Nov. 16, 1943. A. C. SMITH 2,334,223

MATERIAL HANDLING APPARATUS

Filed May 26, 1941 4 Sheets-Sheet 1

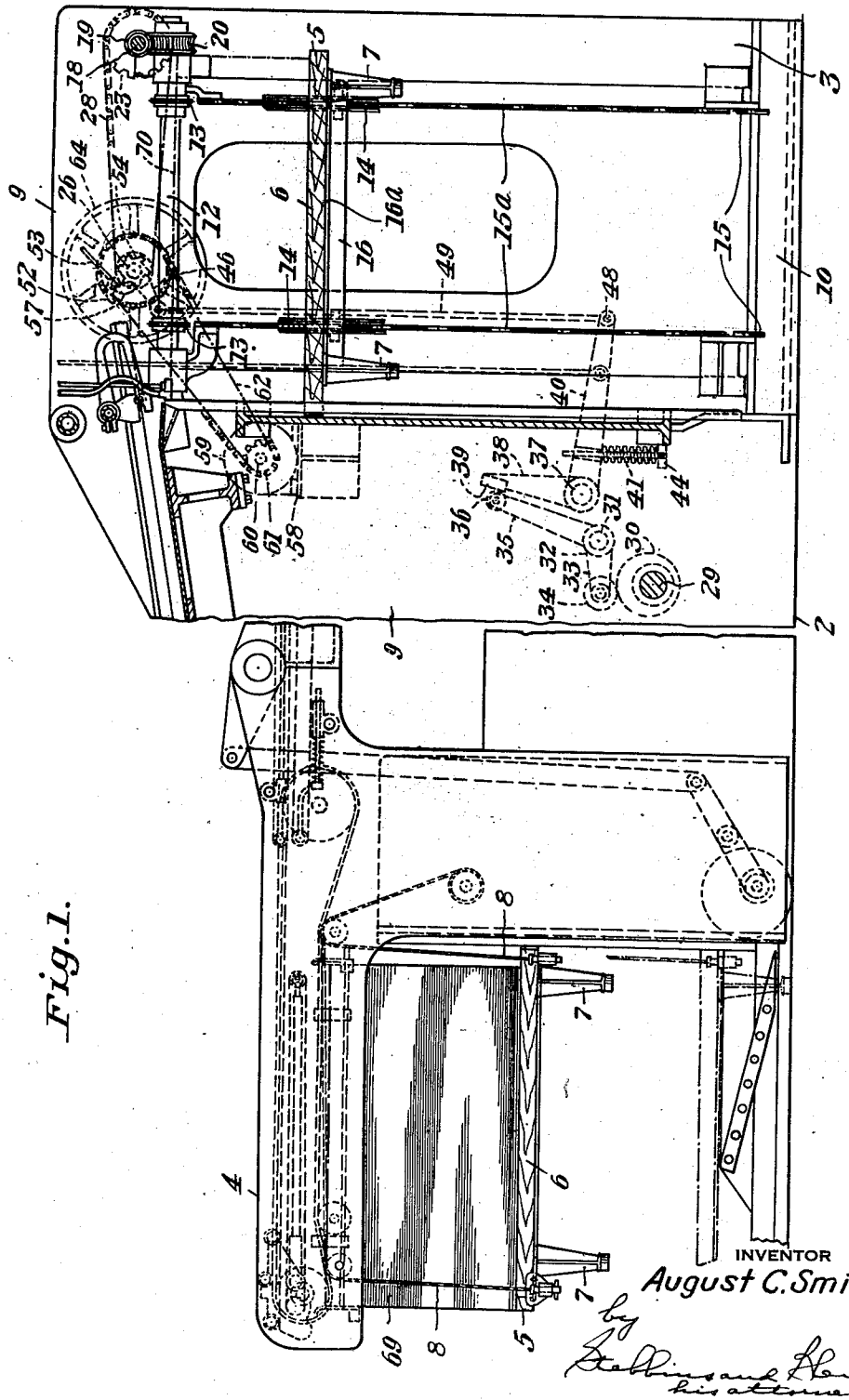


Fig. 1.

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MATERIAL HANDLING APPARATUS

Filed May 26, 1941 4 Sheets-Sheet 2

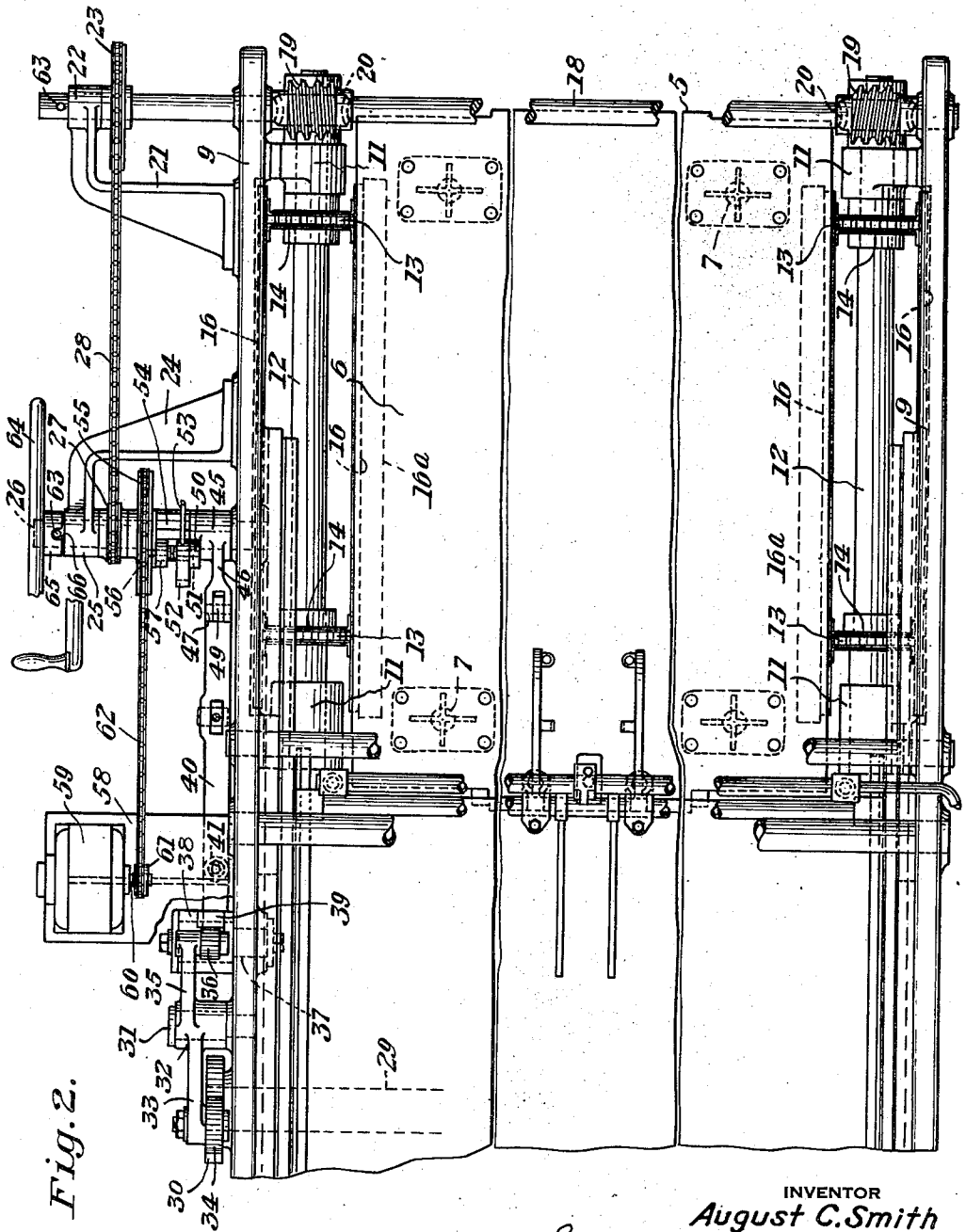


Fig. 2.

INVENTOR
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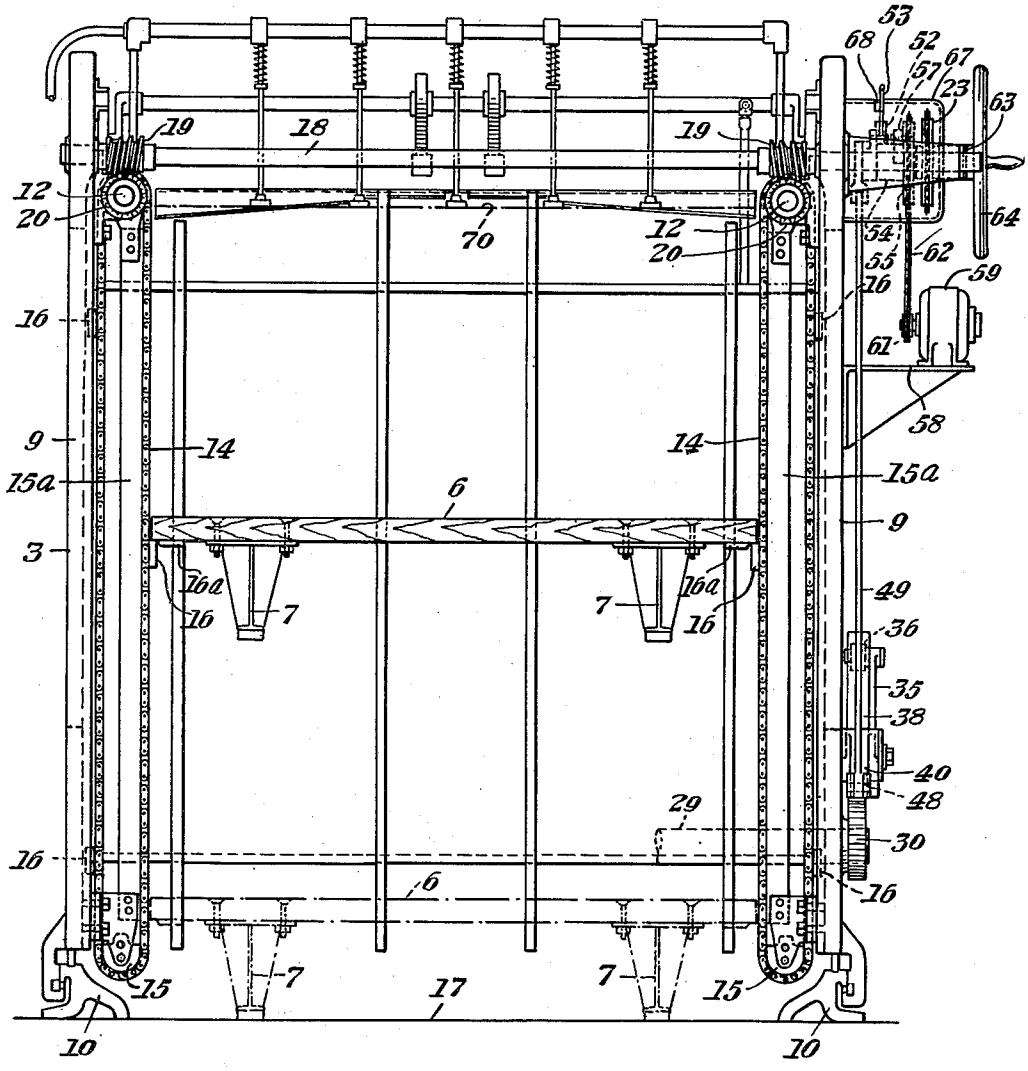
by Robbins and Blanco
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Nov. 16, 1943. A. C. SMITH 2,334,223

MATERIAL HANDLING APPARATUS

Filed May 26, 1941 4 Sheets-Sheet 3

Fig. 3.



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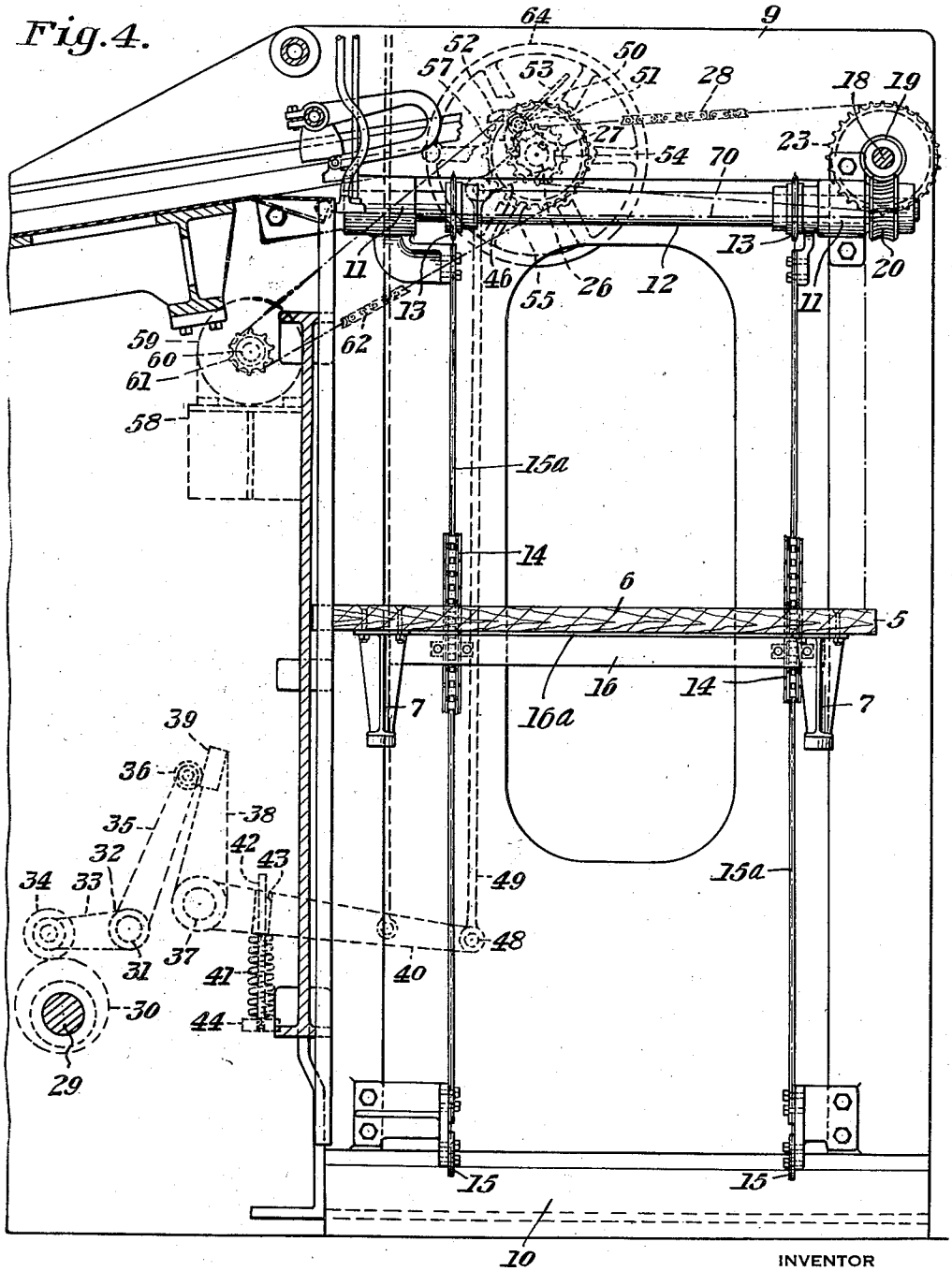
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Nov. 16, 1943. A. C. SMITH 2,334,223

MATERIAL HANDLING APPARATUS

Filed May 26, 1941 4 Sheets-Sheet 4

Fig. 4.



INVENTOR

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Patented Nov. 16, 1943

2,334,223

UNITED STATES PATENT OFFICE

2,334,223

MATERIAL HANDLING APPARATUS

August C. Smith, Pittsburgh, Pa., assignor to Miller Printing Machinery Co., Pittsburgh, Pa., a corporation of Pennsylvania

Application May 26, 1941, Serial No. 395,137

26 Claims. (Cl. 271—3)

This invention relates to material handling apparatus. It has to do with apparatus for handling material treated in a processing mechanism such, for example, as a printing press or the like. The invention relates particularly to means for supporting the material in proper position relatively to the processing mechanism either before or after treatment or both and to the handling and positioning of the supporting means.

While in its broadest aspects the invention is applicable to material handling apparatus generally it is particularly adaptable to the art of handling sheets which are printed upon or otherwise treated in a press. The press may be a printing press, a cutting and creasing press or other instrumentality for acting upon sheets successively. The word "printing" as used herein comprehends not only the application of ink to sheets but also analogous treatment thereof customarily performed in similar apparatus, as, for example, cutting and creasing. Purely for purposes of explanation and illustration the invention will be described as embodied in sheet handling apparatus for handling sheets which are printed upon in a printing press. In the described embodiment of the invention certain of the novel features have to do with both the feeder and the delivery.

I provide for greatly facilitated handling of sheets being fed to and delivered from a press. Customarily a pile of sheets is supplied to the feeder and as the sheets are moved from the pile one by one to be operated upon in the press the pile is raised to maintain the top of the pile at the proper level for feeding. The printed sheets are piled up by the delivery and as the delivered pile increases in height its support is lowered. When a pile of sheets being fed into a press is exhausted a new pile must be supplied. Various provisions for supplying a new pile of sheets under such circumstances have heretofore been made. It has been proposed to insert a second pile support in the feeder below a previously inserted pile support which is nearing the top of its travel and to pile sheets upon the second support. This has the disadvantage that sheets have to be deposited upon the support after the support is inserted into the feeder, or if it be attempted to insert the support into the feeder with a heavy pile of sheets thereon great difficulty in handling is encountered. It has also been proposed to provide a special stationary seat in the feeder for a pile support and to deliver a loaded pile support to that seat and pick up the pile support by elevating means during operation of the feeder. This provision is undesirable as it complicates the feeder structure and imposes an obstacle to free access to portions of the feeder mechanism.

I provide for supplying a loaded pile support to a feeder in position to be picked up and elevated by the elevating means and picking up and raising the pile support automatically during operation of the feeder. I preferably provide a pile support or carrier having supporting means and a sheet supporting surface disposed above the bottom of the supporting means so that the carrier may be introduced to the feeder to rest upon its supporting means in position to be automatically picked up and elevated without the necessity of providing any seat for the carrier in the feeder. I also provide a pile carrier interchangeable between the feeder and delivery and having its own support so that it may be introduced to the feeder and picked up automatically as above described. Thus a pile of sheets to be printed a second time may be transferred directly from the delivery to the feeder without repiling and without the provision of any special seat in the feeder. Preferably the pile carrier has supporting legs. Preferably it is supported in the delivery by tension means, as is customary in the art, but may be positioned upon its legs for automatic picking up by the pile elevating means of the feeder.

I also provide improved means for raising and lowering the pile carrier or support in the feeder, although in its broadest aspects this feature of the invention likewise is not limited to a sheet feeder or, indeed, to sheet handling apparatus as distinguished from apparatus for handling other materials.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention, in which

Figure 1 is a side elevational view, partly in vertical cross section, of printing apparatus showing portions of a feeder and a delivery with the printing couple cut away;

Figure 2 is an enlarged fragmentary plan view of a portion of the feeder;

Figure 3 is an end elevational view of the feeder; and

Figure 4 is a side elevational view, partly in vertical cross section, of a portion of the feeder.

Referring now more particularly to the drawings, there is shown a printing press designated

generally by reference numeral 2 but with the printing couple cut away since the invention does not relate to the structure of the printing couple per se. The printing press is provided with a feeder designated generally by reference numeral 3 and a delivery designated generally by reference numeral 4. The feeder is adapted to supply sheets in succession to the printing couple where they are printed or otherwise acted upon whereafter they are delivered to a pile by the delivery. I provide pile supports or carriers which are interchangeable between the feeder and delivery. Each of such supports or carriers is designated by reference numeral 5 and comprises a wooden top 6 and four legs 7 connected therewith. The legs constitute supporting means for the carrier and the upper surface of the top 6 constitutes a pile or sheet supporting surface upon which the pile of sheets rests. These carriers are adapted to be positioned in the feeder to rest upon their legs 7 whereby to be automatically picked up and raised, as will presently be described, and they are also adapted to be supported and lowered in the delivery by tension supporting means shown as comprising cables 8 and which may be of known construction.

The feeder 3 comprises opposed side frames 9 supported upon tracks 10 whereon the feeder is movable toward and away from the printing couple. The side frames 9 are suitably cross-connected to form a rigid support for the sheet feeding mechanism. The side frames 9 carry bearings 11 in which are rotatably mounted two horizontal longitudinally extending shafts 12, one adjacent and parallel to each side frame, the shafts being parallel to each other. Each shaft 12 carries a pair of spaced sprockets 13. Disposed about each sprocket 13 and extending downwardly therefrom is a sprocket chain 14. Each sprocket chain 14 passes about a bottom guide 15 at the base of the feeder. Thus there are four pairs of cooperating sprockets and guides, each pair having a sprocket chain trained thereabout. Two of the chains are disposed at one side of the feeder and the other two are disposed at the opposite side. Each chain is directly opposed to one of the chains at the other side.

Connected with and extending between the two chains 14 at each side of the feeder are three bars 16 equally spaced along the chains. Since the driving sprockets 13 at each side of the feeder are fixed to the same shaft and all four driving sprockets are identical the chains will be operated synchronously by means presently to be described and the bars 11 will move with the chains. The length of the top 6 of each of the pile carriers 5 is slightly less than the transverse distance between the inner reaches of the chains 14 as shown in Figure 3. A pile carrier is adapted to be introduced to the feeder at the bottom thereof as shown in chain lines in Figure 3 and to be set upon the floor 17, its legs 7 spacing its top 6 above the floor as shown. When the carrier is thus positioned the under surface of its top 6 is somewhat above the elevation of the bottom guides 15.

All of the chains 14 are adapted to be driven upwardly, outwardly, downwardly and inwardly, viewing Figure 3. Thus when one of the pile carriers is positioned as shown in chain lines in Figure 3 it will upon operation of the feeder automatically be picked up by the opposed bars 16. The bars on the respective chains are arranged so that they will move upwardly in transversely aligned pairs. Thus a pile support with a pile thereon may be introduced to the feeder by a lift truck or the like which engages the under surface of the top 6 between the legs 7 and set down on the floor upon its legs. As the feeder operates the chains automatically pick up the carrier by engagement of the members 16 beneath the end edges of the carrier top 6. The inner reaches of the chains 14 are held against outward displacement by vertical guides 15a which lie between the inner and outer reaches of the chains and against the outer faces of the inner reaches thereof as shown in Figure 3. The carrier is centered by guide members 16a fastened to the under surface of the top 6 of the carrier, as shown in Figure 3, and which lie between the bars 16. No special stationary seat for the carrier is required and the mechanism is thus greatly simplified and free access to all the parts of the feeder is provided for. When the carrier has been raised to the upper portion of the feeder another carrier with a pile of sheets thereon may be positioned as above described and raised automatically below the first carrier. Thus as soon as all of the sheets of the upper pile have been fed the upper carrier may be quickly lifted out and the pile of sheets on the lower carrier may be quickly raised to bring the top sheet of such pile into feeding position. The whole operation may be performed in a few seconds so that there is no appreciable delay. Moreover, as soon as a pile of sheets of desired height has been accumulated upon one of the carriers at the delivery end of the apparatus such carrier may be transferred on a lift truck or other suitable transfer mechanism from the delivery end to the feeder end of the press and there introduced as above described to enable the sheets to pass through the press a second time to receive a second impression. Of course the printing form will ordinarily be changed between the first and second passes of the same sheets through the press.

Extending transversely of the feeder and journaled in the side frames 9 is a shaft 18. Such shaft fixedly carries two worms 19 of the same size and pitch but of opposite hand. Each of the shafts 12 fixedly carries a worm wheel 20 meshing with one of the worms 19. Thus rotation of the shaft 18 in one direction turns the shafts 12 to move the inner reaches of the chains 14 upwardly and rotation of the shaft 18 in the opposite direction turns the shafts 12 to move the inner reaches of the chains 14 downwardly.

Connected with one of the side frames 9 is a bracket 21 having a bearing portion 22 through which one end of the shaft 18 extends as shown in Figure 2. Fixed to the shaft 18 outside the frame 9 and adjacent the bearing portion 22 is a sprocket 23. Also fixed to the same side frame is a bracket 24 having a bearing portion 25, and a shaft 26 is rotatably mounted in said bearing 25 and also has bearing in the side frame. Fixed to the shaft 26 is a sprocket 27 which is in longitudinal alignment with the sprocket 23. A sprocket chain 28 meshes with the sprockets 23 and 27. Since the sprocket 23 is fixed to the shaft 18 and the sprocket 27 is fixed to the shaft 26 turning of the shaft 26 in one direction results in raising of a pile carrier carried by the chains 14 and turning of the shaft 26 in the opposite direction results in lowering of a pile carrier carried by the chains 14.

The feeder is provided with oscillatory means for raising the pile carrier in the feeder while

the press is in operation. Such oscillatory means may be driven from the press drive and may be of known construction and provided with known control mechanism for insuring that the top of the pile in the feeder remains substantially at a predetermined height. The oscillatory means for raising the pile carrier is shown diagrammatically in the drawings, the control mechanism being omitted for clarity and since it is of known construction. A shaft 29 extends transversely of the press and carries an eccentric 30. Pivoted upon a transverse stud 31 in the press frame is a bell crank lever 32 having a relatively short generally horizontal arm 33 carrying at its extremity a roller 34 riding upon the eccentric 30. The bell crank lever 32 also has a relatively long generally vertically extending arm 35 having at its upper extremity a roller 36. A transverse shaft 37 is mounted in the feeder frame and carries a generally vertically extending arm 38 having at its extremity an abutment portion 39 adapted to abut the roller 36 carried by the arm 35, as shown in Figure 1. When the feeder is moved bodily away from the press on the tracks 10 the connection between the roller 36 and the abutment portion 39 is broken simply by movement of the latter away from the former and when the feeder is moved back into operative position this connection is automatically re-established.

Also fixed to the shaft 37 is a generally horizontally extending arm 40. A compression coil spring 41 guided by a rod 42 extending through an enlarged bore 43 in the arm 40 at all times urges such arm upwardly. The rod 42 is threaded into a bracket 44 carried by the feeder frame. The shaft 29 is connected with the press drive and rotates during operation of the press. Through the connections above described it causes oscillation of the arm 40 about the axis of the shaft 37.

Loosely mounted on the shaft 26 is a collar 45 having integral therewith an arm 46. Shown for convenience as pivoted to the arm 46 at 47 and to the arm 40 at 48 is an operating rod 49. Consequently upon rotation of the shaft 29 the rod 49 oscillates vertically and the collar 45 oscillates angularly upon the shaft 26. The collar 45 also carries an extension 50 to which is pivoted at 51 a pawl 52 having a handle 53 by which the pawl may be moved between operative and inoperative positions. In the drawings the pawl 52 is shown in inoperative position.

Fixed to the shaft 26 is a ratchet 54 with which the pawl 52 is adapted to cooperate. However, the ratchet 54 is much wider longitudinally of the shaft 26 than the pawl 52, such pawl acting upon one side only of the ratchet. Rotatably mounted on the shaft 26 is a sprocket 55 to which is pivoted at 56 a second pawl 57 adapted to cooperate with the portion of the ratchet 54 offset from the pawl 52. Fixed to the feeder frame is a support 58 which carries an electric motor 59 whose shaft 60 has a sprocket 61 fixed thereto. A sprocket chain 62 meshes with the sprockets 55 and 61.

A portion of the shaft 26 projects outwardly beyond the bearing 25 and a portion of the shaft 18 projects outwardly beyond the bearing 22. Each of these projecting shaft portions is provided with a radial pin 63. A hand wheel 64 is provided which has a hub 65 adapted to be passed over either of the shafts 18 and 26. The hub 65 has a notch 66 adapted to receive the pin 63 in whichever of the shafts 18 and 26 the hand wheel is applied to. The hand wheel is shown in Figure 2 as applied to the shaft 26. The engagement of the pin 63 in the notch 66 results in turning of the shaft 26 upon turning of the hand wheel. Since the hand wheel is direct-connected to the shaft it turns the shaft positively in either direction. A resilient snap connection (not shown) may be provided for preventing accidental removal of the hand wheel 64 from each of the shaft ends while allowing easy removal of the hand wheel when desired.

The hand of the ratchet 54 and the pawls 52 and 57 is such that the oscillatory mechanism driven from the shaft 29 and the motor 59 can turn the shaft 26 only in a direction to raise the pile support. When the oscillatory mechanism is in operation the pawl 52, being then placed in operative position with respect to the ratchet 54, turns the shaft 26 periodically but always in a direction to raise the pile carrier. When the motor 59 is operated the pawl 57 connected with the sprocket 55 turns the ratchet 54 and the shaft 26 continuously in a direction to raise the carrier. Neither the oscillatory mechanism nor the motor 59 can lower the carrier.

The hand wheel 64 when applied either to the shaft 26 or to the shaft 18 can be used either for raising or for lowering the carrier. When the carrier is to be lowered the pawl 52 is moved by its handle 53 to the inoperative position shown in the drawings. The pawl 57 may remain in operative position at all times. If the pawl 57 is in operative position and either shaft 26 or 18 is turned by the hand wheel to lower the carrier this will result in driving the motor 59 backward but will do no harm. If the added drag of the motor is undesirable the pawl 57 may be moved to inoperative position.

When the press is in operation and a pile carrier is nearing the upper portion of the feeder another pile carrier with a pile of sheets thereon is positioned in the feeder on the floor as shown by the chain lines at the bottom of Figure 3. When the next pair of bars 16 comes around under the lower carrier such carrier will be raised as above described. As the last sheet is taken from the upper carrier such upper carrier is manually removed and immediately the motor 59 is operated to rapidly raise the lower carrier until the top of the pile of sheets carried thereby is at the proper level for feeding. If desired an automatic device may be provided for stopping the rapid upward movement of the support or such movement may be stopped by the operator and the support adjusted to desired position by the hand wheel 64 applied either to the shaft 26 or to the shaft 18. When the hand wheel 64 is applied to the shaft 26 a greater mechanical advantage is afforded although the speed of movement of the carrier relatively to the speed of turning of the wheel is less than when the hand wheel is applied to the shaft 18.

In Figure 3 a casing 67 is shown about a portion of the shaft 26, such casing being omitted in the other figures. A slot 68 is formed in the upper portion of the casing for receiving the handle 53 of the pawl 52 so that such pawl may be moved to operative and inoperative positions without removing the casing 67.

The drawings show more or less diagrammatically or fragmentarily other elements of the apparatus, but since such other elements may be conventional and do not form part of the

present invention they will not be described in detail. It is of course to be understood that means are provided in the feeder for taking sheets from the top of the pile in the feeder and feeding them one by one to the press, after which they pass to the delivery and are piled up. The pile of sheets in the delivery is shown at 69. For clarity the sheets are not shown in the feeder but it will be understood that the pile carriers 5 when supplied to the feeder carry piles of sheets. The level of the top of the pile of sheets in the feeder carried by the upper carrier is designated by the chain line 70. In Figures 3 and 4 the upper pile carrier in the feeder is shown at a somewhat lower elevation than in Figure 1 and in Figures 1 and 4 no lower pile carrier is indicated as is the case in Figure 3.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. Sheet handling apparatus comprising a feeder portion and a delivery portion, the delivery portion having means for supporting and lowering a pile carrier, a pile carrier adapted to be supported and lowered by said means, the feeder portion having means for supporting said pile carrier prior to raising it and with said pile carrier in the path of raising means and also having raising means separate from said supporting means adapted to pick up the pile carrier from said supporting means and raise the same, whereby the pile carrier with a pile of delivered sheets thereon may be transferred directly from the delivery portion to the feeder portion and positioned on said supporting means in position to be picked up and raised in said feeder portion so that the sheets may be again fed through the apparatus.

2. Sheet handling apparatus comprising a feeder portion and a delivery portion, the delivery portion having means for supporting and lowering a pile carrier, a pile carrier adapted to be supported and lowered by said means, the feeder portion having means for supporting said pile carrier prior to raising it and also having raising means adapted simultaneously to raise a plurality of pile carriers, said raising means having pile carrier engaging means adapted to pick up said pile carrier from said supporting means and raise the same while said raising means is still raising a previously pick-up pile carrier.

3. Sheet handling apparatus comprising a floor, generally upwardly movable means for raising a pile carrier having thereon a pile of sheets, a pile carrier having a sheet supporting surface, a surface adapted to rest on a lift truck or the like and means extending downwardly from said last mentioned surface whereby the pile carrier may be set down on the floor by a lift truck or the like in the path of said generally upwardly movable means, said generally upwardly movable means having portions adapted to engage beneath the pile carrier upon generally upward movement of said means while the pile carrier is thus positioned on the floor to raise the same.

4. Sheet handling apparatus comprising a pile carrier having supporting means and a sheet supporting surface disposed above the bottom of the supporting means, the carrier being constructed to receive lifting means beneath a portion thereof whereby the carrier may be loaded with a pile of sheets at a loading station and then lifted and transferred to a second station with the pile of sheets thereon and set down upon its supporting means at said second station and pile carrier raising means for engaging the loaded pile carrier as thus set down at said second station and raising the same.

5. Sheet handling apparatus comprising a pile carrier having supporting means and a sheet supporting surface disposed above the bottom of the supporting means, the carrier being constructed to receive lifting means beneath a portion thereof whereby the carrier may be loaded with a pile of sheets at a loading station and then lifted and transferred to a second station with the pile of sheets thereon and set down upon its supporting means at said second station, pile carrier raising means at said second station and means for moving said pile carrier raising means upwardly after the loaded pile carrier has been thus set down at said second station whereby automatically to engage and raise the loaded pile carrier without the necessity of fastening the same to the pile carrier raising means.

6. Sheet handling apparatus comprising a pile carrier having supporting means and a sheet supporting surface disposed above the bottom of the supporting means, the carrier being constructed to receive lifting means beneath a portion thereof whereby the carrier may be loaded with a pile of sheets at a loading station and then lifted and transferred to a second station with the pile of sheets thereon and set down upon its supporting means at said second station and pile carrier raising means having a portion underlying a portion of the carrier as thus set down at said second station and movable upwardly to automatically engage and raise the carrier without the necessity of fastening the carrier to the raising means.

7. Sheet handling apparatus comprising a pile carrier having supporting legs and a sheet supporting surface disposed above the legs, the carrier being adapted to receive lifting means beneath a portion thereof between the legs whereby the carrier may be loaded with a pile of sheets at a loading station and then lifted and transferred to a second station with the pile of sheets thereon and set down upon its legs at said second station and pile carrier raising means having a portion underlying a portion of the carrier as thus set down at said second station and movable upwardly to automatically engage and raise the carrier without the necessity of fastening the carrier to the raising means.

8. Sheet handling apparatus comprising a pile carrier having supporting legs and a sheet supporting surface disposed above the legs, the carrier being adapted to receive lifting means beneath a portion thereof between the legs whereby the carrier may be loaded with a pile of sheets at a loading station and then lifted and transferred to a second station with the pile of sheets thereon and set down upon its legs at said second station and pile carrier raising means comprising opposed endless elements having correspondingly positioned carrier engaging and raising members and means for synchronously driving said elements to bring said members up under the pile carrier as thus set down at said second station to automatically engage and raise the carrier without the necessity of fastening the carrier to the raising means.

9. Sheet handling apparatus comprising a pile carrier having supporting means and a sheet supporting surface disposed above the bottom of the

supporting means, the carrier being constructed to receive lifting means beneath a portion thereof whereby the carrier may be loaded with a pile of sheets at a loading station and then lifted and transferred to a second station with the pile of sheets thereon and set down upon its supporting means at said second station and pile carrier raising means comprising opposed endless elements arranged generally vertically and having correspondingly positioned carrier engaging and raising members adapted to move upwardly opposite each other at the inner or adjacent reaches of said elements and means for synchronously driving said elements to bring said members up under the pile carrier as thus set down at said second station to automatically engage and raise the carrier.

10. Sheet handling apparatus comprising a feeder portion and a delivery portion, the delivery portion having means for supporting and lowering a pile carrier, a pile carrier having supporting means and a sheet supporting surface disposed above the bottom of the supporting means and having means for engagement with said means for supporting and lowering the carrier, the carrier being constructed to receive lifting means beneath a portion thereof whereby after receiving a pile of sheets at said delivery portion and disengagement with said means for supporting and lowering the carrier it may be transferred by the lifting means to the feeder portion with the pile of sheets thereon and set down upon its supporting means at the feeder portion, and pile carrier raising means having a portion underlying a portion of the carrier as thus set down at the feeder portion of said apparatus and movable upwardly to automatically engage and raise the carrier.

11. Sheet handling apparatus comprising a feeder portion and a delivery portion, the delivery portion having tension means for supporting and lowering a pile carrier, a pile carrier having supporting means and a sheet supporting surface disposed above the bottom of the supporting means and having means for attachment of said tension means, the carrier being constructed to receive lifting means beneath a portion thereof whereby after receiving a pile of sheets at said delivery portion and detachment of said tension means therefrom it may be transferred by the lifting means to the feeder portion with the pile of sheets thereon and set down upon its supporting means at the feeder portion, and pile carrier raising means having a portion underlying a portion of the carrier as thus set down at the feeder portion of said apparatus and movable upwardly to automatically engage and raise the carrier.

12. Sheet handling apparatus comprising a feeder portion and a delivery portion, the delivery portion having means for supporting and lowering a pile carrier, a pile carrier having supporting legs and a sheet supporting surface disposed above the legs and having means for engagement with said means for supporting and lowering the carrier, the carrier being adapted to receive lifting means beneath a portion thereof between the legs whereby after receiving a pile of sheets at said delivery portion and disengagement with said means for supporting and lowering the carrier it may be transferred by the lifting means to the feeder portion with the pile of sheets thereon and set down upon its legs at the feeder portion, and pile carrier raising means having a portion underlying a portion of the carrier as thus set down at the feeder portion of said apparatus and movable upwardly to automatically engage and raise the carrier.

13. Sheet handling apparatus comprising a feeder portion and a delivery portion, the delivery portion having tension means for supporting and lowering a pile carrier, a pile carrier having supporting legs and a sheet supporting surface disposed above the legs and having means for attachment of said tension means, the carrier being adapted to receive lifting means beneath a portion thereof between the legs whereby after receiving a pile of sheets at said delivery portion and detachment of said tension means therefrom it may be transferred by the lifting means to the feeder portion with the pile of sheets thereon and set down upon its legs at the feeder portion, and pile carrier raising means at the feeder portion comprising opposed endless elements arranged generally vertically and having correspondingly positioned carrier engaging and raising members adapted to move upwardly opposite each other at the inner or adjacent reaches of said elements and means for synchronously driving said elements to bring said members up under the carrier as thus set down at the feeder portion of said apparatus to automatically engage and raise the carrier.

14. Material handling apparatus comprising a support and means for changing the elevation of the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, ratchet means connected with said member, means including a pawl engaging said ratchet means and oscillatory mechanism operating said pawl to turn said member and means including a second pawl engaging said ratchet means and continuously operable mechanism operating the second pawl to turn said member.

15. Material handling apparatus comprising a support and means for changing the elevation of the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, a second turnable member connected with the first to turn simultaneously therewith but at different speed, means connected with one of said members to turn it in one direction only and means operable directly upon each of said members to turn it in the opposite direction.

16. Material handling apparatus comprising a support and means for changing the elevation of the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, a second turnable member connected with the first to turn simultaneously therewith but at different speed, means connected with one of said members to turn it in one direction only and means operable directly upon each of said members to turn it in either direction.

17. Material handling apparatus comprising a support and means for changing the elevation of the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, a second turnable member connected with the first to turn simultaneously therewith but at different speed, means including oscillatory mechanism connected with one of said members to turn it in one direction

only, means including continuously operable mechanism connected with one of said members to turn it in one direction only and means operable directly upon each of said members to turn it in the opposite direction.

18. Material handling apparatus comprising a support and means for changing the elevation of the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, means including oscillatory mechanism to turn said member in one direction, means including continuously operable mechanism to turn said member in the same direction only and means direct-connected to said member to turn it in the opposite direction.

19. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising the support comprising a turnable member, connections between said member and the support whereby the support is raised upon turning of said member, ratchet means connected with said member, means including a pawl engaging said ratchet means and oscillatory mechanism operating said pawl to turn said member to raise the support and means including a second pawl engaging said ratchet means and continuously operable mechanism operating the second pawl to turn said member to raise the support.

20. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising the support comprising a turnable member, connections between said member and the support whereby the support is raised upon turning of said member and mutually exclusive oscillatory means and continuously operable motor means for turning said member to raise the support, said oscillatory means being adapted to remain in operative position during operation of said motor means.

21. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising and lowering the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, oscillatory means for turning said member to raise the support, motor means; connections between said motor means and said member whereby said motor means may be rendered continuously effective only for turning said member to raise the support and manually operable means for turning said member to raise or lower the support.

22. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising the support comprising a turnable member, connections between said member and the support whereby the support is raised upon turning of said member, ratchet means connected with said member and means including a pawl, a sprocket for moving the pawl to operate said ratchet means, a motive unit and a sprocket chain driven by the motive unit and meshing with said sprocket for turning said member to raise the support.

23. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising and lowering the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, a second turnable member connected with the first to turn simultaneously therewith but at different speed, means including oscillatory mechanism connected with one of said turnable members to turn it to raise the support, means including continuously operable mechanism connected with the same turnable member to turn it to raise the support and manually operable means for turning each of said turnable members in either direction.

24. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising the support comprising a turnable member, connections between said member and the support whereby the support is raised upon turning of said member, ratchet means connected with said member, means including a pawl engaging said ratchet means and oscillatory mechanism operating said pawl to turn said member to raise the support and means including a second pawl engaging said ratchet means and continuously operable mechanism operating the second pawl to turn said member to raise the support.

25. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising and lowering the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, ratchet means connected with said member, means including a pawl engaging said ratchet means and oscillatory mechanism operating said pawl to turn said member to raise the support, means including a second pawl engaging said ratchet means and continuously operable mechanism operating the second pawl to turn said member to raise the support, and means operable upon said member to turn the same to lower the support, said first mentioned pawl being adapted to be rendered inoperative when the support is to be lowered.

26. Sheet feeding apparatus comprising a support for a pile of sheets and means for raising and lowering the support comprising a turnable member, connections between said member and the support whereby the elevation of the support is changed upon turning of said member, ratchet means connected with said member, means including a pawl engaging said ratchet means and oscillatory mechanism operating said pawl to turn said member to raise the support, means for turning said member to lower the support and means connected with said pawl for rendering the same inoperative when the support is to be lowered.

AUGUST C. SMITH.

CERTIFICATE OF CORRECTION.

Patent No. 2,334,223. November 16, 1943.

AUGUST C. SMITH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 55, claim 2, for "pick-up" read --picked-up--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of January, A. D. 1944.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)