Sept. 13, 1938. H. B. GREENWOOD 2,130,233

ROLL LIFT STAND

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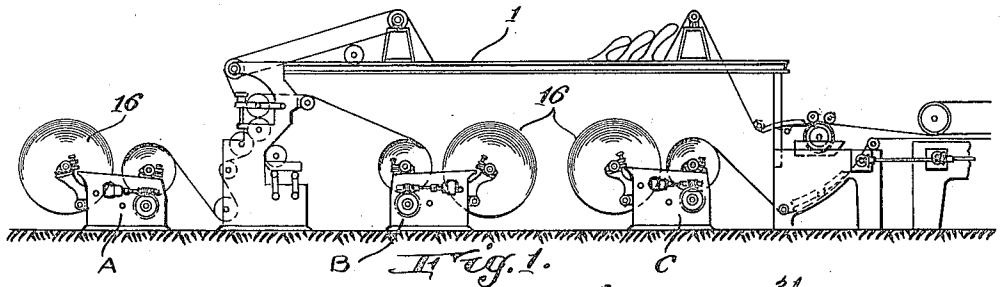



Fig. 1.

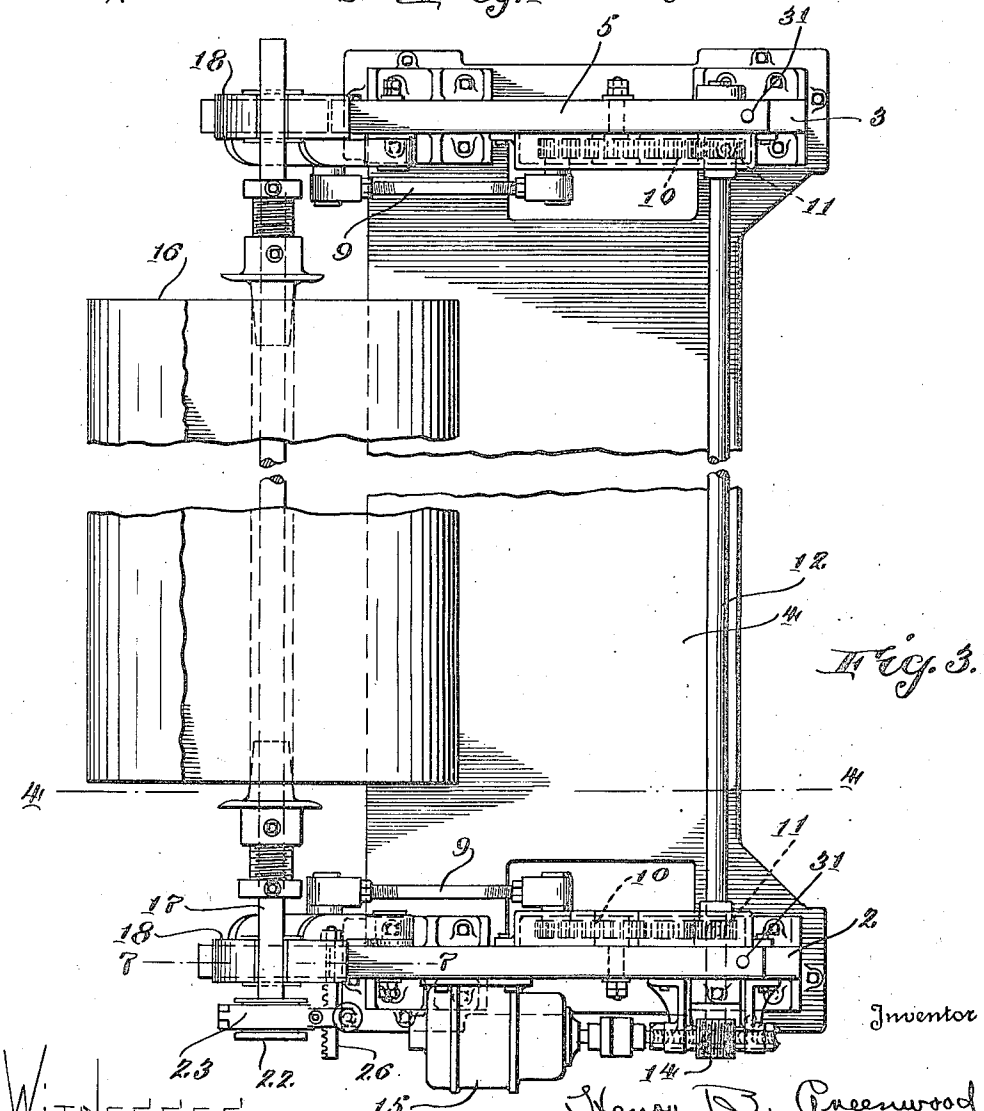



Fig. 3.

Witnesses:

Inventor

Henry B. Greenwood

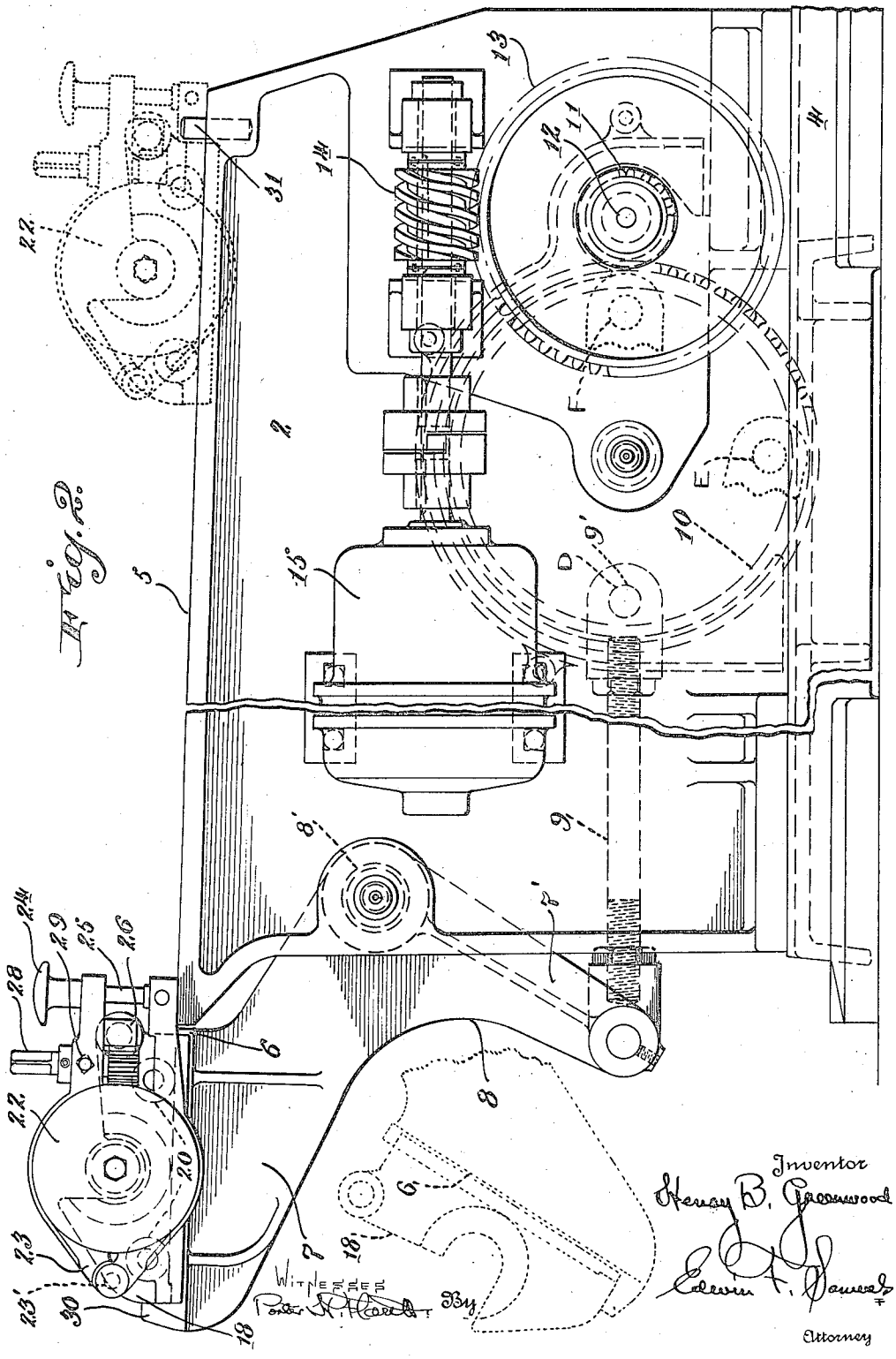
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Sept. 13, 1938. H. B. GREENWOOD 2,130,233

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Sept. 13, 1938. H. B. GREENWOOD 2,130,233

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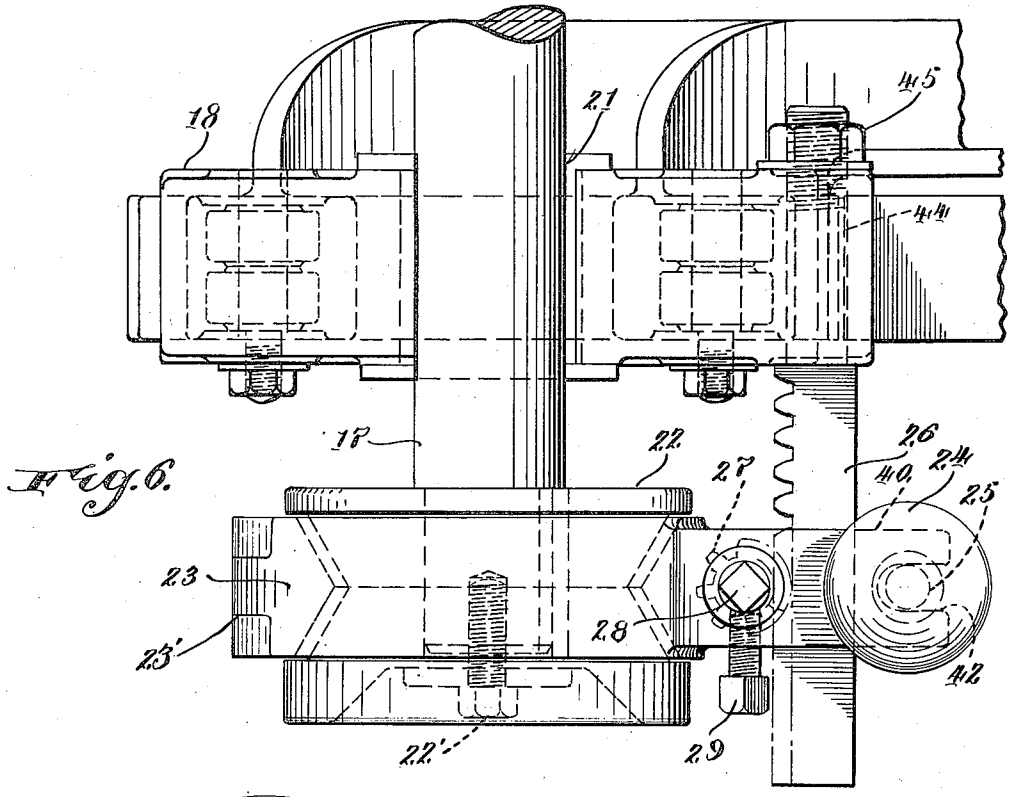



Fig. 6.

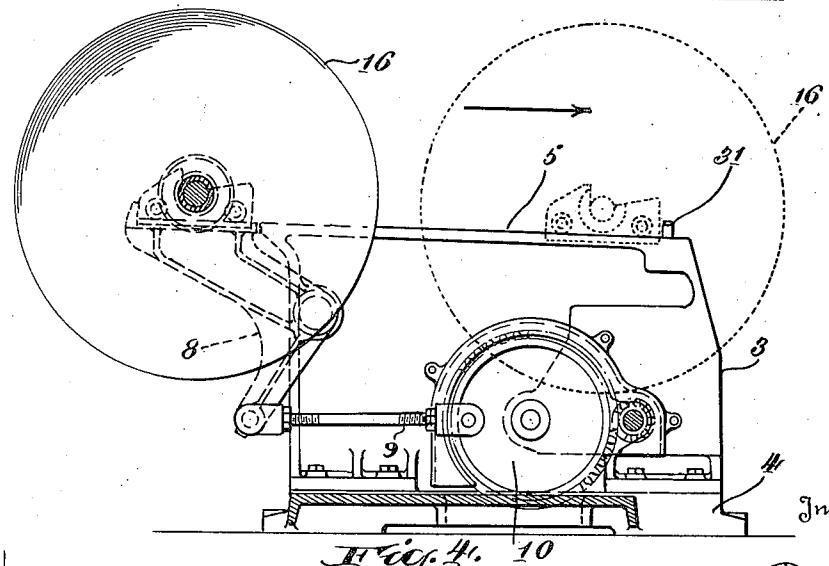



Fig. 4.

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ROLL LIFT STAND

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Fig. 5.

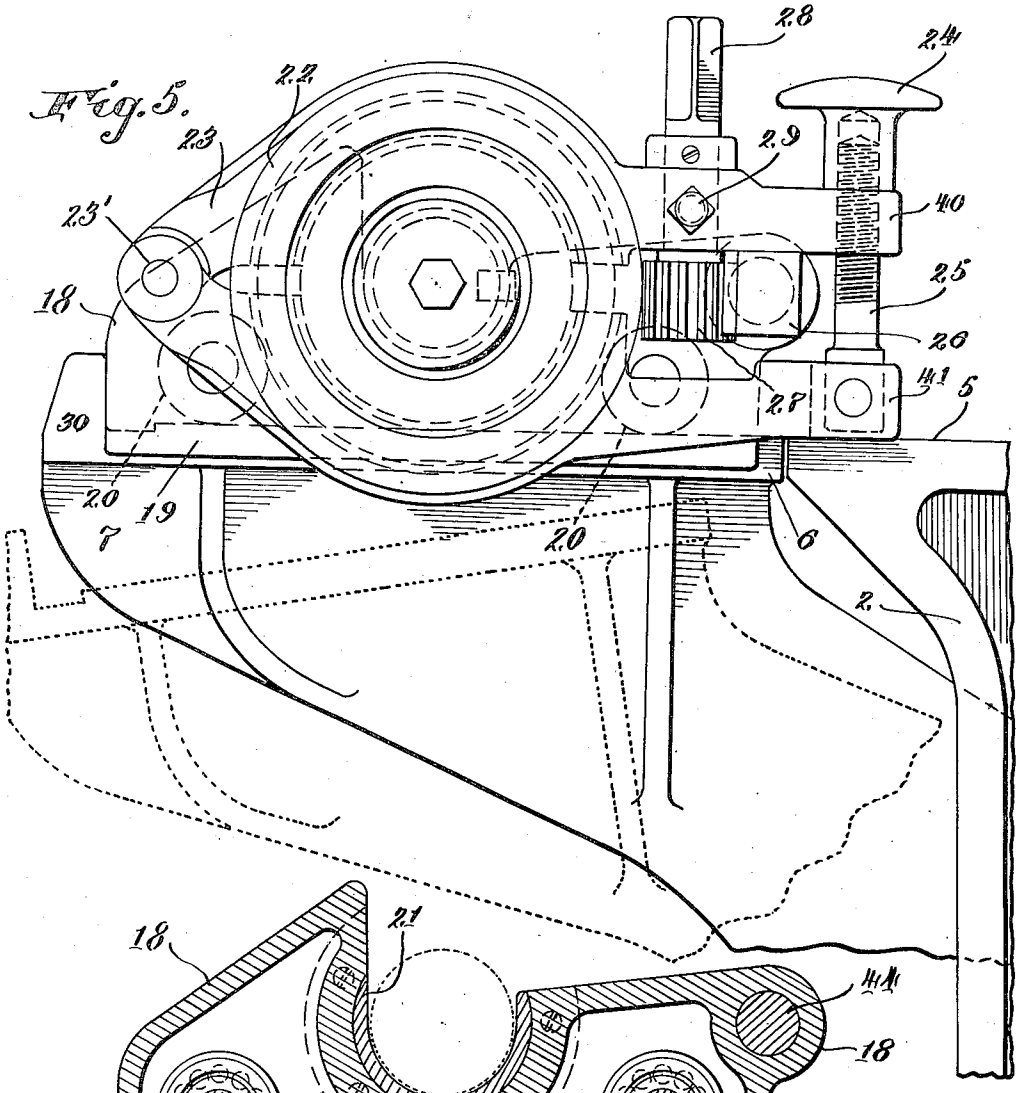






Fig. 7.

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Patented Sept. 13, 1938

2,130,233

# UNITED STATES PATENT OFFICE

2,130,233

## ROLL LIFT STAND

Henry B. Greenwood, Glenarm, Md., assignor to F. X. Hooper Company, Inc., Glenarm, Md., a corporation of Maryland

Application July 6, 1935, Serial No. 30,072

11 Claims. (Cl. 242—58)

This invention relates to an improved roll lift stand, referred to herein for brevity as a roll stand, for raising and presenting rolls of paper to be unwound from the roll and fed to a machine which consumes the paper. This machine may be a corrugated board machine or a printing press or other machine which uses paper or similar material drawn from a roll, the roll stand of the invention being adapted to carry a reserve roll in addition to the roll from which the paper is being fed to the machine.

An important object of the invention is to provide a roll stand of simple construction having means by which a roll may be easily raised to a point where it is ready for connection to the web being consumed and supported until needed, and then connected and transferred to final unrolling and feeding position so that there will be substantially no delay and little effort involved in the transfer, the machine of the invention being so arranged that the full reserve roll may be connected to the web being consumed while still in its initial position on the stand and thereafter moved forwardly to replace the used roll.

In the machine of the invention the roll stand is provided with parallel rails or ways each consisting of a movable and a stationary section. The paper roll shaft on which the roll is carried, is supported on these ways by means of shaft carriers or dollies which move along the ways carrying the roll from the initial or reserve position which is on the movable way sections to final unrolling position at the opposite end of the stationary way sections. The paper on the reserve or full roll is to best advantage connected to the free end of the paper just unwound from the used roll, and the latter is removed before the new roll is advanced to final unrolling or feeding position, the new roll being, particularly when it is of large size, partially used in the initial position.

To raise the full roll, which is of considerable weight, to the level of the stationary way, the movable way sections are each mounted on a rocking or other movable support on and with which the way sections are swung or moved downwardly to the level of the roll shaft, the roll being on the floor or other low support. The roll shaft ends are then placed in the carriers on the way sections. Then the supports are rocked or otherwise raised, the movable way sections with the roll thereon being thus raised to the level of the stationary ways, where the roll is held in reserve until needed.

The operation of the movable way sections is accomplished by suitable gearing preferably driven from a convenient type of motor. This gearing and the rocking supports are designed and constructed not only to raise and lower the movable way sections but to maintain exactly their parallel relation. This gearing is further preferably so designed as to give a reduction of speed of the movable way sections and carrier and support relatively to the speed of the motor as the level of the stationary way is approached. This gives an increase of the force applied in lifting the roll in proportion to the load on the motor. This is of considerable advantage as the largest and heaviest rolls being of greatest diameter, when on the floor, support the roll shaft at the highest elevation, so that the heavier the roll the shorter the lift, and with the heaviest rolls this lifting takes place where the greatest lifting force is available.

The invention further relates to a brake construction controlling the unwinding of the roll, the braking force being variable and effective both in the reserve position and the final feeding position on the stand and during transfer from one position to the other.

The invention also provides means for moving the roll in the direction of its axis operable in any position of the roll on the stand.

Other objects and advantages of my invention will be apparent from the following description and the accompanying drawings forming a part thereof and in which

Figure 1 is a side elevation of a corrugated board machine, showing the use of three roll stands.

Figure 2 is a side elevation of the roll stand of the invention.

Figure 3 is a top plan view thereof with the reserve roll thereon.

Figure 4 is a longitudinal sectional view on line 4, 4 in Figure 3.

Figure 5 is an enlarged detail view of the lifting lever, shown fragmentarily, shaft carrier and brake mechanism in side elevation.

Figure 6 is a top plan view thereof.

Figure 7 is a longitudinal sectional view through a shaft carrier on lines 7, 7 in Figure 3, showing the rail end in dotted lines.

In the drawings similar numerals refer to similar parts through the several views.

To illustrate an application of the roll stand to a well-known type of machine, a corrugated board machine is shown in Figure 1. This has three roll stands, the first stand A delivers the top sheet. The second stand B delivers the middle sheet which is corrugated and the third stand C delivers the bottom sheet, the three sheets being,

in the process of manufacture combined in a manner well known in the art. It will be apparent that with several rolls delivered at the same time on such a machine, stoppage of the machine for renewal of the rolls would be expensive. The drawings show each roll stand carrying a reserve roll 16 ready for instant connection of the paper thereon to the end of the paper on the used roll. This connection of the respective ends is accomplished in a manner well known in the art.

The roll stand comprises two upright side frames, 2, 3 mounted on a base 4. These side frames 2, 3 have stationary runway or rail sections 5 at the top, which are parallel and spaced upwardly from the floor sufficiently to accommodate the rolls. The stationary runway or rail sections are preferably arranged on a slight incline, i. e., they are inclined downwardly from the horizontal, toward the delivery end of the stand which is at the right in Figure 2. At the upper end of the incline which is remote from the delivery end of the stand, each rail or runway 5 has a section 6, which is movable separately from the remainder of the runway and is supported on the arm 7 of a bell crank lever or other suitable roll lifting support 8 of which there is one for each rail. The stationary sections 5 and movable sections 6 are collectively referred to as runways or rails. Each bell crank lever 8 is in turn pivotally supported on a stud shaft 8' in the corresponding side members 2, 3. The lower end of the depending arm 7' of each bell crank lever 8 is connected by a connecting rod 9 to a crank pin seated outwardly from the center in a gear 10, there being one said gear on each side member with a corresponding connecting rod and a bell crank lever 8 supporting the movable end section 6 of the corresponding rail.

These gears 10, one at each side of the machine, are driven by pinions 11, one on each end of a shaft 12 which extends across the roll stand, having a bearing in each side member 2, 3. The shaft 12 is driven by a worm gear 13 secured to the shaft which is in turn driven by a worm 14 on the shaft of the electric motor 15. The operation of the motor 15 will thus swing the bell cranks in unison to raise and lower the rail or way sections 6, maintaining their exact parallel relation. The worm drive from the motor has an important function, enabling the rail sections 6 with a roll thereon to be stopped and supported in any position by merely stopping the motor. This makes it possible to hold the movable rail sections 6 at any desired angle to the stationary sections, and to tip them downwardly from sections 5, see Figure 5, to hold the roll in initial position, preventing advancement of the roll until the operator is ready to move it.

The large paper rolls 16 from which the paper is to be fed are secured to roll shafts 17 in accordance with the usual practice, as shown in Figure 3. Shaft carriers 18, adapted to run on the ways or rails 5 and 6 and separable therefrom are also provided. These have depending guiding flanges 19 extending downwardly on each side of the rails or ways, and ball bearing rollers 20 to engage the rails so that the carriers with the upper rolls thereon move freely along the rails. These shaft carriers are each provided with a shaft bearing 21 thereon open at the top to admit a roll shaft 17 which, in the operative position extends across the rails from one carrier 18 to the other, on the respective rails.

One end of each roll shaft 17 has keyed thereto a grooved brake pulley 22 held in position by a washer and cap screw 22' seated in the end of the shaft. A split brake band 23 hinged at 23' engages the pulley 22. This band is provided with arms 40, 41 secured to the ends of the band and projecting oppositely to the hinge. The brake band is tightened by a hand nut 24 on a threaded pin 25, which nut engages the arm 40 from above, the pin being pivoted to the lower arm 41 and the upper arm being suitably slotted at 42 to receive the pin 25 as shown in Figures 5 and 6. When nut 24 is loosened, the pin 25 may be swung out of the slot releasing the band so that it is freely removed from the pulley 22.

As a means for supporting the brake band against rotation and also for use in moving the rolls in the direction of their axes, a rack 26 is provided. This rack in the form shown has a shank 44 extending through the carrier 18 in the direction of the shaft 17 and secured by means of a nut 45. The rack 26 extends between the brake arms 40, 41, thus preventing rotation of the brake band.

To move the shaft 17 and roll 16 in the direction of the axis, a pinion 27 is provided. This pinion engages the rack 26. The pinion is mounted on a short shaft 28 which extends vertically through the upper arm 40 of the brake band in which arm it has a bearing, the pinion being mounted in operative relation to the rack between the arms and on the lower end of the shaft 28, the upper end of which is formed for engagement with a crank or wrench. The pinion is normally held against rotation to prevent movement of the roll in the direction of its axis by means of a set screw 29. When it is desired to move the roll, a crank or other suitable tool is applied to the upper end of the shaft and the set screw 29 is loosened and the gear 27 and rack 26 are operated in either direction, moving the brake band 23, the shaft 17 and the roll 16. This adjustment is employed to line up the paper roll in feeding the paper and it may be done at any time without changing the tension of the brake.

When a roll is to be placed upon the stand, the bell crank levers or other moving supports 8 carrying the rail sections 6 at each side are swung downwardly in unison, retaining their parallel relation, the connecting rods 9 and gears 10, 11 at each side being connected together by the shaft 12, the side frame and base construction being extremely rigid for this purpose. To accomplish this result, the motor 15 is operated just sufficiently to bring the rail sections 6 to the proper location to receive the ends of the shaft 17 within the bearings 21 of the carriers 18 which are supported on the rail sections 6 for this purpose.

It is of interest that the connecting rods 9 in the upper position of the movable rail sections 6 and levers 8 in the preferred form shown are substantially in alignment with crank pins 9' and centers of gears 10, and as the connecting rods and crank pins approach this position, the action of the connecting rods and gears 10 is somewhat in the nature of the action of a toggle joint, that is, the motion of the crank pins 9' in the direction of the length of the connecting rods, which motion advances the rods 9 to raise the rail sections 6, approaches zero at this point, bearing at this time its smallest ratio to the speed of rotation of gears 10, which carry the crank pins, and to the motor speed, so that the force available to raise the roll is greatly increased as the upper position of the rail sections is approached.

In raising to position on the stand the heaviest rolls of the largest diameter, the rail sections 6 and the levers 8 when lowered to receive the roll, will be lowered only a small amount and then raised through the same arc to lift the roll. This means that the right hand end of the connecting rods 9, and the crank pins 9' will remain in the arc immediately adjacent position D, moving to this position in raising the heaviest rolls. This is of great advantage in that it applies substantially the maximum force to raise the larger and heavier rolls. If a very small diameter roll is to be lifted to the stand, the movable way sections 6 must be lowered still further, as to the position shown at the left in dotted lines in Figure 2. To accomplish this, the right hand end of the rod 9 may pass around through position E where the thrust applied to the connecting rod is least in proportion to the power of the motor, but this only occurs when relatively small rolls of relatively light weights are lifted, the height of the roll shaft when placed in the large rolls being such that it may be engaged by a relatively slight downward motion of the arm 7 of bell crank 8 which requires only a short movement of the crank pin 9' limited to the maximum power zone. Thus, with the large rolls the power of the motor is utilized most economically in lifting the greatest weight.

The way sections 6 have end abutments 30 thereon to support the carriers 18 in the downwardly inclined position of the section 6. When the ways are lowered to receive a roll, the shaft carriers 18 are placed on the ways and the roll shaft 17 with the roll 16 thereon is placed in the carrier bearings 21, the brake assembly is attached and the ways are raised. The upward movement is preferably stopped before the rail section 6 reaches a horizontal position, being inclined downwardly from the ways as shown in dotted lines in Figure 5. This eliminates any tendency of the roll to slide down the inclined way 5 into contact with the roll from which the paper is being fed. This is the initial and reserve roll position. In this position the roll awaits the consumption of the previous roll. When the previous roll is used, the paper on the reserve roll is connected to the web of paper being consumed. If the roll is by chance too large to advance freely, the paper is fed and used until the diameter is sufficiently reduced so as to avoid contact with any obstruction as the shaft 12. When it is desired to move the new roll forwardly to final position, the used roll having been removed, the ways 6 are further raised by operation of motor 15 to the position shown in Figure 4 and the shaft carriers 18 with the roll thereon slide down the inclined ways carrying the roll with them. At this time the brake is adjusted to restrict rotation of the roll to prevent slacking of the paper which is taken up by the machine as the roll advances. The pins 31 limit the forward movement of the carriers.

This forward position of the carriers against the stop pins 31, which is final unrolling or feeding position, is shown in dotted lines in Figure 2. The roll when advanced to this position, remains until exhausted, at which time the shaft and carriers are removed from the stand, and a new roll, having been previously lifted to the reserve position as described, is connected to the web being used, and placed in consumption, the process being repeated as required to feed the machine without the necessity for stopping at any time to replace the rolls.

It will be apparent that various modifications may be made in the structure of the stand and the details thereof without departing from the spirit of the invention.

I have thus described specifically and in detail a single embodiment of my invention in the preferred form in order that the manner of constructing, applying, operating and using the same may be fully understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

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

1. A roll stand for paper and similar rolls for supporting the rolls in feeding relation to a machine using the paper from the rolls, comprising in combination a pair of spaced parallel ways, each of said ways having a stationary section for supporting a paper roll in unrolling, i. e., feeding position, and a movable section at one end of said ways, carriers adapted to run on said ways and having means for rotatively supporting paper roll shafts with the rolls thereon, and said roll shafts, having brake members thereon, pivotally mounted supporting means for said movable sections adapted to present the movable way sections in running relation with the stationary sections, and means for rocking said supports for lowering and raising the movable sections to receive a paper roll in said carriers on the movable rail sections and raise it to the stationary ways to be transferred thereto by operation of the carriers from one way section to the other, said carriers having braking means adapted to be connected thereto to move therewith and cooperating with the brake members on the roll shafts.

2. A roll stand for paper rolls and their roll shafts comprising in combination a pair of raised parallel runways, removable shaft carriers operable on said runways, there being a pair of carriers adapted to receive the respective ends of each roll shaft, means for raising a roll and its supporting shaft on and with said carriers, bringing said carriers into running relation with said runways, and removable means on one carrier of each pair of carriers running therewith on the ways for controlling rotation of the roll shaft.

3. A roll stand for paper rolls and their roll shafts comprising in combination a pair of raised parallel runways, removable shaft carriers operable on said runways, there being a pair of carriers adapted to receive the respective ends of each roll shaft, means for raising a roll and its supporting shaft and said carriers, bringing said carriers into running relation with said runways, and removable means on one carrier of each pair of carriers running therewith along the ways for controlling rotation of the roll shaft, said removable means comprising a brake band adapted to co-operate with a pulley on the shaft, the brake band having parallel projecting arms with means for operating said arms to apply tension to the band, a rack projecting from the carrier between the arms and a pinion engaging the rack and mounted on one of said arms, and means for rotating the pinion to move the roll shaft and roll in the direction of the shaft axis.

4. A roll stand for paper rolls and their roll shafts comprising a pair of raised parallel runways, removable roll shaft carriers operable on said runways, two for each roll shaft engaging the respective ends of the shaft and running on the respective ways, means for raising a roll and roll

shaft and its carriers in their assembled running relation to said ways bringing the carriers into running relation with the runways, a removable brake on one of each pair of carriers moving therewith to control the rotation of the shaft thereon and means combined with the brake for moving the shaft and roll longitudinally of the shaft axis relatively to said carrier.

5. A roll stand for paper rolls and their roll shafts comprising a pair of raised parallel ways, removable roll shaft carriers operable on said ways, two for each roll shaft engaging the respective ends of the shaft and running on the respective ways, means comprising two pivotally mounted bell crank levers each provided with a means for supporting a carrier thereon in its running relation thereto, and means for swinging said bell crank levers in unison, raising a roll and roll shaft and its carriers in their assembled running relation to said ways bringing the carriers into running relation with the ways.

6. A roll stand for paper rolls and their supporting shafts comprising in combination a pair of spaced parallel stationary runways, a lever for each runway, both mounted to swing about a single axis, said levers being connected to move together about said axis, movable runway sections one carried by each lever, the sections being held in parallel relation to be moved into running relation with said stationary runways by said levers, removable shaft carriers operating on said movable runway sections and on said stationary runways, there being a carrier arranged to support each end of each roll shaft, means for operating said levers in unison to lower the movable sections to receive a roll supporting shaft with its carriers on said sections and to return said levers, raising the roll supporting shaft to the stationary ways, bringing the runway sections into alignment with the stationary runways and the carriers into running relation therewith.

7. A roll stand for paper rolls and their supporting shafts comprising in combination a pair of spaced parallel stationary runways, a support for each runway mounted to swing about a single axis, said supports being connected to move together about said axis, movable runway sections one carried by each support to be moved into alignment with said stationary runways by said supports, removable shaft carriers operating on said movable runway sections and on said stationary runway, and from one to the other, one for carrying each end of each roll shaft, means for operating said levers in unison to lower the movable sections to receive a roll supporting shaft with its carriers on said movable runway sections and to return said supports, raising the roll supporting shaft to the stationary ways, bringing the runway sections into alignment with the stationary runways and the carriers into running relation therewith, and means at the remote ends of both sections for arresting the motion of the carriers.

8. A roll stand for paper rolls and their supporting shafts comprising in combination a pair of parallel stationary ways, a pair of movable way sections at one end of said ways, a bell crank lever supporting each movable section, said levers being pivoted substantially on the same axis, the upper position of said movable sections being in running alignment with the stationary way sections, roll shaft carriers running on said ways from said movable sections to said stationary sections, and means for operating said bell crank levers to swing the said movable sections downwardly to receive a paper roll and roll shaft and carrier thereon, and return them to substantial alignment with the stationary sections, said means comprising a single source of power, rotary gear means and a connecting rod and crank pin for each bell crank, the connecting rod and crank pin being in substantial alignment with the center of rotation of the crank pin in the upper position of the movable sections.

9. A roll stand for paper and similar rolls comprising in combination a pair of spaced parallel ways, adapted to support roll shafts in running relation therewith the ways having stationary sections adapted at one end to hold a roll in final unrolling position and having movable way sections at the other end, means adapted to support the movable sections in running alignment with the stationary sections of the ways, and means for lowering the movable sections of said ways to receive a roll shaft and roll thereon and for raising the same to alignment with the stationary way sections to raise a paper roll to the ways, permitting it to be moved along the stationary way sections to said final unrolling position, said lowering and raising means comprising a connecting rod and crank pin at each side of the stand, and driving means for rotating the crank about a center to raise said sections with a roll thereon, said connecting rod being operatively connected to the movable way sections, said connecting rod and crank pin being in substantial alignment with the center of rotation of the crank pin when the movable way sections are in substantial alignment with the stationary way sections.

10. A roll stand for paper and similar rolls for supporting the rolls in feeding relation to a machine using the paper from the rolls comprising in combination a pair of spaced parallel ways, each having a stationary section and a movable section at one end of the ways, said movable sections having a normal position in running relation with the stationary sections, said ways being adapted to receive roll shafts to be supported thereon to move along the ways and from the movable sections to the stationary sections, pivotally mounted supporting means for said movable sections and means for rocking said supports to raise and lower the movable sections, holding them in parallel relation to receive a paper roll and deliver it to the runways, said raising and lowering means comprising a gear drive, and intermediate connections to said supporting means comprising a connecting rod, a crank operating said connecting rod and operated by said drive, said supporting means having a lever arm to which said connecting rod is connected oppositely to said crank, said connecting rod and crank approaching alinement and the lever arm being substantially at right angles to the connecting rod as the movable sections approach said normal position, giving a reduction of speed of the rocking support in relation to the speed of the gear drive and a consequent increase of the force applied as the movable way sections approach said normal position without corresponding increase of load on the power source.

11. A roll stand for paper and similar rolls for supporting the rolls in feeding relation to a machine using the paper from the rolls, comprising in combination a pair of spaced parallel ways, each having a stationary section and a movable section at one end of the ways, said movable sec-

tions having a normal position in running relation with the stationary sections, said ways being adapted to support a shaft centrally located of said roll to be moved along the ways from the movable sections to the stationary sections, pivotally mounted supporting means for said movable way sections and means for rocking said supports about said pivots to raise and lower the movable sections holding them in parallel relation to receive the shaft of the said paper roll to deliver it to the stationary ways, said raising and lowering means comprising a power driven rotatable member and intermediate connections eccentrically located of said rotatable member for connecting the rotatable member with the said movable way section support, said raising and lowering means being adapted to give a reduced speed to the rocking support in relation to the speed of the driving means and a consequent increase of the force applied as the movable way sections approach said normal position without corresponding increase of load on the power source.

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