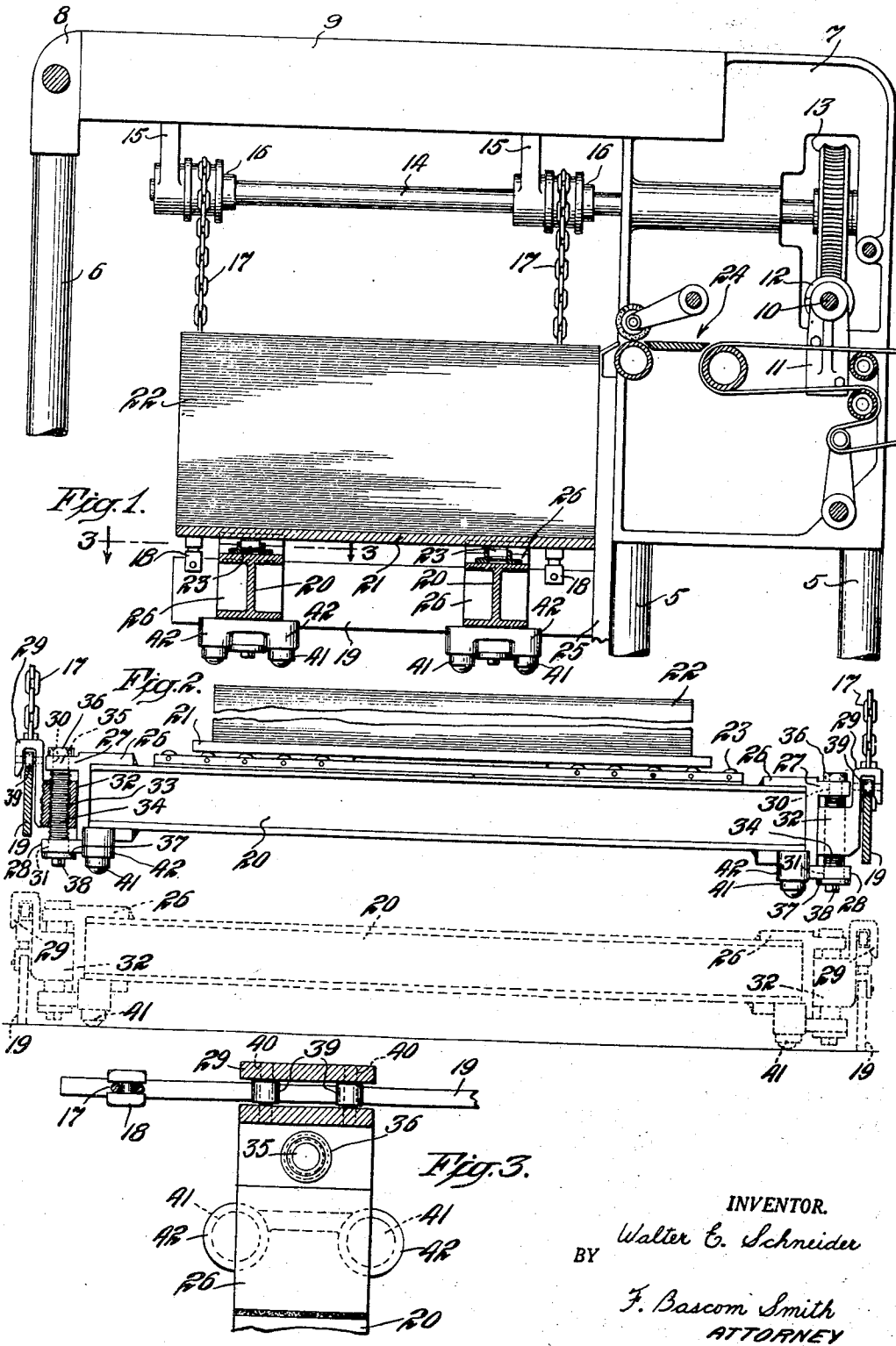


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SHEET FEEDING APPARATUS

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## SHEET FEEDING APPARATUS

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This invention relates to sheet feeders, and more particularly to pile elevators therefor employed to support and raise a pile of sheets to position for feeding of the sheets one after another from the top of said pile.

One object of the present invention is to provide a sheet feeder having a pile elevator so constructed that any portion of the pile of sheets thereon may be bodily shifted easily and conveniently to effect a level condition at the top of said pile.

Another object is to provide a pile elevator having pile supporting cross members so constructed that opposite ends thereof may be independently raised or lowered to bring a portion or portions of the pile of sheets to a plane level with the remaining portions of said pile.

A further object is to provide a sheet feeder having a pile elevator of the suspended type including a pair of pile supporting cross members so constructed that said members may be bodily raised or lowered independent of each other, whereby the level of an entire transverse portion of the pile may be varied with respect to the level of other portions of said pile.

The above and further objects and novel features of the present invention will more fully appear from the following detail description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only, and are not intended as a definition of the limits of the invention, reference for this latter purpose being had primarily to the appended claims.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

Fig. 1 is a vertical longitudinal sectional view of a sheet feeder embodying a pile elevator constructed in accordance with the present invention;

Fig. 2 is a rear elevation, partly in section, of the pile elevator, with parts thereof omitted for purposes of clearer illustration, and showing said elevator in pile supporting and pile receiving positions; and

Fig. 3 is an enlarged fragmentary horizontal sectional view on the line 3—3 of Fig. 1.

Referring to the drawings, 5 indicates the front uprights and 6 the rear uprights of a frame of the feeder, the front uprights having heads 7 bolted thereto, and the rear uprights having heads 8 bolted thereto. The front and rear heads 7 and 8 are connected together by side members 9.

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Extending transversely of the feeder is a shaft 10 journalled at its opposite ends in brackets 11 bolted to the adjacent heads 7. Fixed on opposite ends of shaft 10 are worms 12 which mesh with worm gears 13 that are fixed on corresponding ends of shafts 14. The latter extend longitudinally of the feeder at opposite sides thereof and are journalled in suitable bearings formed in the heads 7, and in brackets 15 bolted to the side members 9.

Fixed on shafts 14 are toothed sheaves 16 in the teeth of which are engaged links of chains 17 that are connected at their lower ends by couplings 18 to side bars 19 of a pile elevator including said chains. The pile elevator also includes longitudinally spaced cross beams 20 which are supported by the bars 19. Beams 20 are adapted to receive and support a pile board 21 and a pile of sheets 22 thereon, said beams being provided at the tops thereof with rollers 23 on which the pile board rests so that the latter and the pile of sheets may be readily adjusted sidewise on the elevator to proper position in the feeder.

The elevator may be rapidly lowered to the machine foundation to load it, and raised to bring the top of the pile of sheets to proper position for feeding, by any suitable means for these purposes. Shaft 10 is then intermittently rotated in the usual manner by any well known means to raise the elevator step by step in order to maintain the top of the pile at the proper feeding level as the sheets are separated one after another therefrom by sheet separating devices, and forwarded in succession by sheet forwarding devices to conveying means indicated generally at 24. The sheet separating and forwarding devices form no part of the present invention and it is therefore unnecessary to illustrate and describe the same in detail. During step by step upward movement of the elevator, the front edge of the pile is guided by spaced pile guides 25 supported in any suitable manner on the feeder frame.

In accordance with the present invention, the pile supporting cross beams 20 are connected with the side bars 19 of the elevator in a novel manner so that opposite ends of said beams may be independently raised or lowered at will relative to said bars whereby any portion of the pile of sheets 22 thereon may be bodily raised or lowered with respect to the other portions to effect a level condition at the top of the pile and to maintain a definite operating relation between the sheet separating and forwarding devices and those portions of the pile engaged by said devices.

As herein shown, each cross beam 20 has se-

cured to the opposite ends thereof, as by welding, a bracket 26 formed with two vertically spaced, laterally extending arms 27 and 28 to receive therebetween a downwardly facing hook member 29, said arms being provided with axially aligned openings 30 and 31, respectively, of different diameters. Hook member 29 is formed with a laterally offset, vertical body portion 32 provided with an internally threaded bore 33 extending therethrough and in axial alignment with the openings 30, 31 in arms 27 and 28, the length of portion 32 being less than the distance between arms 27 and 28. Inserted upwardly through opening 31 in arm 28 and threaded through the threaded bore 33 in hook member 29 is a jack screw 34 formed at its upper end with a reduced non-threaded portion 35 which extends through the opening 30 in arm 27 and has welded thereto a retaining washer or collar 36. Screw 34 is formed at its lower end with an enlarged circular head 37, and with a square or hexagon head 38 to receive a wrench or similar tool for rotating said screw. Rotation of hook member 29 relative to bracket 26 is prevented through engagement of the inner flat surface of said member with the adjacent flat face of said bracket.

Hook members 29 are engaged over the elevator side bars 19 to support the cross beams 20, pile board 21 and pile of sheets 22 for elevation thereby, and to facilitate movement of said beams along said bars to proper pile supporting position, the members 29 are each provided with two laterally spaced anti-friction rollers 39 journalled on pins 40 fixed in said members. To further facilitate handling of beams 20, the latter are provided at each end thereof with two casters 41 carried in suitable sockets formed in extensions 42 of brackets 26.

Assuming now that it is desired to load the sheet feeder with a pile of sheets, the side bars 19 of the elevator are lowered to the machine foundation, whereupon one of the bars 19 is lifted manually out of the way and the cross beams 20 are rolled lengthwise on the casters 41 into the feeder until the body 32 of hook member 29 on the leading end of each cross beam contacts the opposite side bar 19, as shown in dotted lines in Fig. 2. The lifted side bar 19 is then again lowered to the machine foundation at which time said bar engages the bodies 32 of the adjacent hook members 29. A pile board 21 is then placed on beams 20 and a supply of sheets piled on said board. It will be understood that a skid type of pile board having runners or legs on the underside thereof may be used instead of the plain pile board herein illustrated. In this case the skid together with the pile of sheets thereon are truck-loaded into the feeder through the rear or either side of the feeder, after which the cross beams are rolled into position beneath said skid and pile, as previously described.

Engagement of side bars 19 with bodies 32 as aforesaid, automatically positions the hook members 29 directly above said bars, as shown in dotted lines in Fig. 2, so that upon upward movement of chains 17, the side bars will automatically engage members 29 and elevate the cross beams 20, pile board 21 and pile of sheets 22 until the top of the latter reaches the proper level for feeding of the sheets one after another therefrom.

Should it be found that when the pile of sheets is elevated to proper feeding position the top of the pile is not at a uniform level and that a certain portion or portions thereof are disposed higher or lower than the other portions due to

the characteristics of the paper, or improper piling of the sheets on the elevator, or, in the case of printed sheets, due to the embossing effect of the printing as well as the layer of ink on the individual sheets, said irregularities may be quickly and conveniently compensated for through rotation of one or more of the jack screws 34. Upon rotation of one of the jack screws, for example, the end of the cross beam 20 under the control of said screw is raised or lowered, depending on the direction of rotation of the screw, relative to the hook member 29 and the adjacent side bar 19, without affecting the relative position of the opposite end of said beam. The portion of the pile under the influence of said adjustment will thus be raised or lowered bodily, as the case may be, without affecting the remaining portions of the pile, thereby bringing the upper surface of said portion to proper level. Any portion of the pile may thus be adjusted to proper level through rotation of one or more of the jack screws 34, which may be effected not only before the feeder is initially started, but also while the feeder is in operation to maintain a uniform pile level as the sheets are fed one after another from said pile. Further, through rotation of jack screws 34 on corresponding ends of both cross beams 20, an entire longitudinal portion of the pile may be bodily raised or lowered, and through rotation of both jack screws on either of said beams, the latter may be bodily raised or lowered and thus shift an entire transverse portion of the pile.

If, for any reason, it is desired to present the pile of sheets to the sheet handling devices in a manner such that the top thereof is at a greater or lesser angle with respect to horizontal, this may be easily effected by raising or lowering one of the cross beams bodily relative to the elevator side bars through rotation of the jack screws on both ends thereof.

There is thus provided a pile elevator having pile supporting cross members so constructed that any portion of a pile of sheets supported thereon may be easily and conveniently shifted to effect a level condition at the top of the pile through raising or lowering of either end of said cross members relative to the side bars of the elevator on which said members are supported. Also, the pile supporting cross members may be bodily raised or lowered independent of each other, whereby the level of an entire transverse portion of the pile of sheets may be shifted with respect to the level of the remaining portions of the pile.

Although a single embodiment of the invention has been illustrated and described in the foregoing specification, it is to be expressly understood that changes may be made therein particularly in the design and arrangement of the parts illustrated, without departing from the spirit and scope of the invention, as will now be clear to those skilled in the art. For example, the jack screws may be arranged for manipulation above the cross beams by merely reversing the openings in the end brackets and inserting said screws downwardly through the tops of said brackets. For a definition of the limits of the invention, reference is had primarily to the appended claims.

What is claimed is:

1. In sheet feeding apparatus of the type having a pile elevator including two laterally spaced vertically movable bars, and a pair of longitudinally spaced, elongated members disposed between said bars and adapted to support a pile of sheets thereon, of means for supporting said

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members on said bars and providing for vertical adjustment of the same bodily and angularly relative to the bars comprising a relatively fixed member engaged over one of said bars, and a relatively movable member supporting an end of one of said elongated members on said fixed member.

2. In a suspended type of pile elevator including two laterally spaced bars, and a pair of longitudinally spaced cross beams disposed between said bars and adapted to support a pile of sheets thereon, of means for connecting said beams with said bars and providing for vertical adjustment of said beams relative to said bars comprising an externally threaded member rotatably carried by each beam at opposite ends thereof, and an internally threaded element having threaded engagement with each of said members and provided with a downwardly facing hook for engagement with said bars.

3. In sheet handling apparatus of the type having a pile elevator, means for supporting a pile of sheets on said elevator comprising two longitudinally spaced cross beams, brackets secured to opposite ends of said cross beams and each having vertically spaced laterally projecting arms, a jack screw rotatably mounted in said arms, and a hook member disposed between the arms and having threaded engagement with said jack screw.

4. In a pile elevator of the suspended type employing two laterally spaced bars adapted to

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support longitudinally spaced cross beams for carrying a pile of sheets, the combination with said bars and beams of means for supporting said beams on said bars, said means including spaced arms secured to an end of one of said beams, a hook member including a body portion disposed between said arms, and means extending through said arms and body portion for moving said arms relative to said hook member.

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