright frame or carriage 4, 5. Said connection, in the form shown, comprises a stationary shaft or rod 99 extending transversely of the stand and of channels 1, 2 from one side frame or plate 76 to the other, being secured in and to suitable lugs.

Each piston 98 has a projecting fin 100' mounted thereon, carrying an apertured lug 100 located forwardly of said piston. Shaft or rod 99 extends through this lug and has suitable positioning means 99' on each side of said lug. The cylinders are inclined upwardly and inwardly toward the center of the machine, the shaft 99 being

preferably spaced upwardly above the floor as in Fig. 12.

In the form shown in Figs. 11 to 16, each head or upright frame or carriage 4, 5, is provided with vertically and horizontally operating hydraulic thrust units and each of these is similar to the corresponding construction, Figs. 1 to 9, in that it is adapted to give a length of adjustment in these respective directions considerably in excess of the minimum contracted or normal length of the hydraulic unit. In this way both forms of the invention provide for a pick up of the smallest as well as the largest diameter rolls and the raising of these rolls to suitable let off position and for the lowering and release of partially used rolls at suitably low levels whereby they are placed on the supports 52 which must be near the floor to obviate an extended lift to or from the dolly; and both forms of the invention accomplish these important operations without extension beneath the floor. It is also notable that both forms of roll lift stand unit give the necessary degree of horizontal adjustment to provide for engaging and lifting full length or half length rolls or other lengths, employing a hydraulic unit, the normal contracted or minimum length of which is extremely short in comparison to the length of adjustment provided. And, having in mind the fact that the hydraulic pressure and hence the consumption of power is dependant upon and determined by the back pressure, it is clear that in the operation of all these units the adjusting motion is attained with slight effort manually or hydraulically, or hydraulically with mechanical increase, the full hydraulic thrust being exerted, for a short interval only and through a short distance, i. e., in advancing the cones horizontally to centering and lifting position after they contact the ends of holes 10' and in lifting a roll from supports 52 to provide clearance in unrolling the web.

To this end each of the upright hydraulic units 84 comprises a base or outer cylinder 105 mounted in base 84' on trunnions 88 and a plurality of successively smaller cylinders 106, 107, etc., each operating in telescoping relation to the next larger cylinder in the relation thereto of the usual piston, the inner cylinder 95 which is actually a piston being preferably closed at the bottom at 108. This inner member or piston 95 carries the eye lug 95' which is connected to sliding carrier blocks 79 or 81, the hydraulic elements being preferably the same at each side of the lift stand. By this means the actual motion or length of the upright path of the cones is increased or caused to exceed the length of the base or outer cylinder 105 and/or the total length of the hydraulic lifting element in contracted condition, or its minimum length, which is approximately the height of base cylinder or outer cylinder 105. Though the arrangement shown is preferred, reversal or inversion is contemplated.

In the construction Figs. 11 to 16, the hydraulic units 90 at each end are referred to for convenience as horizontal though the degree of inclination upwardly toward the corresponding upright frame 4, 5, as shown, is regarded as satisfactory. These horizontal hydraulic units 90 preferably comprise each an outer or base cylinder 109 and a plurality of successive telescoping inner cylinder members 110, 111, etc., the inner telescoping member or piston 93 carrying the lug 100 engaging shaft 99 on upright 4 or 5. There may be, as in the construction shown, one more telescoping cylinder in the horizontal than in the upright hydraulic unit, or lifting unit, the horizontal motion provided being longer than the vertical one. While the arrangement shown is preferred, reversal of the hydraulic units is contemplated. The contracted or minimum length of each horizontal hydraulic unit is the length of the base cylinders 109 or approximately their length. The horizontal hydraulic units may be closely similar in detail to the vertical unit, Fig. 16.

The operation and functions of both the hydraulic lifting and the horizontal hydraulic elements have been fully discussed but it may be noted in connection with the rack and cylinder hydraulic unit first described in connection with Figs. 1 to 9 that a part of the piston stroke may, if desired, be utilized with and in addition to the rack adjustment, to conform or adjust the spacing of the cones to the length of the rolls.

Referring now to the diagram, Fig. 10, it will be noted that, as already described, the upright frame, head or carriage 4 carries the hydraulic pump 6 operated by a hand lever 9 for which an electric pump suitably located to handle a number of lift stands may be substituted. The hand pump may be regarded as having advantages in that the lever strokes may be so determined as to give the desired extent and speed of cone motion according to the identity of the particular valves opened or closed at the time, it being borne in mind, however, that the vertical or upright hydraulic units are collapsed by gravity on opening of the proper relief valves and the horizontal cylinders are collapsed by a spring action in the form shown, Figs. 1 to 9.

In the forms Figs. 11 to 16, a spring 112 connected at one end to thrust base 92 and at its other end to roller axle 22 may be employed to assist in collapsing the horizontal hydraulic units 109. All the cylinders, as shown, are of the single acting type which is regarded as capable of much more satisfactory arrangement and operation for the purposes in hand than double acting cylinders.

Referring to diagram, Fig. 10, which shows a piping and valve diagram subject to wide variation, the sump or receptacle 7, as shown, may be connected to an extra supply tank 8 which drains into the sump, or the tank may be omitted. The relief or release pipes 114, 114' lead from the relief valves controlling the four hydraulic units and to be described to this tank and/or to sump 7. The pressure pipe 115 leads from the pump to two pressure distributing lines 117, 118. The pressure line 117 is connected by pipes 117' and 117'' to the respective horizontal hydraulic units of upright frames or heads 4, 5, respectively, all the pipes being flexible where necessary. The admission of pressure to these hydraulic units is controlled by valves 119 and 119' and the release by way of relief pipes 114 is controlled by valves 120 and 120'. The pressure is led to the vertical hydraulic units by pipes 121 and 121'.

These pipes 121 and 121' are controlled by valves 122 and 122'. The pressure in the vertical hydraulic elements is released to tank 8 by way of relief pipe branch 114' and relief pipes 114 the former controlled by valves 124 and 124', the precise arrangement of piping and valves being a matter of design and not material to the invention.

While Fig. 10 in effect illustrates the construction Fig. 1, the valve and piping diagram applies to both forms, Figs. 1 to 9, and Figs. 11 to 16. The operation of the hydraulic units by manipulating

the valves in sequence having been fully discussed, further reference to this seems unnecessary.

The illustration, Figure 10 is purely for example, the piping and valve control being a matter of design capable of wide variation, no particular arrangement of piping and valves being regarded as essential to the practice of the invention.

In some instances the full rolls or partially used rolls, because of loosening or defective winding, are larger at one end than at the other, this causes or tends to cause cocking and side deflection of the web as fed to the corrugator with consequent injury to and breaking of the web. The difficulty can be overcome by placing the large end of the roll further from the corrugating machine being fed than is the small end of said roll. This is accomplished in the machine shown by making the upright ways 155, see Figs. 6 and 7, in which the carrier blocks 26, for the cones, travel, deeper than would otherwise be necessary and placing upright adjustment strips 156 in the grooves at each edge of the path of the blocks 26 to determine the exact position of their path. These strips are adjusted one oppositely to the other to different positions in the direction of the depth of the grooves to locate and adjust the path of the block and hence the alignment of the roll axis in a horizontal plane.

Referring to Fig. 6 the adjustment strips 156 which extend the full vertical length of the upright ways are shown in horizontal section. The strips 156 are held in position and adjusted by screw bolts 157 swiveled at their ends in said strips and threaded through side frames 67, 68 of upright frames 66. The heads of some of the bolts 157 and the lower end of strips 156 are shown in Fig. 6. The manner of oppositely adjusting strips or bars 156 to locate and adjust the path of carrier blocks 26 to align the rolls in a horizontal plane is thus fully apparent.

Figs. 17, 18 and 19 show a corrugating machine having corrugating rollers 130 and 131 and paste roller 132 and idling rollers to be described.

These corrugating and pasting rollers are shown in combination with the roll lift stand of the invention, each stand, in the form shown, including two roll lifting units each handling a single roll.

In the form shown, there is a roll lift stand 133 at the right in Fig. 17, or to the rear of the corrugating rollers 130 and 131 and delivering thereto a web of material to be corrugated, generally of the type known as straw. At the front of the machine there is a roll lift stand 134, i. e., at the left in Fig. 17, which feeds to front idler roller 135, this stand carries the top liner web which is led about the rollers as shown and combined with the corrugated web as it comes from the corrugating rollers. The completed single face corrugated material is fed to the rear along a conveyor 136 to the hot plate 137 from which it is drawn upwardly over roller 138 to paste rollers 139 where it is combined with a second liner from a roll lift stand 140 beneath the hot plate.

Each of the roll lift stands 133, 134 and 140 comprises two roll lift units, as previously described, said units of stand 134 being indicated by reference characters 141 and 142; the unit adjacent the roll to which the stand delivers being unit 141 and the remote unit being indicated by reference character 142. The full rolls supported on this stand are indicated by reference character 10.

As the web being run through the machine is exhausted and just prior to the release of the inner wrap of the web, the web from the spare roll is affixed to the web from the exhausted or consumed roll by splicing, and the feeding of the web continues, the web being thereafter taken from the new or full roll 10 which has been connected by splicing.

Fig. 18 shows a full roll 10 on a remote stand 142. At this time the forward end 144 of the spare roll 10 is being spliced to the web of a nearly exhausted roll 145 on the nearby stand 141 the first roller of the corrugator being shown at 135. The web of the nearly exhausted roll 145 is indicated by reference character 146, it being noted that the end 144 is spliced or affixed to the top surface of the web 146.

Fig. 19 shows a nearly exhausted web 147 on the remote stand 142 having its unrolled portion 148 led rearwardly over idling roller 135. As the web 148 from roll 147 approaches exhaustion, the end 149 of the web from a full roll 10 on the nearby stand unit 141 is applied and spliced from below the web 148, as indicated, said end being spliced is designated by reference numeral 149. In each instance, the exhausted portion of the web is permitted to go through the machine, the double portion being, as a rule, discarded when the corrugated board is cut into sheets in the manufacture of boxes, or it can be made into boxes as desired.

For convenience in splicing, the web from the remote unit 142, is led upwardly and over an idling roller 150 supported on upwardly extending brackets 151 at the top of the nearby unit 141.

The roll lift stand units of the invention have been described in their application to a corrugating machine because the invention relates particularly to the adaptation of hydraulic principles of operation to the corrugating machine art.

Numerous details and features of operation have been included to complete the disclosure and to enable those skilled in the art to practice the invention, however, these details in numerous instances are subject to variation and rearrangement within the scope of the invention as defined in the claims.

We have herein described specifically and in detail a preferred and various modified forms of the invention, the description being specific and in detail in order that the manner of constructing, applying, operating and using the invention may be fully understood, however, these details are subject to variation the specific terms being used in a descriptive rather than in a limiting sense, and the scope of the invention being defined in the claims.

What we claim as new and desire to secure by Letters Patent is:

1. A roll lift stand for a corrugating machine for making corrugated board and the like, having two upright frames mounted to move each toward and away from the other substantially on a single horizontal path, each said frame comprising an upright way, two roll centering means adapted to engage and to be inserted in the opposite axial ends of a roll located between said frames to center and support the roll and mounted to move along said upright ways to

align and to lift and lower the rolls, a hydraulic motor comprising a hydraulic cylinder and piston at one end of said machine and means connecting said motor to one of said frames to advance the frame along said path for supplying roll engaging and centering pressure to said centering means said connecting means comprising means whereby the said latter frame is moved along said path by said motor for distances in excess of the length of the piston stroke.

2. A roll lift stand for a corrugating machine for making corrugated board and the like, having two upright frames mounted to move each toward and away from the other substantially on a single horizontal path, each said frame comprising an upright way with roll centering means mounted thereon and adapted to engage the opposite axial ends of a roll to center and support the same said centering means being mounted to move along said upright ways, a motor comprising a single acting hydraulic cylinder and piston at one end of said machine and connected to one of said frames to advance the same toward the center of said horizontal path for supplying roll centering pressure to said frame and hence to said centering means, and additional means providing for adjustment of said motor in the direction of said horizontal path to provide additional adjustment of said frame along said path to conform to the length of a roll, and spring means opposed to the said roll centering pressure to contract the over all length of said cylinder and piston when said pressure is released.

3. A roll lift stand for a corrugating machine for making corrugated board and the like, having two upright frames one mounted to move toward and away from the other, substantially on a single horizontal path, each said frame comprising an upright way with roll centering means adapted to enter and engage the opposite axial ends of a roll to center and support the same and being mounted to move along said upright ways, means connected to one of said frames for supplying roll centering pressure to said frame and hence to its centering means, and for providing for adjustment of said movable frame to conform to the length of the roll, and a hydraulic unit mounted on each said frame to move therewith and operatively engaged to the centering means for lifting the roll and aligning the centering means therewith, said unit comprising a hydraulic cylinder and means connected to said unit and operatively connected to the corresponding centering means for increasing said lifting motion beyond the length of said cylinder.

4. A roll lift stand for a corrugating machine for making corrugated board and the like, having two upright frames each mounted to move toward and away from the other substantially on a single horizontal path, each said frame comprising an upright way with roll centering means adapted to enter and engage the opposite axial ends of a roll to center and support the same and being mounted to move along said upright ways, a hydraulic cylinder and piston connected to one of said frames for supplying roll centering pressure to said frames and hence to its centering means and means providing for adjustment of said cylinder and piston and frame along said horizontal path to conform to the length of the roll, and a hydraulic unit mounted on each said frame to move therewith for lifting the roll and aligning the centering means therewith, said unit comprising a single acting hydraulic cylinder, and means operatively connecting said unit to said centering means for imparting lifting motion to said centering means and a roll thereon and for increasing said lifting motion beyond the stroke of said cylinder.

5. A roll lift stand for a corrugating machine for making corrugated paper and the like, having two upright frames mounted for movement on approximately a single horizontal path toward and away from each other, roll centering means on each frame adapted to enter and engage the opposite ends of a roll to be lifted thereby, means for applying roll engaging pressure to said centering means, said respective centering means being inwardly disposed toward the center of said stand, each said centering means being mounted for movement in a vertical direction, a hydraulic lifting element mounted on and moving with each said frame; each said element comprising a single hydraulic cylinder and piston and means operatively connecting each said unit to the corresponding centering means to lift the roll and to extend the hydraulic lifting motion to exceed the vertical dimension of said cylinder.

6. A roll lift stand for a corrugating machine for making corrugated paper and the like, comprising two upright frames mounted for movement on approximately a single horizontal path toward and away from each other, roll centering means on each frame adapted to enter and engage the opposite ends of a roll to be lifted thereby, said respective centering means being inwardly disposed toward the longitudinal center of said stand, each said centering means being mounted for movement in a vertical direction, an upright hydraulic lifting unit mounted on and moving with each said frame, each said unit comprising a single hydraulic cylinder and piston, and means for operatively connecting each said lifting unit to the corresponding centering means whereby the hydraulic lifting motion is extended to exceed the length of said cylinder, said lifting elements being adapted to move said centering means for alignment with, and for lifting rolls of different sizes.

7. A roll lift stand for a corrugating machine for making corrugated paper board and the like, comprising two upright frames mounted for movement on a single approximately horizontal path toward and away from each other, each said frame having roll centering means adapted to be inserted in the opposite ends of a roll to be lifted, each said centering means being mounted for movement in a vertical direction on its stand, an upright hydraulic lifting element mounted on each said frame, each said element comprising a single hydraulic cylinder and means operatively connecting each lifting element to the corresponding centering means whereby the lifting motion is extended to exceed the length of said cylinder, each lifting element being adapted to move with its frame and to lift the corresponding centering means for alignment with and for lifting a roll, each said lifting element being wholly above and movable along the floor or other horizontal surface on which the roll stand and corrugating machine are supported.

8. In a roll lift stand for a corrugating machine for making paper board and the like, two upright frames one being mounted to move substantially on a horizontal path toward and from the other, each said frame having mounted thereon to move in a vertical direction a roll centering means adapted to enter and engage the axial end of a roll, each said frame having lifting means com-

prising a single hydraulic cylinder and means connecting said lifting means to the corresponding centering means for lifting a roll, said connection comprising means for extending the lift to exceed the actual length of said cylinder, said roll stand also including a hydraulic means comprising a single hydraulic cylinder for advancing one frame to press the centering means into the end of the roll and additional means for increasing the adjustment provided by said cylinder for adjustment of said latter frame to the length of the rolls, said increased adjustment exceeding the length of said cylinder.

9. A roll lift stand for corrugating machines and the like, comprising two upright frames mounted for movement substantially on a single horizontal path each toward and from the other, each said frame having mounted thereon for movement in a vertical direction centering means for a roll, said respective centering means being adapted to enter and engage the opposite ends of a roll, means on each head for applying lifting force to the said centering means and two hydraulic units, each comprising a single acting cylinder and means connecting each said cylinder to a corresponding one of said upright frames to advance the frame and apply centering pressure to said centering means whereby the latter are inserted in a roll in lifting engagement therewith, and resilient means tending to collapse the cylinder space when the hydraulic pressure is released.

10. A roll lift stand for corrugating machines and the like, comprising two upright frames mounted for movement substantially on a single horizontal path each toward and from the other, each said frame having mounted thereon for movement in a vertical direction centering means for a roll, said respective centering means being adapted to enter and engage the opposite ends of a roll, means on each head for applying lifting force to the said centering means and two hydraulic units, each said unit comprising a single acting cylinder and piston and means connecting each said unit to a corresponding one of said upright frames to advance the frame and apply centering pressure to said centering means whereby the latter are inserted in a roll in lifting engagement therewith, and continuous tension means tending to collapse the cylinder space and to thereby expel the hydraulic fluid from each said cylinder, each said unit having a movable thrust base to which the end of said tension means remote from the frame is connected, and a series of stops for each said thrust base said stops having supporting surfaces disposed toward the frame, the said collapsing action effected by each tension means, serving to withdraw the corresponding support from the stop with which it is in engagement when the hydraulic pressure is released, said stops being arranged in the direction of the thrust.

11. A roll lift stand for corrugating machines and the like, comprising two upright frames mounted for movement substantially on a horizontal path each toward and from the other, each said frame having roll centering means mounted thereon for movement in a vertical direction, said centering means for a roll being adapted to engage the opposite ends of the roll at the center and both said centering means being disposed toward the longitudinal center of said path, hydraulic means on each head for applying lifting force to the said centering means, and two hydraulic units, each comprising a single cylinder and means connecting each unit to a corresponding upright frame to advance the frames along said path and apply centering pressure to said centering means and to adjust the centering means to the length of different rolls whereby they are inserted in a roll in lifting engagement therewith, means providing for extending the path of each frame along which said centering pressure is thus applied by the respective units whereby each said path exceeds the length of one said cylinder, and a hand pump providing hydraulic pressure for said cylinder and for said hydraulic means whereby said motions are manually controlled.

12. In a roll lift stand for a corrugating machine for making corrugated board having two upright frames mounted to move each toward and from the other substantially on a single horizontal path, each said frame having roll centering means mounted thereon for movement in a vertical direction, a hydraulic motor comprising a single upright hydraulic cylinder on each head, and means operatively connecting each said cylinder to the corresponding centering means in lifting relation thereto, comprising means for extending the lifting motion provided by said hydraulic motor to exceed the length of said cylinder whereby a length of vertical traverse of said centers suitable to the lifting and depositing of rolls of widely different diameters is attained, the lifting cylinders being entirely above the floor level.

13. In a roll lift stand for a corrugating machine for making corrugated board having two upright frames mounted to move toward and from each other substantially on a single horizontal line, each said frame having roll centering means mounted thereon for movement in a vertical direction, a hydraulic motor comprising a single hydraulic cylinder on each head, and means operatively connecting each said motor to the corresponding centering means in lifting relation thereto, and a hand pump and connections whereby said pump supplies hydraulic pressure to one or both cylinders providing manual control of the lift and alignment of said centering means.

14. In a roll lift stand for a corrugating machine for making corrugated paper board and the like, having two upright frames, each mounted to move on a horizontal path toward and from the other, each said frame having roll centering means mounted for vertical movement and adapted to engage and enter a roll at the centers of the opposite axial ends to lift the roll, each frame being provided with lifting means for said centering means, a hydraulic cylinder and piston unit at each end of the stand, each said unit being connected at one end to the corresponding upright frame, a thrust base for each hydraulic unit located on the side of its said frame remote from the center of said lift stand in the direction of said path, each hydraulic unit having engagement at its end opposite to its frame with its thrust base, and means for supporting each thrust base in a series of positions, spaced from each other and arranged, in the direction of said path to take up the back thrust of said unit in advancing said frames and centers toward the longitudinal center of said path.

15. In a roll lift stand for corrugating machine webs and the like, having two upright frames, each mounted to move on a horizontal path toward and from the other, each said frame having a roll centering means mounted for vertical movement and adapted to engage and enter a

roll at the center of its axial end to center the roll, each frame being provided with lifting means for said center, a hydraulic cylinder and piston unit for each said frame, each unit being connected at one end to the corresponding frame, a thrust base for each hydraulic unit located on the side of said frame remote from the center of said lift stand in the direction of said horizontal lines, each said hydraulic unit having engagement at its end opposite to said frame with a corresponding thrust base and means for supporting each thrust base in a series of positions spaced from each other and arranged in the direction of said path to take up the back thrust of the corresponding hydraulic unit, means tending to draw each thrust base toward its corresponding frame, tending to collapse the corresponding hydraulic unit, said supporting means for the back thrust base being provided with means for releasing the corresponding thrust base in response to said tendency.

16. In a roll lift stand for corrugating machine for making corrugated board having two upright frames, one mounted to move on a horizontal path toward and from the other, each said frame having roll centering means mounted for vertical movement thereon and adapted to engage a roll at the centers of its opposite axial ends, each frame being provided with lifting means for said center; a hydraulic cylinder and piston unit connected at one end to said moving frame, a thrust base for said hydraulic unit located on the side of said frame remote from the center of said lift stand in the direction of said horizontal path, said hydraulic unit having engagement at its end opposite to its frame with said thrust base and means for supporting said thrust base in a series of positions spaced from each other and arranged in the direction of said path to take up the back thrust of said unit, and means for moving and holding the thrust base out of engagement with said supports permitting the frame to be moved in the direction of said path for purposes of adjustment to the length of a roll.

17. In a roll lift stand for a corrugating machine for making corrugated board having two upright frames, one mounted to move on a horizontal path toward and from the other, each said frame having a roll centering means each said centering means being mounted for vertical movement on said frame said centering means being adapted to engage a roll at the centers of its opposite axial ends, each frame being provided with lifting means for said centering means; a hydraulic cylinder and piston unit connected at one end to said moving frame, a thrust base for said hydraulic unit located on the side of said frame remote from the center of said lift stand in the direction of said horizontal path, said hydraulic unit having engagement at its end opposite to said frame with said thrust base and means for supporting said thrust base in a series of positions spaced from each other and arranged in the direction of said path to take up the back thrust of said hydraulic unit, means tending to draw the thrust base toward said movable frame, tending to collapse the hydraulic element, and means for automatically releasing said back thrust support from said back supporting means and holding it released when said hydraulic unit is collapsed, permitting said frame to be moved freely along said path.

18. In a roll lift stand having two upright frames with roll centering and lifting means, said frames being movable one toward the other in the direction of the axis of a roll on said stand, a hydraulic cylinder and piston unit connected to one frame to move it in said direction and having a thrust base and a series of back thrust supports for said base arranged and spaced in said direction, means tending to collapse the hydraulic unit and withdraw the base from engagement with a support, and automatic means for throwing said base out of engaging relation with said back thrust supports as the cylinder is collapsed permitting the frame to be moved freely back and forth in said direction.

19. A roll lift stand having a plurality of upright frames, each movable in a horizontal direction toward and from the other, said respective upright frames having roll centering members adapted to enter and engage the opposite ends of a roll at the center, means for advancing each of said frames in said direction which is in line with the axis of a roll on said stand, said advancing means comprising a hydraulic thrust unit of the single acting type connected to each frame, a back thrust base connected to each said unit oppositely to said frame and having a series of supports to take up the back thrust of said unit in advancing said frame, said supports being spaced and arranged in said direction, means tending to collapse said cylinders and draw said back thrust bases each toward the corresponding frame and means for automatically throwing said base out of engaging relation with its said back thrust supports as said base is withdrawn by said collapsing means and holding it out of engagement therewith whereby said frame is free to be moved backwardly and forwardly in said direction, said back thrust supporting means being open on the side toward the corresponding frame to release said bases.

20. In a roll lift stand for corrugating machines and the like, two upright frames mounted to move one toward the other in a horizontal line, said frames having upright ways with roll centering supports mounted therein for vertical adjustment, and means for separately adjusting said ways back and forth in a horizontal direction at right angles to said horizontal line to align in a horizontal direction a roll on said centering supports.

21. A roll lift stand for a corrugating machine for making corrugated board and the like, having two upright frames, mounted to move one toward the other approximately on a straight horizontal line, each said frame having upright ways and roll centering and supporting means adapted to engage the centers of the rolls, said centering and supporting means being mounted in said ways to move on an upright path, means mounted on each said frame for raising said centering means for lifting a roll, said lifting means comprising a hydraulic cylinder having a plurality of telescoping extensions therein whereby the lifting path is extended beyond the length of said cylinder.

22. A roll lift stand having two upright frames one mounted to move on an approximately straight horizontal path, toward and from the other, each said frame having roll centering and supporting means adapted to engage and center and support an axial end of a roll to support the roll with its axis parallel to said path, a hydraulic unit for moving said movable frame inwardly along said horizontal path toward the center of the axial length of a roll on said stand, said hy-

draulic unit comprising a hydraulic cylinder having a plurality of telescoping extension members, said unit having a thrust support for one end of said unit located at a point spaced outwardly in the direction of said path from its upright frame, said unit being oppositely connected to said frame, whereby said movable frame may be moved along said path by its hydraulic unit for a distance in excess of the length of said cylinder for adjustment to the length of a roll and for applying thrust to said centering member to accomplish centering and lifting engagement with a roll and for adjusting and aligning said roll.

23. A roll lift stand having two upright frames mounted to move on an approximately straight horizontal path, each toward and from the other, each said frame having roll centering and supporting means adapted to engage and center and support an axial end of a roll to support the roll with its axis parallel to said path, said centering means being mounted to move in a vertical direction and each frame having means for lifting said centering means to lift a roll, said lifting means being in the form of a hydraulic cylinder having a plurality of telescoping extension members therein whereby the lifting path of the corresponding center is extended beyond the length of said cylinder, a hydraulic unit for each said frame, for moving said frame inwardly along said path toward the center of the axial length of a roll on said stand, each said hydraulic unit comprising a hydraulic cylinder having a plurality of telescoping extension members therein, each said unit having a thrust support for one axial end of said unit located at a point spaced outwardly in the direction of said path from its said upright frame, each said unit having its other end operatively connected to its frame, whereby said frame may be moved along said path by said hydraulic element for a distance in excess of the length of said cylinder for adjustment to the length of a roll and for applying thrust to said centering member to accomplish a centering and lifting engagement with a roll and for adjusting and aligning said roll.

24. A roll lift stand having two upright frames mounted to move on an approximately straight horizontal path, each toward and from the other, each said frame having roll centering and supporting means adapted to engage and center and support an axial end of a roll to support the roll with its axis parallel to said path, a hydraulic unit for each said frame for moving said frame inwardly along said path toward the center of the axial length of a roll on said stand, each said hydraulic unit comprising a single acting hydraulic cylinder having a plurality of telescoping extension members therein, each said unit having a thrust support for one axial end of said unit located at a point spaced outwardly in the direction of said path from its said upright frame each said unit having its other end operatively connected to said frame, whereby said frame may be moved along said path by said hydraulic element for a distance in excess of the length of said cylinder for adjustment to the length of a roll and for applying thrust to said centering member to accomplish centering and lifting engagement with a roll and for adjusting and aligning said roll and tension means applying a continuous tendency to collapse said hydraulic units.

25. In a roll lift stand having two upright frames with roll centering means on each frame aligned in a vertical plane, said frames being movable horizontally in the direction of said plane and said centers being mounted for vertical motion in the same plane, means on each frame for raising the centers to lift a roll, each said means comprising a hydraulic unit consisting of cylinder and piston elements mounted on each frame, one element being stationary and the other to be advanced by the hydraulic pressure in said cylinder, a freely rotating pulley carried by the latter element to be advanced thereby and having a tension member extending about the arc of said pulley which is forward in said advancement, one end of said tension member being anchored and the other end of the same being connected in lifting relation to the centering means on said frame.

26. In a roll lift stand for a corrugating machine two upright frames mounted for movement on a substantially rectilinear path each toward and from the other, each said frame having an upright way with a roll centering support mounted for upright movement along said way each said centering support being inwardly disposed toward the center of said path, an upright hydraulic cylinder and piston mounted on each said frame and connected to the corresponding cone to lift the same and a hydraulic cylinder and piston adjacent each end of said path each connected to the corresponding frame to advance the frames to press the centering supports into engagement with the ends of the roll.

27. In a roll lift stand for a corrugating machine two upright frames mounted for movement on a substantially rectilinear path each toward and from the other, each said frame having an upright way with a roll centering support mounted for upright movement along said way each said centering support being inwardly disposed toward the center of said path, an upright hydraulic cylinder and piston mounted on each said frame and connected to the corresponding cone to lift the same and a hydraulic cylinder and piston adjacent each end of said path each connected to the corresponding frame to advance the frames to press the centering supports into engagement with the ends of the roll, some of said cylinders being of the single acting type and resilient means for collapsing each said single acting cylinder.

28. A roll lift stand for corrugating machines and the like, comprising two upright frames mounted for movement substantially on a horizontal path each toward and from the other, each said frame having roll centering means mounted thereon for movement in a vertical direction, said centering means being adapted to engage the opposite ends of the roll at the center and both said centering means being disposed toward the longitudinal center of said path, hydraulic means on each head for applying lifting force to the said centering means, and two hydraulic units, each comprising a single cylinder and means connecting each unit to a corresponding upright frame to advance the frames along said path and apply centering pressure to said centering means, and to adjust the centering means to the length of different rolls, whereby they are inserted in rolls in lifting engagement therewith, means providing for extending the path of each frame along which said centering pressure is thus applied by the respective units, whereby said path exceeds the length of one said cylinder.

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