July 14, 1959 A. H. HOLMES ET AL 2,894,745

LETTERPRESS MACHINES OR CUTTING AND CREASING MACHINES, OF THE VERTICAL TYPE

Filed Feb. 7, 1957 5 Sheets-Sheet 1

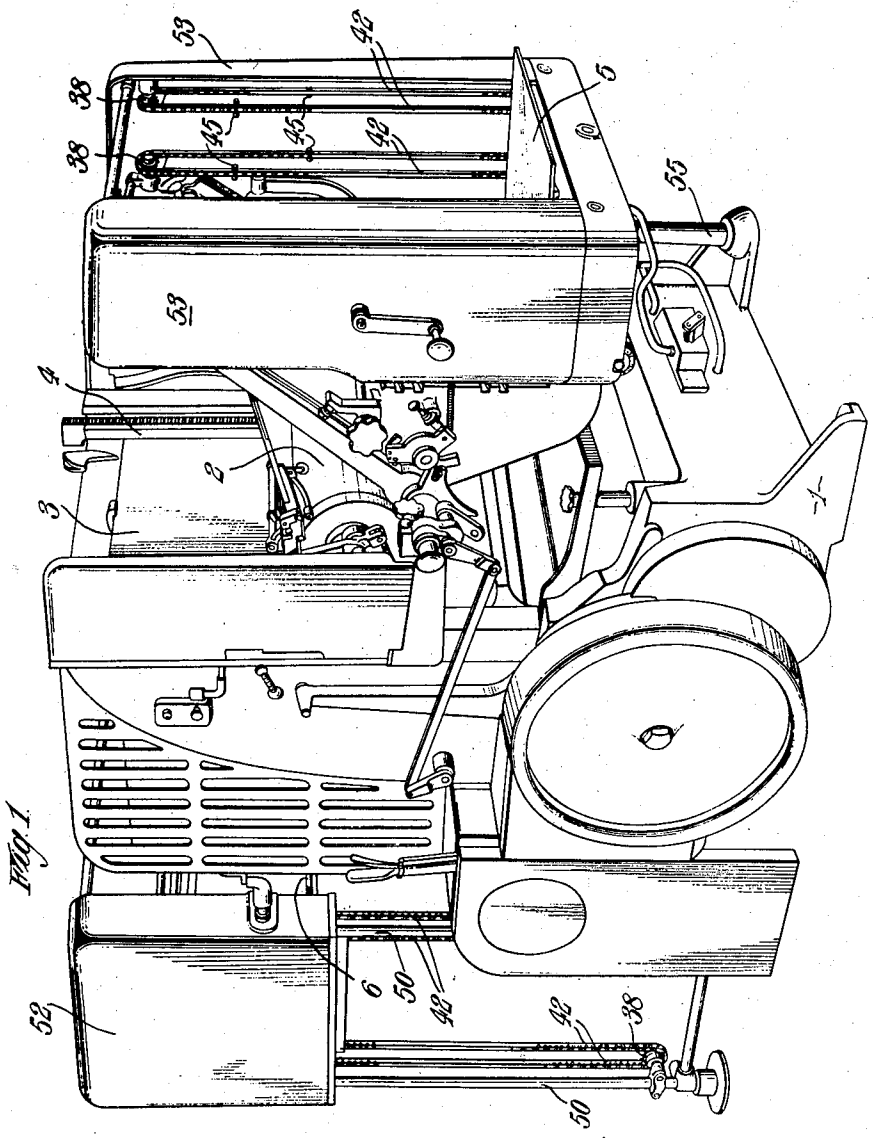


Fig. 1.

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5 Sheets-Sheet 2

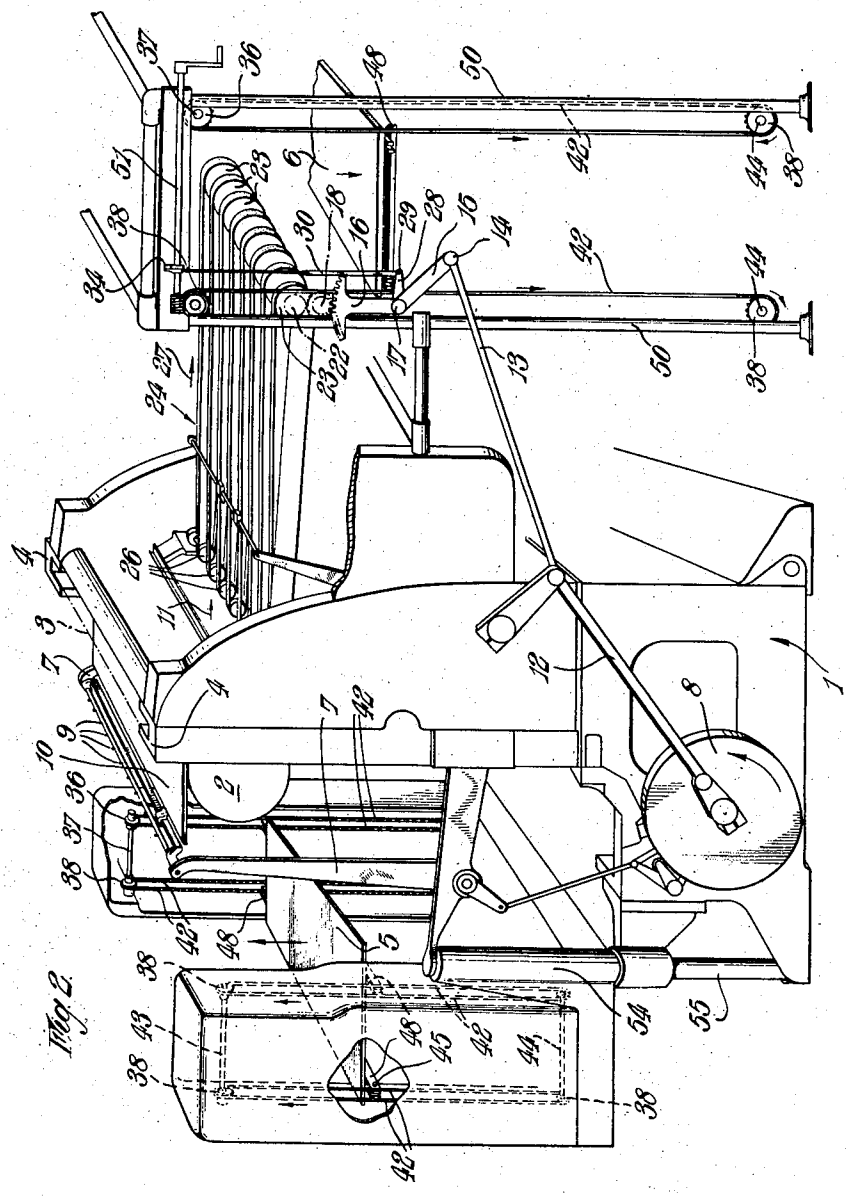


Fig 2

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5 Sheets-Sheet 3

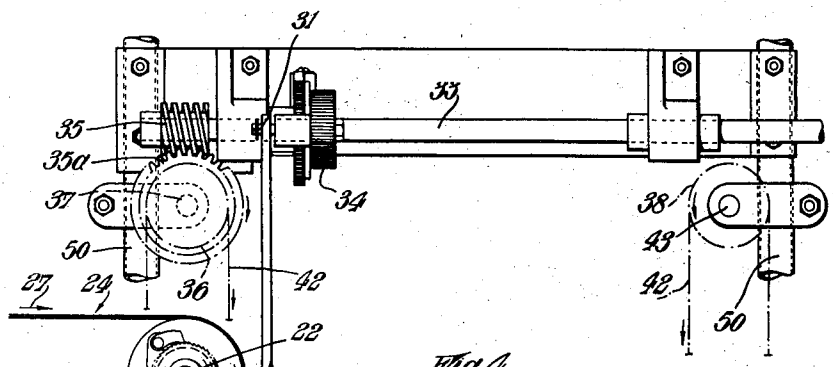


Fig. 4.

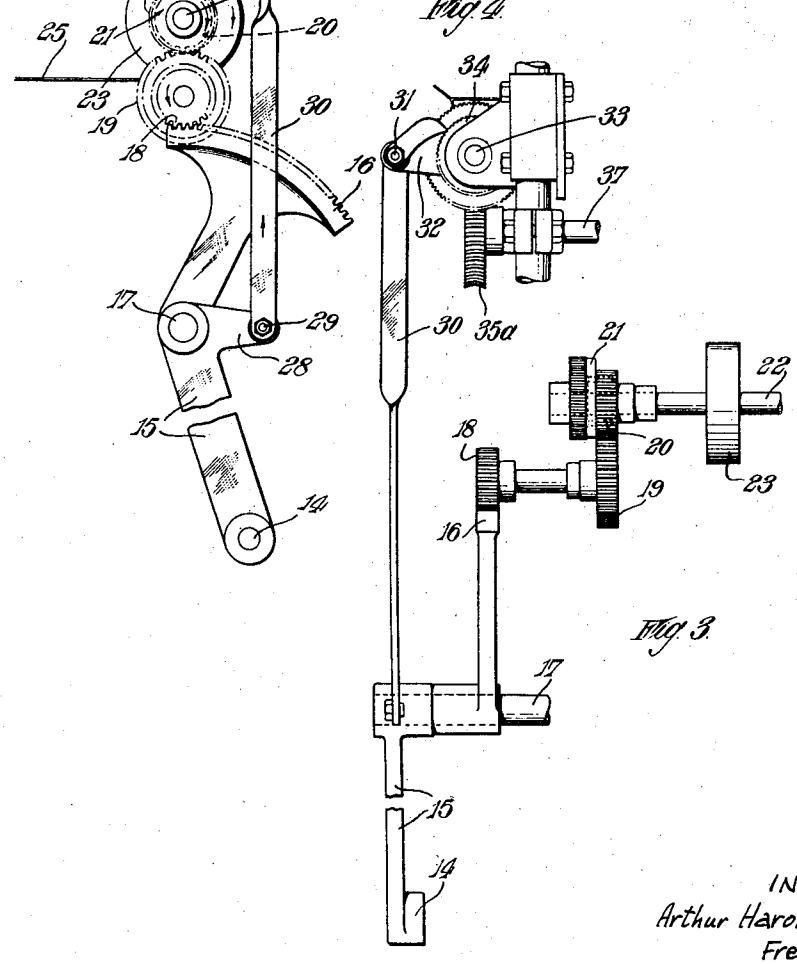


Fig. 3.

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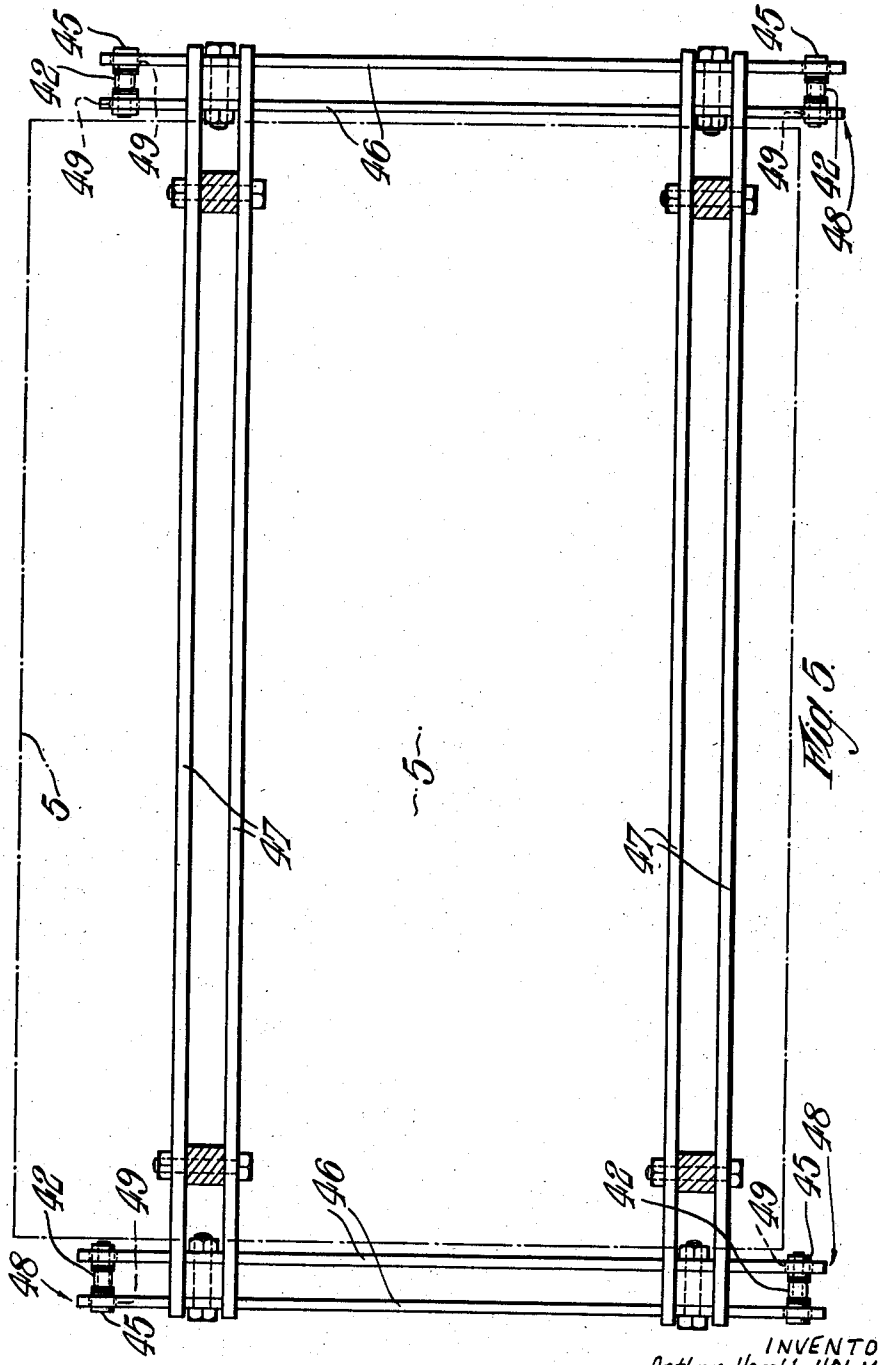


Fig. 5.

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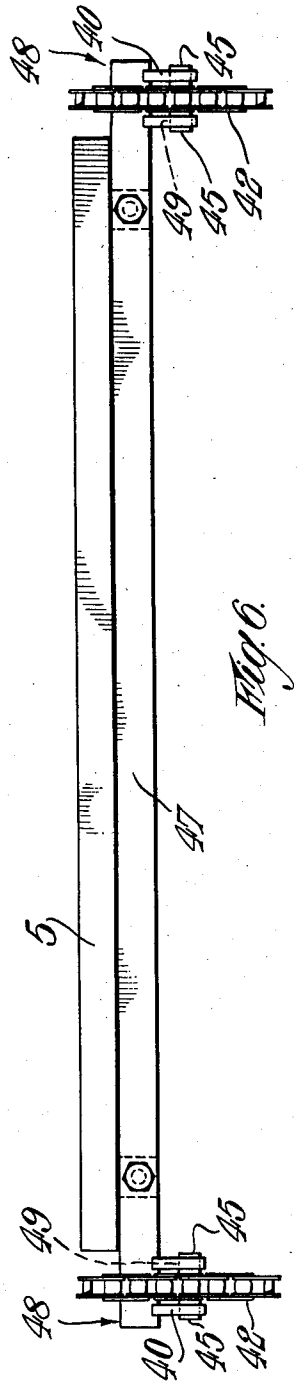


Fig. 6.

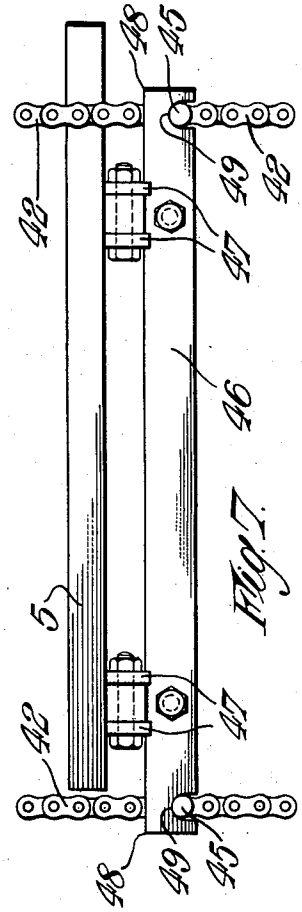


Fig. 7.

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United States Patent Office 2,894,745 Patented July 14, 1959

2,894,745

LETTERPRESS MACHINES OR CUTTING AND CREASING MACHINES, OF THE VERTICAL TYPE

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Application February 7, 1957, Serial No. 638,856

1 Claim. (Cl. 271—62)

The present invention relates to a vertical type letterpress or printing machine which is also capable of use as a cutting and creasing machine for cutting and scoring sheets in the manufacture of collapsible boxes or cartons, in which a rotary impression cylinder turnable about a horizontal axis is also reciprocated in a vertical plane in relation to an adjacent vertically reciprocable bed; the latter will either mount printing type, or a cutting and scoring block dependent upon the intended use of the machine.

It is orthodox practice in a machine of this type to provide feed and delivery tables at the respective ends of the machine. Individual sheets from a pile supported on the feed table are transferred, via a transfer board, to the impression cylinder and processed against said bed by means of an oscillating feeding mechanism incorporating sheet gripping means, such as pneumatic suckers, which grip the sheet and hold it during the transferring operation; after processing, the sheet is subsequently gripped and transferred by a delivery mechanism to the said delivery table. As this operation proceeds as an automatic cycle, the feed and the delivery tables are arranged automatically to ascend and descend respectively in order to compensate for the progressively diminishing height of the sheet pile on the feed table and the correspondingly increasing height of the processed sheets delivered upon the delivery table.

These machines are generally efficient either for printing or box or carton making; there is, however, a disadvantage that the pile capacity of either table is limited and as a result the operator is required frequently to stop and restart the machine either for unloading the processed pile of sheets on the delivery table or for reloading the feed table. For example, with known machines the pile capacity of either table is approximately one foot and when card or like thick sheets are to be processed, the productive capacity of the machine is considerably reduced due to frequent stoppage for unloading or reloading.

The primary object of the present invention is to provide for a substantial increase in the useful working period of the machine in a simple and inexpensive manner.

According to the present invention in a machine of the kind referred to at least one end thereof is provided with a system of vertical chain transmission which supports a table in a horizontal plane and is arranged to be driven periodically in a predetermined direction so that the table will either ascend or descend with the said chain transmission.

According to another aspect of the present invention in a machine of the kind referred to there is provided at each end of the machine a system of vertical chain transmission respectively supporting a feed table and a delivery table in the horizontal plane, the said transmissions being arranged to be driven periodically in opposite directions so that the feed table and the delivery table will respectively ascend and descend.

Preferably, the underside of a table is provided with a carrier having seats which engage rollers, combining to form four points of a rectangle, on the chain transmission.

A machine according to the invention is illustrated by way of example on the accompanying drawings in which:

Fig. 1 is a pictorial view of one side of the machine;

Fig. 2 is a perspective diagrammatic view of the other side of the machine drawn to a larger scale for illustrating the invention in greater detail;

Fig. 3 is an end view of the driving mechanism for the delivery end of the machine seen in Fig. 2;

Fig. 4 is a side view of Fig. 3;

Fig. 5 is a plan of a feed or delivery table illustrating the chain supporting means therefor;

Fig. 6 is an elevation of Fig. 5;

Fig. 7 is a side view of Fig. 6.

As will be observed from the drawings with particular reference to Figs. 1 and 2, a letterpress or sheet cutting or creasing machine of the vertical type incorporates a machine frame **1** which supports a rotary impression cylinder **2** turnable about a horizontal axis; this cylinder **2**, in addition to its rotary motion, is reciprocable in a vertical plane at one side of and adjacent to a vertically reciprocable bed **3** supported in upright guides **4**. The bed **3** is provided with printing type or a cutting and creasing block (not shown), depending upon whether the machine is to be used for printing on sheets or for cutting and creasing sheets in the manufacture of collapsible boxes or cartons. At one end of the machine there is a feed table **5** and at the other end a delivery table **6**. A pile of sheets will be placed on the feed table **5** and by means of a transfer mechanism incorporating an oscillating pick-up arm **7** deriving its motion from a main drive **8**, indvidual sheets will be picked up in the known manner by pneumatic suckers **9** on the arm **7**, will be deposited on the transfer board **10**, fed between the impression cylinder **2** and the bed **3** and after processing will emerge as indicated by the arrow **11**, Fig. 2.

The feed table **5** and the delivery table **6** are each provided according to the invention with a deep pile feed and a deep pile delivery mechanism. It is, however, optional to provide the machine with the deep feed or the deep delivery mechanism dependent upon the work to be performed by the machine. The following description of the invention as illustrated in Figs. 1 and 2 applies to the provision of a deep pile feed table **5** and also a deep pile delivery table **6** at the respective ends of the machine, and as the mechanism employed for periodically raising the feed table **5** is substantially identical with the mechanism employed for periodically lowering the delivery table **6**, the following detailed description of the mechanism related to the delivery table will suffice. Attention is particularly directed to Fig. 2 in which it will be seen that the main drive **8** has a crank **12** which communicates reciprocating motion to a driving link **13**. The latter is pivotally connected at **14** to an arm of a bell-crank lever **15** having a gear segment **16** movable on a fixed axis **17** so that the gear segment **16** derives an oscillating motion from the driving link **13** and the lever **15**. The gear segment **16** meshes with a pinion **18** which is geared-up at **19** to engage a driven pinion **20** incorporating a one-way clutch **21** of the ratchet pawl type. The driven pinion **20** and clutch **21** are fast on a shaft **22** mounting several coaxial pulleys **23** of a tape conveyor **24**, the tapes **25** extending in a horizontal plane and passing over corresponding pulleys **26** in an endless fashion. Consequently, the oscillating motion of the gear segment **16** will transmit through the one way clutch **21** intermittent angular movement to the conveyor shaft **22** and, as a result, the tape conveyor **24** will have

periodic rapid conveying motions in the direction of the arrow 27. The arm 28 of the bell-crank lever 15 is pivotally connected at 29 to an end of an upright link 30, the other end of which is pivotally connected at 31 to a ratchet lever 32 fulcrumed on an elevated shaft 33 mounting a one-way clutch 34 of the ratchet-pawl type for imparting through the link 30 periodic rotary motion to the shaft 33. The shaft 33 transmits through a worm gear drive 35, 35*a* corresponding motion to a sprocket 36 on a shaft 37. Another alike sprocket 38 is provided remotely on the shaft 37 and a parallel lower shaft with corresponding sprockets 36, 38 is arranged to provide at one side two parallel endless chain transmissions 42, 42. The endless chain transmission is duplicated by the provision at the opposite side of upper and lower parallel shafts 43, 44, furnished with alike sprockets 38 and chain transmissions 42 thus providing at the corners of a rectangle a system of four parallel endless chain transmissions 42, 42, movable in vertical planes. A simple chain-sprocket drive (not shown) is transmitted from the upper sprocket shaft 37 on one side to the upper sprocket shaft 43 on the opposite side for driving the duplicated shaft 43 at the same speed as the shaft 37. Consequently, the periodic rotary motion transmitted by the ratchet clutch 34, through the gearing 35, 35*a* and thence to the endless chain transmission 42 on the shafts 37, 40 is communicated to the endless chain transmissions on the shafts 43, 44.

The feed table 5 and the delivery table 6 are detachably supprted on stretches of the chains 42 arranged at the deep pile feed end and the deep pile delivery end of the machine. As is seen in Fig. 2 the transmission chains 42 are indicated as being driven in a predetermined direction so that the delivery table 6 will be periodically lowered. A similar drive but in the opposite sense is imparted to the transmission chains 42 applicable to the feed table 5 as indicated, will result in a periodic raising of the latter to the same extent as the table 6 is lowered.

It will be apparent, therefore, that as the process of sheet feeding from a pile of sheets on the feed table 5 (by means of the said transfer mechanism 7, 9, 10) to the cylinder 2 and bed 3 takes place, the feed table 5 will be periodically raised by the chain transmission 42. The processed sheets will be deposited on the conveyor 24 and conveyed in two rapid, successive stages upon the deep pile delivery table 6. The latter will be periodically lowered by the chain transmission 42 to the same, or approximately the same extent as the table 5 is raised and, as a result, compensating ascending and descending movements respectively of the tables 5, 6 takes place in an automatic manner as a sheet pile on the feed table 5 progressively diminishes in depth, and as sheets will be piled on the delivery table 6 with a corresponding increase in depth. A machine of a design above described has a deep pile feeding transmission and deep pile delivery transmission in which the displacements of the tables 5, 6 can be 3–4 feet deep, thus greatly increasing the working capacity of the machine over what has been possible hitherto.

When it is found desirable to employ only a deep delivery transmission 42 at the one end of the machine, the conveyor 24 will be incorporated with the machine in order to bridge the space between the output side of the bed 3 and the table 6 to ensure that processed sheets will be efficiently conveyed and deposited on the table 6. If, however, only a deep feed transmission 42 is provided at the other end of the machine, the conveyor 24 may not be required.

Either table 5, 6 is detachably supported on its chain transmissions 42 in the following manner, reference being made to Figs. 5, 6 and 7. The chains are provided at convenient positions with exterior coaxial rollers 45 which combine to form four points of a rectangular support for a bipartite table carrier 46 fastened to bars 47 which span the underside of the table and are fastened thereto. The ends of the carrier 46 are provided at the four corners 48 with seats 49 which seat upon the rollers 45 and support the table in a horizontal plane as the chain transmission 42 is raised or lowered. With this arrangement a table 5 or 6 can be readily connected to or disconnected from the chain transmission 42, and it will be most convenient to place a lift truck under the carrier 46 appertaining to the deep pile delivery table 6 when loaded, and transport the pile load to a site.

Simple means in the form of an upright skeleton frame 50 standing on the ground and detachably secured to the frame 1 beyond the end of the machine is provided for supporting the chain transmission 42 at the deep pile delivery end. A manually operable shaft 51 has a worm drive to one of the sprockets, such as 36, for the purpose of operating the chain transmission 42, when the machine is not working, as for setting or adjusting the height of the table 6. As is more easily seen in Fig. 1, the deep delivery transmission 42 is partly guarded at 52 and the deep feed transmission 42 is amply guarded at 53. The entire structure of the deep feed transmission 42 is pivotally mounted at 54 on a pillar 55 of the machine frame 1, (Fig. 2), in order that the said structure can be hinged into an aside position for providing access to the machine.

It will be appreciated from the above description that the deep pile chain transmission 42 for the tables 5, 6 provided at the respective ends of the machine can be employed either singly or as a combination. It will be further appreciated that our invention is not to be regarded as being limited to the means herein described for transmitting motion periodically to the chains since various forms of one way clutches could be employed in substitution for the ratchet-pawl type chosen for illustrating the idea of imparting intermittent motion to a chain-sprocket shaft.

What we claim is:

In a machine of the kind referred to having two ends, one of said ends being the deep pile delivery end of said machine, in combination, vertical chain transmission means disposed at least at said deep pile delivery end; a plurality of roller means fixed to said transmission means in a common horizontal plane; mean for driving said transmission means in a predetermined direction whereby to cause ascent or descent of said roller means; table means including carrier means fixed to the underside thereof, said carrier means having a plurality of seats for engaging with said roller means in such a way that said table means is supported by said transmission means in a horizontal plane and ascends or decends when said transmission means is set in motion; a bed and conveyor means intermediate the deep pile delivery end and said bed, said conveyor means having a shaft, said transmission means having a sprocket shaft, and said means for driving said transmission means comprising a bell crank lever having an oscillating arm operatively connected with said sprocket shaft; and one-way clutch means operatively connected with said gear segment and with the shaft of said conveyor means, respectively, for driving said conveyor means at a predetermined rate when said transmission means is driven.

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