March 24, 1953 W. H. WILCOX 2,632,554

LEAD LAYING MECHANISM

Filed Dec. 17, 1949 2 SHEETS—SHEET 1

Fig. 1

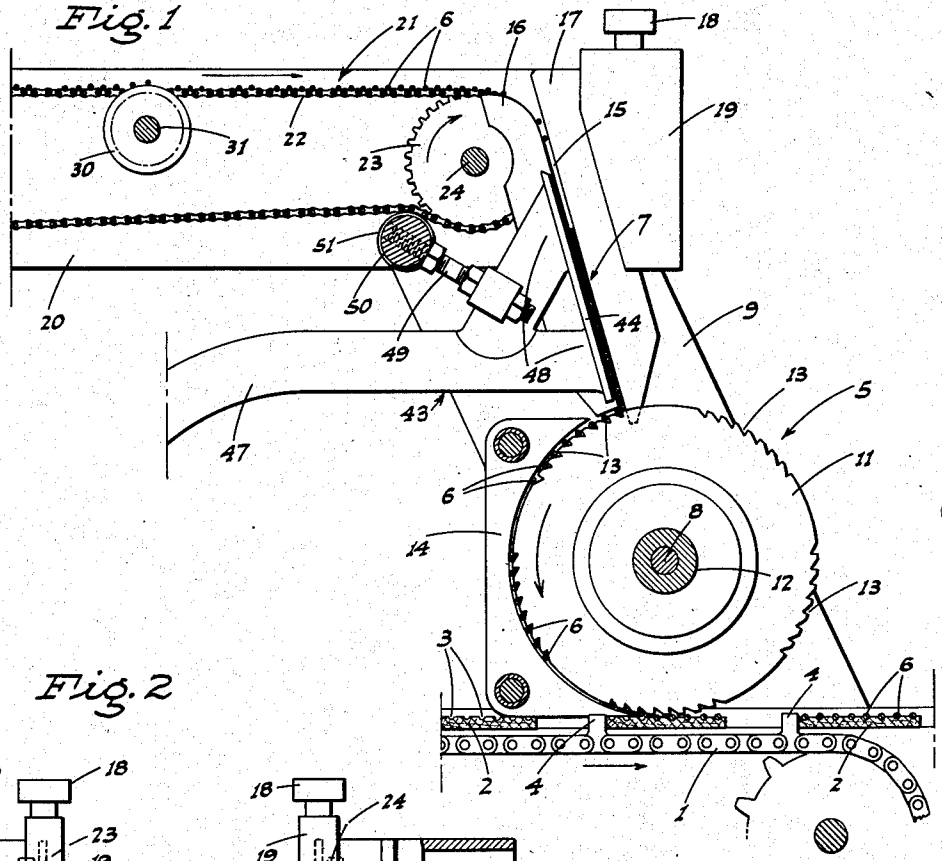
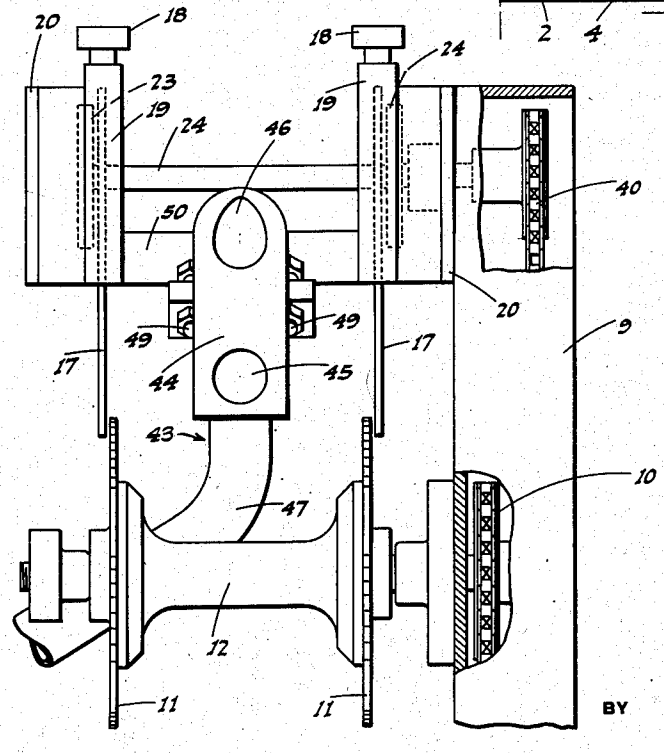


Fig. 2



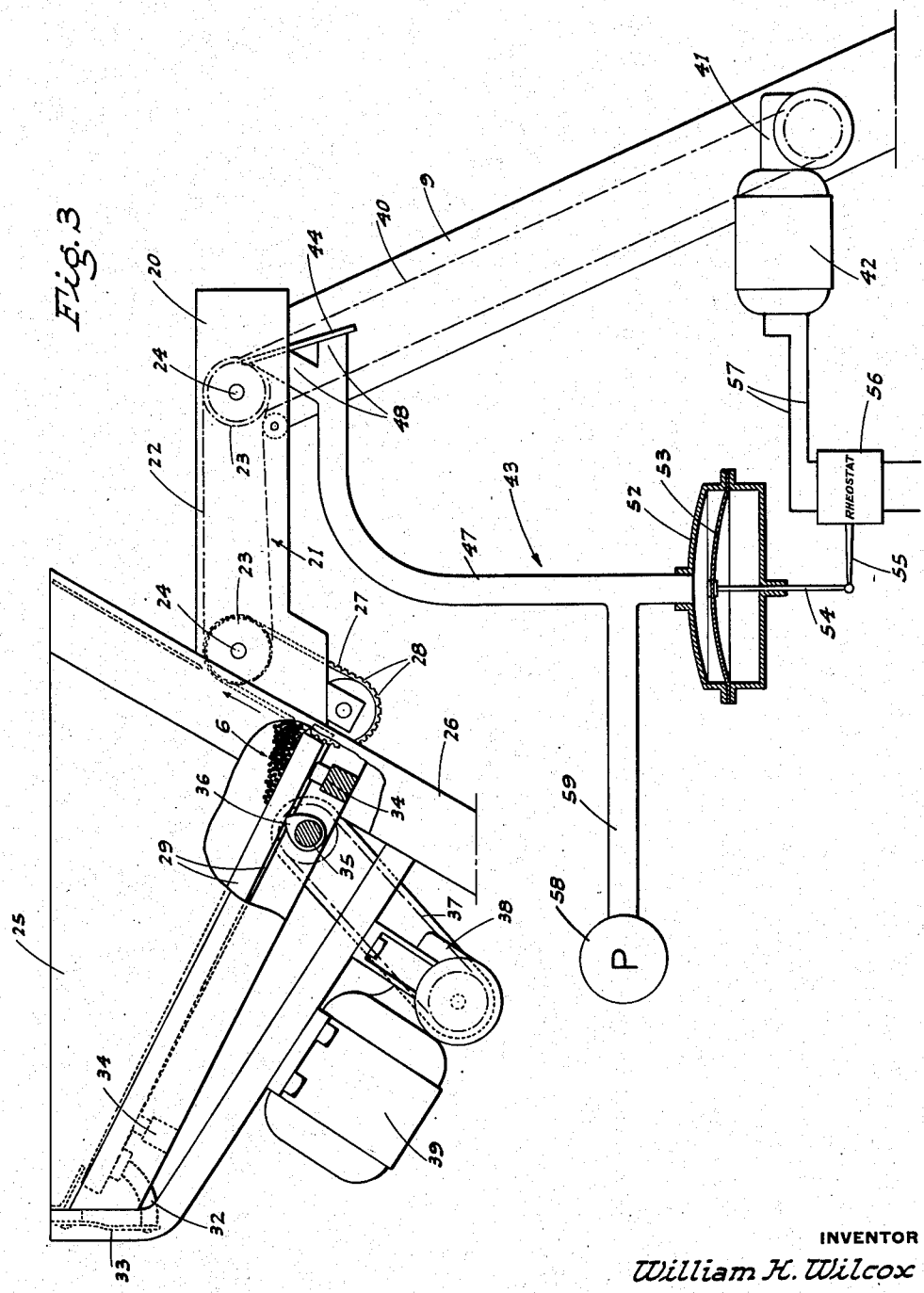
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LEAD LAYING MECHANISM

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Fig. 3



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LEAD LAYING MECHANISM

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8 Claims. (Cl. 198—37)

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This invention relates to, and it is an object to provide, a novel mechanism for automatically depositing or laying individual pencil leads in transversely spaced, longitudinal grooves of conveyor-supported wooden pencil slats preparatory to application, by gluing, of grooved matching slats thereto, as is the practice in the pencil manufacturing industry, to form what may be termed leaded slat units; the latter subsequently being sawed lengthwise between the leads and then shaped to form pencils.

The present invention represents a modification of the lead laying mechanism illustrated in application, Serial No. 781,208, filed October 21, 1947, now United States Patent No. 2,492,250, dated December 27, 1949, entitled Leaded Slat Unit Forming Machine.

The lead laying mechanism includes a rotary feeder having circumferentially spaced notches adapted to receive pencil leads therein lengthwise of the axis and at the top of the device, and to deposit said leads in grooved slats which pass in timed relation at the bottom of said device; the pencil leads being fed to the top of the rotary device from the lower end of a supported stack of said leads.

It is an object of the invention to provide a novel power driven conveyor unit operative between a hopper for said leads and the stack; such conveyor unit including means responsive to overload or underload in the stack arranged to cause automatic deceleration or acceleration, respectively, of the conveyor unit whereby to maintain the number of leads in the stack within normal limits.

Another object of the invention is to provide a lead laying mechanism including an automatic feeder as above, wherein the latter is driven by a variable-speed motor; there being a vacuum responsive speed control unit for the motor, and the vacuum imposed on said unit fluctuating in response to the extent of coverage, by the stack of pencil leads acting as a valve, over a vacuum relief opening.

It is also an object of the invention to provide a lead laying machine designed for smooth, uninterrupted operation, with the lead conveyor unit functioning automatically to supply only the required or normal amount of pencil leads from the hopper to the rotary feeder.

A further object of the invention is to provide a lead laying mechanism, for the purpose described, which includes a novel agitator for the leads in the hopper, whereby to assure of a constant delivery from said hopper to the lead pick-up conveyor.

Still another object of the invention is to provide a practical and reliable lead laying mechanism, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of

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such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a fragmentary sectional elevation of the lead laying mechanism, showing the rotary feeder and adjacent portion of the lead conveyor unit.

Fig. 2 is a front end elevation of the lead laying mechanism.

Fig. 3 is a fragmentary side elevation of the lead conveyor unit, with the vacuum responsive speed control unit mainly in outline.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 indicates a horizontally disposed, endless conveyor 1 driven at a constant speed; such conveyor being adapted to support pencil slats 2 on its upper run, with said slats extending transversely and disposed in equidistantly spaced relation along said run. The pencil slats 2 rest on the upper run of the endless conveyor 1, with their grooved faces uppermost, each slat including a plurality of longitudinal, laterally spaced grooves 3 therein adapted for the reception of pencil leads. The slats 2 are maintained in proper position on the conveyor 1, and advanced in said position, by pusher lugs 4 included in said conveyor.

A rotary feeder, indicated generally at 5, works directly above the upper run of the endless conveyor 1, and is operative to receive pencil leads 6 from the bottom of a stack 7 of said leads above the feeder, and to deliver said leads at the bottom of the feeder into the grooves 3 of the slat 2 in immediately cooperative relation with the bottom of said feeder.

The rotary feeder 5 comprises a horizontal, transverse spindle 8 which is journaled in connection with, and projects from, an upstanding hollow frame 9; such spindle being driven, within said frame, by a constant speed endless drive 10.

In overhanging relation to the conveyor 1 the spindle 8 is fitted with a pair of axially spaced feeder discs 11 whose spacing is slightly less than the length of the leads 6, and which spacing is maintained by an intermediate spool 12 on the spindle.

The feeder discs 11 are each formed with matching or alined, circumferentially spaced rows of notches 13; each row having a number of notches corresponding to the grooves 3 in each slat 2.

As the rotary feeder 5 constantly rotates in the direction indicated by the arrow in Fig. 1, the matching rows of notches 13 successively pick off or take delivery of a series of the pencil leads 2 from the bottom of the stack 7; the leads being maintained in the notches between the top and bottom of the feeder by lead retention guards 14. As each series of pencil leads reaches the bottom of the feeder 5, such leads are deposited—as pre-

viously described—in the corresponding grooves 3 of the immediately adjacent slat 2. The conveyor 1 and the rotary feeder 5 are driven so that their lineal and peripheral speeds, respectively, are exactly the same, and the circumferential spacing of the rows of notches 13 on the feeder is the same as the spacing of the slats 2 on the conveyor 1.

The present invention contemplates a novel conveyor unit for maintaining the number of pencil leads in the stack 7 within a predetermined normal range; i. e. to prevent overload or underload of leads in said stack. This is accomplished as follows:

The stack 7 of pencil leads, wherein the leads are horizontal and extend transversely, is maintained at a slight upward and rearward incline, with the leads resting at the ends in end slots 15, each of which is defined by a rear guide 16 and a front guide 17. Each front guide 17 is adjustable up or down, to vary the width of the slots 15, by means of an adjustment screw 18 carried in a mount 19; the mounts 19 being fixed in connection with the forward ends of corresponding longitudinal side beams 20 included in the frame structure.

At the top of the rear guides 16, their forward edges are rounded rearwardly, as shown, whereby to receive the pencil leads 6 from the upper run of a longitudinal, substantially horizontally disposed, lead conveyor, indicated generally at 21; the latter being of endless type and including a pair of transversely spaced, endless chains 22 which traverse end sprockets 23.

The end sprockets 23 are carried on cross shafts 24 journaled in connection with, and extending between, the side beams 20.

The side beams 20 project forwardly from a fixed hopper 25 supported in the frame structure, an adjacent part of said frame structure being indicated at 26. The lower end portion of the forward wall of the hopper 25 is comprised of the upper run of an endless, lead pick-up conveyor 27 which is transversely grooved, as at 28, for lead reception. The pick-up conveyor 27 is driven from the adjacent cross shaft 24, and thus has the same relative speed as the conveyor 21.

A quantity of transversely extending pencil leads 6 are disposed in the hopper 25, whose bottom comprises longitudinal grate bars 29. From the bottom of the hopper 25 the conveyor 27 constantly picks up pencil leads 6 in the grooves 28, carrying said leads upwardly and discharging them onto the upper run of the conveyor 21 for advance and ultimate discharge into the stack 7. To assure that the pencil leads 6 lie unentangled on the upper run of the conveyor 21, smooth faced rollers 30 on a cross shaft 31 run adjacent the endless chains 22 and project slightly thereabove, whereby the pencil leads engage said rollers and unentangle or straighten out transversely of the conveyor 21 as they pass said rollers.

The pencil leads 6 are maintained under agitation in the hopper 25, to assure of their proper pick-up by the conveyor 27, such agitation being accomplished as follows:

The longitudinal grate bars 29 which form the bottom of the hopper extend at a forward and downward incline, alternate ones being fitted at their upper ends, and on the under side, with rigid arms 32 connected to mounting springs 33 which tend to swing said grate bars 29 downwardly. The other grate bars are rigid, being supported in the hopper from cross bars 34.

A transverse cam shaft 35 is disposed beneath

the grate bars 29 adjacent their lower ends; such cam shaft 35 having cams 36 on which said alternate ones of said grate bars ride. The cam shaft 35 is actuated by an endless drive 37 from speed-reduction mechanism 38 of an electric motor 39. With this arrangement the alternate grate bars 29 are recurringly lifted and dropped so as to constantly agitate the pencil leads 6 in the hopper 25.

The endless conveyor 21 is driven, at variable speed, by an endless drive 40 from speed reduction mechanism 41 of a variable speed electric motor 42. By varying the speed of the motor 42 it will be recognized that the speed of pencil lead delivery from the conveyor 21 to the stack 7 will correspondingly vary, and a vacuum responsive speed control unit, indicated generally at 43, is employed to speed up the motor 42 and conveyor 21 upon underloading of the stack 7, and to slow down said motor and conveyor upon overloading of said stack relative to a predetermined normal.

Such vacuum responsive speed control unit 43 comprises a back plate 44 disposed immediately to the rear of, and engaged by, the stack 7 of pencil leads between the rear guides 16, said back plate 44 having a lower port 45 and an upper port 46 therein. The lower port 45 is circular, while the upper port 46 is egg-shaped; i. e. tapers towards its upper end.

A conduit 47, branched, as at 48, is disposed with said branches in communication with the ports 45 and 46; the conduit being supported by a suspension bolt 49 from a cross rod 50 extending between the side beams 20. Said cross rod 50 additionally serves as the mount for rollers 51 which the lower runs of the endless chains 22 traverse.

At the end opposite the branches 48 the conduit 47 is connected to a diaphragm type actuator 52 which includes a vacuum responsive diaphragm 53 connected to an actuating rod 54. The actuating rod 54 is connected in turn in operative relation to the arm 55 of a speed controller or rheostat 56 interposed in the energizing circuit 57 for the variable speed motor 42.

A constantly operating suction pump 58 is connected by a conduit 59 with the conduit 47 intermediate the ends of the latter.

The stack 7 of pencil leads act as a valve with respect to the ports 45 and 46, thus regulating the extent of vacuum imposed by the pump 58 on the actuator 52. As the stack 7 begins to overload, such stack, fully closing the port 45, progressively closes the port 46, whereupon the vacuum in conduit 47 correspondingly increases and the actuator 52 responds in such direction that the rheostat 56 is operated to slow down the motor 42. This slowing down is accomplished smoothly by reason of the upward taper of the port 46, and as the motor 42 slows down there is a consequent lesser delivery of pencil leads from the conveyor 21 to the stack 7, as is desirable to prevent overloading.

Contrariwise, if the stack 7 becomes underloaded; i. e. not sufficient pencil slats in such stack, the upper port 46 will be progressively uncovered, and in extreme cases the lower port 45 will likewise be uncovered. When this occurs there is a corresponding vacuum drop in the conduit 47 to which the actuator 52 responds in a direction to operate the rheostat in a manner to speed up the motor 42. This causes the conveyor 21 to be accelerated, to the end that the pencil leads are fed faster to the stack 7, re-

turning the latter to a height within its normal limits.

Thus, the above disposed vacuum responsive speed control unit is operative, smoothly, effectively, and automatically, to maintain an adequate number of pencil leads 6 in the stack 7 within predetermined limits. This is an extremely valuable feature in a lead laying machine of automatic type, wherein the leads are fed from a hopper to a constantly driven rotary feeder.

From the foregoing description it will be readily seen that there has been produced such a device as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. In a pencil lead laying mechanism including means to support a stack of pencil leads for downward motion, a feeder disposed to receive pencil leads from the bottom of the stack, and a conveyor disposed to deliver pencil leads to the top of the stack; a variable speed drive for the conveyor, a variable speed electric motor connected in driving relation to the conveyor, and control means operative to cause acceleration or deceleration of the motor in response to the stack lessening or increasing, respectively, in height relative to a predetermined normal; said control means including a vacuum responsive actuator, a source of vacuum connected to the actuator, and means to vary the vacuum in response to stack height.

2. In a pencil lead laying mechanism including means to support a stack of pencil leads for downward motion, a feeder disposed to receive pencil leads from the bottom of the stack, and a conveyor disposed to deliver pencil leads to the top of the stack; a variable speed drive for the conveyor, a vacuum responsive control unit for the variable speed drive, a conduit connected at one end to the control unit and having the other end disposed for progressive, valve-like closure by the stack upon increase in the height of the latter, and means to create a vacuum in the conduit; the control unit acting to increase the speed of the drive upon increase of vacuum in the conduit, and vice versa.

3. In a pencil lead laying mechanism including means to support a stack of pencil leads for downward motion, a feeder disposed to receive pencil leads from the bottom of the stack, and a conveyor disposed to deliver pencil leads to the top of the stack; a variable speed drive for the conveyor, a speed controller for said drive, a vacuum responsive actuator connected to the speed controller, means forming a port to the rear of the stack, the stack serving as a valve for said port progressively opening or closing the same upon decrease or increase, respectively, in stack height, a vacuum conduit connected between the port and actuator, and a source of vacuum connected to said conduit; the actuator causing the speed controller to increase the speed of the drive upon said decrease in stack height with resultant progressive opening of the port, and to decrease the speed of the drive upon said increase in stack height with resultant progressive closing of said port.

4. In a pencil lead laying mechanism including means to support a stack of pencil leads for downward motion, a feeder disposed to receive pencil leads from the bottom of the stack, and a conveyor disposed to deliver pencil leads to the top of the stack; a variable speed electric motor, a speed controller for the motor, a vacuum responsive actuator connected to the speed controller, means in engagement with a face of the stack forming a port, the top of the stack acting valve-like to progressively open or close the port upon decrease or increase in stack height, a conduit connected between the port and actuator, and a vacuum pump connected to said conduit between the port and actuator; the actuator causing the speed controller to increase the speed of the drive upon said decrease in stack height with resultant progressive opening of the port, and to decrease the speed of the drive upon said increase in stack height with resultant progressive closing of said port.

5. In a pencil lead laying mechanism including means to support a stack of pencil leads for downward motion, a feeder disposed to receive pencil leads from the bottom of the stack, and a conveyor disposed to deliver pencil leads to the top of the stack; a plate engaging the stack from one face, a port in said plate, the port being variably valved by the top of the stack upon fluctuation in height of the latter, a vacuum conduit connected to the port, a vacuum responsive actuator connected to the conduit, a variable speed drive for the conveyor, and a controller for the drive connected to said actuator.

6. A lead laying mechanism, as in claim 5, in which the port is tapered toward its upper end.

7. A lead laying mechanism, as in claim 5, in which the plate is formed with a second port below the first named port; the vacuum conduit being branched and the branches connecting to corresponding ports.

8. In a lead laying mechanism which includes a supported stack of pencil leads subject to progressive removal from the bottom, a conveyor to feed leads progressively to the top of the stack, a variable speed drive for the motor, and a control unit for the variable speed drive responsive to fluctuation in the height of said stack; said control unit including a fluid conduit system having a port disposed for cooperation with one face of the stack, said port being variably valved by the top of the stack upon said fluctuation in the height thereof, and the control unit being arranged to respond to fluid conditions in the conduit system resultant from said variable valving of the port.

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