Sept. 9, 1941. W. H. WILCOX ET AL 2,255,522

ARTICLE SEGREGATING MACHINE

Filed Nov. 26, 1938 4 Sheets-Sheet 1

Fig. 1

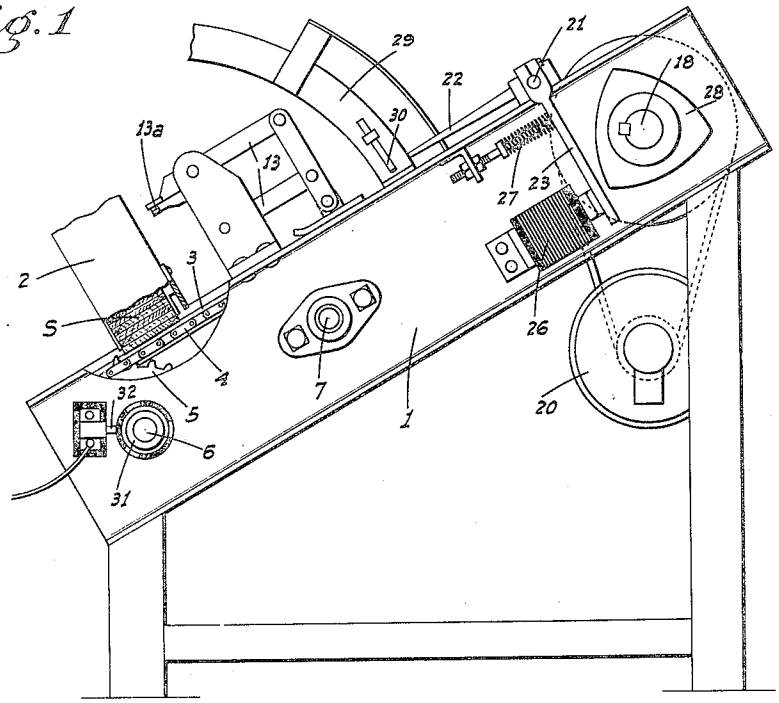
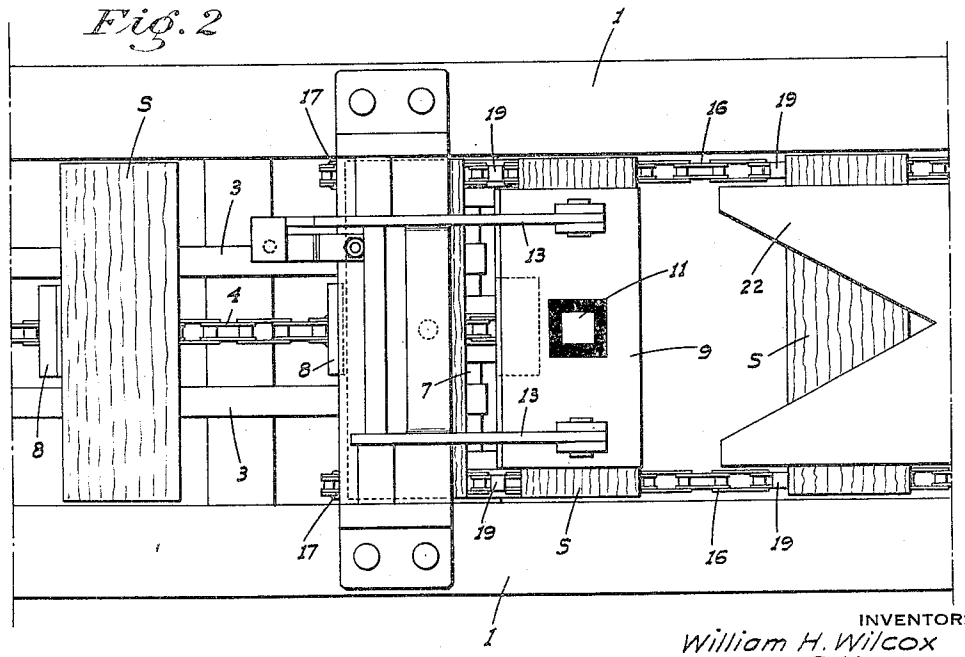


Fig. 2



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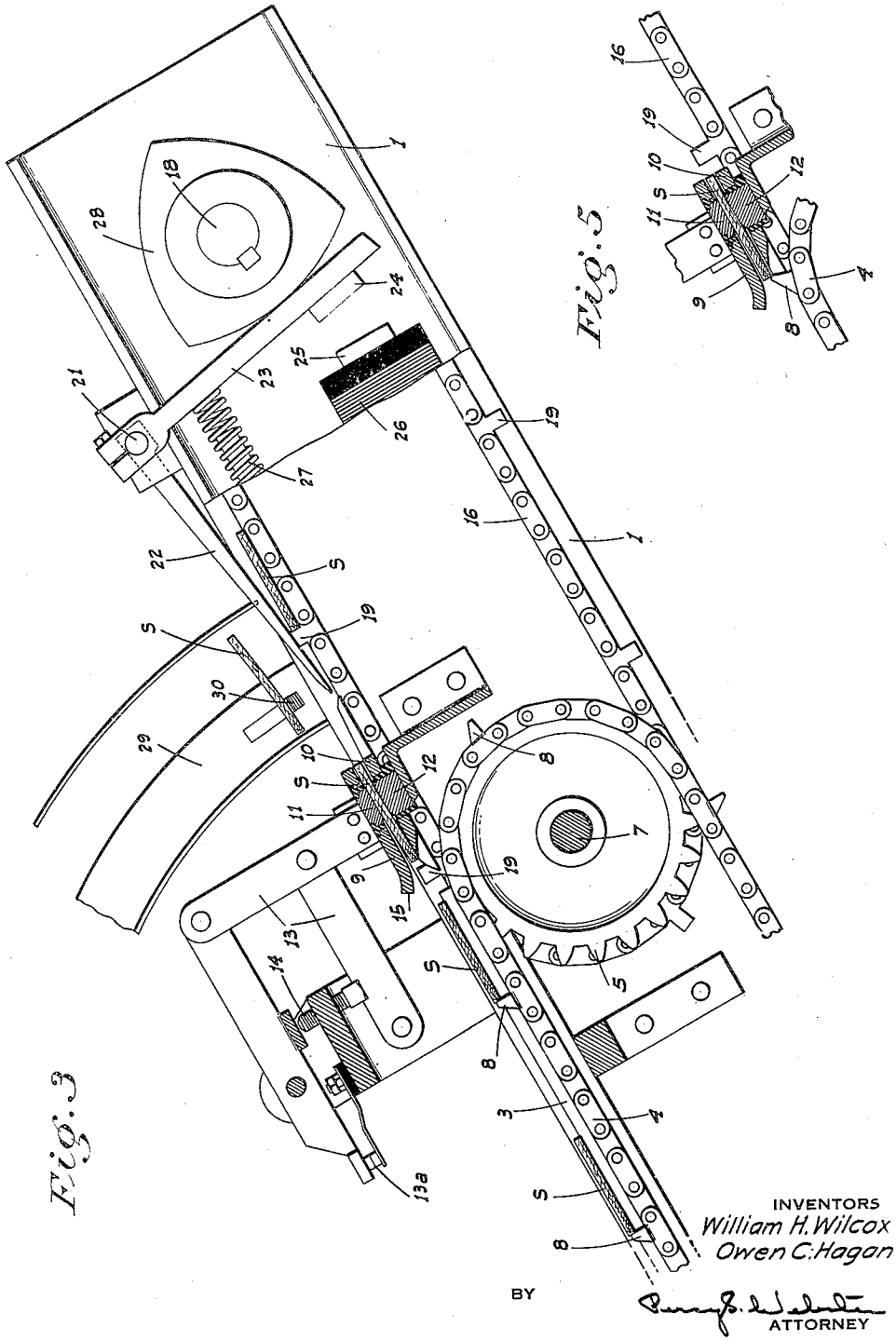


Fig. 3

Fig. 5

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ARTICLE SEGREGATING MACHINE

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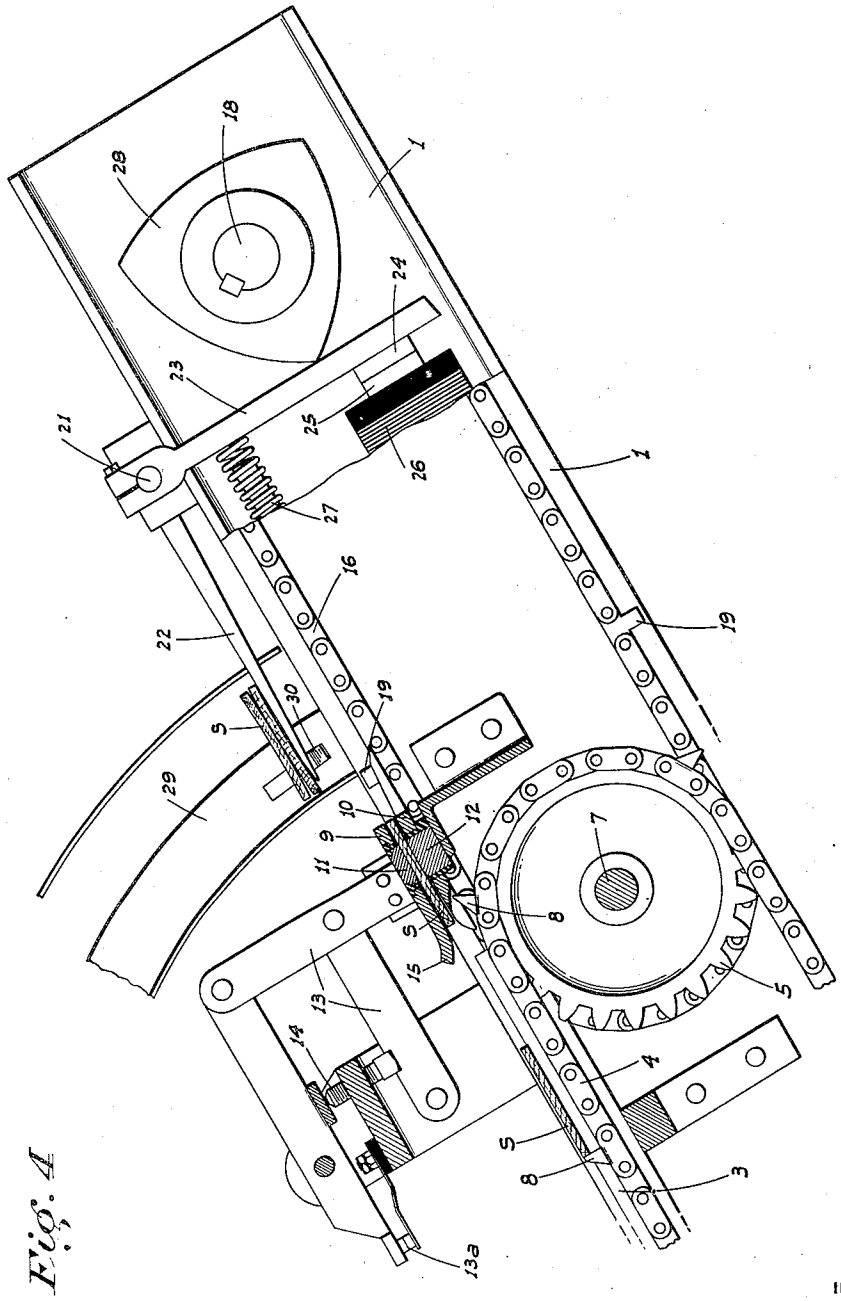


Fig. 4

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ARTICLE SEGREGATING MACHINE

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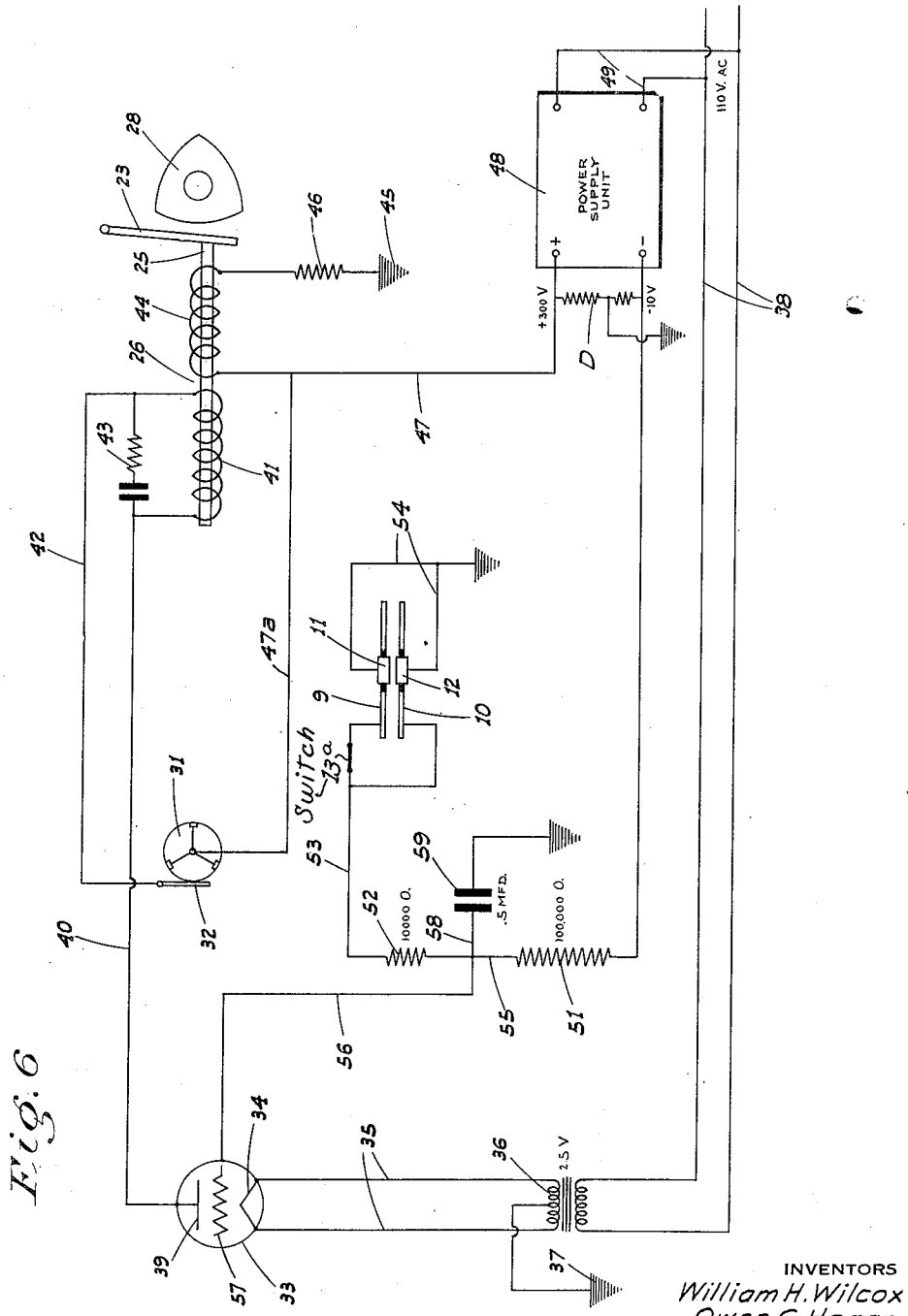


Fig. 6

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UNITED STATES PATENT OFFICE

2,255,522

ARTICLE SEGREGATING MACHINE

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Application November 26, 1938, Serial No. 242,600

5 Claims. (Cl. 209—72)

This invention relates in general to apparatus designed for use in connection with the manufacture of pencil slats, and in particular relates to apparatus for detecting and segregating slats whose dimensional characteristics vary from a predetermined normal.

The manufacture of pencil slats from wood involves high speed production, including multiple sawing of a number of slats from a block of wood, impregnation of the slats with a liquid stain, and kiln drying of such slats thereafter. In the course of such process, numerous slats become warped for one reason or another, and must be segregated from the true slats if the high standard of a mill's product is to be maintained.

It is therefore the principal object of our invention to provide a high speed apparatus which will effectively detect warped slats as they pass through the apparatus, and, after detection, will automatically segregate those warped slats from those which are true and have no such imperfection.

Another object of the invention is to provide an apparatus of the type described, which includes, in the detecting device, a pair of spaced contact plates; the apparatus including, in the conveyor, means to halt each slat momentarily between such plates, and allow the slat to assume a normal at rest position whereby to facilitate and render more accurate the testing thereof by the detecting device.

A further object of the invention is the provision of a simplified electric control system or circuit for the mechanical apparatus.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a side elevation of the apparatus.

Figure 2 is a fragmentary top plan view of the same.

Figure 3 is a fragmentary longitudinal section showing a warped slat between the contact plates.

Figure 4 is a similar view showing said warped slat as being removed from the machine and a subsequent straight or true slat disposed between the contact plates.

Figure 5 is a fragmentary view showing a slat between the contact plates and the corresponding pusher lug as just leaving the slat.

Figure 6 is a diagram of the essential features of the control circuit.

Referring now more particularly to the characters of reference on the drawings, the machine comprises a supporting frame including spaced side beams 1, the spacing of which is but slightly greater than the length of a pencil slat S.

Upstanding from the beams adjacent one end is a slat hopper 2, in which the slats are disposed in flat face to face relation, the lowest slat resting on fixed bars 3 extending lengthwise of and below the level of the top of beams 1.

A single endless chain 4 is disposed with its upper run centrally between the beams 1 and bars 3, said upper run being parallel to and below the top of the bars as shown. This chain is mounted on sprockets 5 fixed on shafts 6 and 7 supported by beams 1, the shaft 6 being back of the hopper. The chain is provided with outwardly projecting pusher lugs 8 spaced apart along the chain a distance considerably greater than the width of a slat and of a height sufficient to engage only the lowermost slat resting on bars 3. As the chain moves along therefore the slats will be successively engaged and withdrawn from the hopper and carried along with the chain while being maintained in definitely spaced relation.

When the slats have been moved along by the lugs as far as possible, as determined by the turning of the lugs out of a straight path as they pass about the other sprocket 5 on shaft 7, said slats are moved off bars 3 and become positioned between upper and lower contact plates 9 and 10 respectively and which are substantially the same size and shape as the slats.

The slats are then held centrally of their area by relatively small opposed contact blocks 11 and 12 spaced closer together than plates 9 and 10 and insulated therefrom. The corresponding plates and blocks are mounted in fixed (though possibly adjustable) relation with each other so that a true slat when engaged by the blocks will always be spaced from plates 9 and 10, for the purpose which will be seen. If, however, a slat has any warp, it will at some point engage either one or the other of the plates 9 and 10, depending on the direction of warp, as well as one or the other or both the blocks. The blocks are as small as practicable in order that they will not be spread by any warp in the slat which might prevent contact of the warped slat with one of the plates 9 or 10 also.

In order that the blocks shall engage the

slats with an even but yieldable pressure irrespective of any slight variation in thickness of the slats, one of the contact plate and block units is made vertically adjustable. In the present instance, the upper plate and block unit is thus shown, said unit being supported by a parallel linkage arrangement indicated generally at **13** and which assures the movable unit remaining parallel to the lower unit irrespective of its spacing relative thereto.

Normally, or when no slat is disposed between the plates, the blocks are spaced apart less than the thickness of a slat, movement of the blocks toward each other by means of a step **14** engaging an element of the linkage **13**. In order that an advancing slat may lift the upper block so as to pass between and be then engaged by the blocks, the upper plate **9** may be curved upwardly across its forward end as shown at **15**.

A contact switch **13***a*, closed when a slat is engaged by the blocks, and one of whose contacts is fixed, may be associated with the linkage assembly so that connection with a circuit wire may be readily made from a fixed point.

Each slat is retained stationary and in position between the contact plates for a predetermined length of time, and is then withdrawn from between the plates by the following means:

A pair of endless chains **16**, disposed on opposite sides of the central chain **4**, are arranged with their upper runs parallel to and alined with the upper run of chain **4**. These chains are mounted on sprockets **17** on shaft **7** the same size as adjacent sprockets (not shown) on another cross-shaft **18**. Chains **16** carry slat engaging lugs **19** at intervals, which are spaced apart the same as the spacing of lugs **8**, but are arranged relative thereto so as to be just ahead of the individual slats as the latter are successively pushed between the contact plates, as plainly shown in Fig. 5. By means of this arrangement, it will be seen that there is a lag or time delay between the disengagement of a slat from an initial pusher lug **8**, and the reengagement of such slat by the subsequent pusher lugs **19**, moving to a slat engaging position from behind the same.

In this manner, each slat is relieved, for the duration of the lag, of all external pressures or forces of a nature which would interfere with the slat assuming a natural position relative to the plates, and which might prevent an accurate warp test or determination being obtained.

The chains **4** and **16** of course move at the same speed, driving means being applied to one of the sprocket mounting shafts by an electric motor **20**.

In order to remove or segregate any warped slat from the remainder, after passing between the contact plates, we provide the following electrically controlled mechanism: A transverse shaft **21** is journaled on top of beams **1** above the chains some distance beyond the contact plate units, and is provided with a radially disposed slat deflector plate **22**, which projects toward said units and tapers to its outer end as shown. This plate is arranged for movement from a position substantially parallel to and above the chains **16**, as shown in Fig. 4, to a downwardly sloping position with its outer end in the path of slats on the chains as shown in Fig. 3. A radial arm **23** is fixed on and depends from one end of shaft **21**, in front of shaft **18**; the arm adjacent its lower end being provided with a metallic armature head **24** on the side thereof opposite said shaft.

This head is disposed for holding engagement with the core **25** of an opposed winding electromagnet **26** secured on the adjacent beam **1** ahead of arm **23**. An adjustable spring **27** acts on arm **23** and tends to pull the same away from the electromagnet and into engagement with a three-point cam **28** fixed on shaft **18**.

When the arm **23** is held immovable by the electromagnet, the deflector plate is clear of the path of the slats on the chains, and when the arm is free of the electro magnet, the spring **27** and the rotating cam **28** act to cause the deflector plate to recurringly raise and lower. The cam **28** is of such proportions relative to the remainder of the assembly and to the speed of travel of the slats that the deflector plate may lower, deflect and raise each passing slat if free to thus move.

Normally, however, or with the passage of true slats between the contact plates, the electromagnet holds the arm **23** clear of the cam as will hereinafter appear. When the arm is thus held, the points of the constantly rotating cam barely clear the arm.

A by-pass or segregated slat receiving assembly for the reception of warped slats raised by the deflector plate and including channel members **29** is mounted in upstanding relation on the beams **1** in position to receive slats lifted by the plate **22**, each slat as lifted passing by and being prevented from dropping when the plate lowers from under the slat by suitable retractible holding elements **30** on the sides of the channel members.

A three-contact commutator **31** is fixed on one of the sprocket mounting shafts, and is engaged by a brush **32**. The commutator contacts are arranged relative to the cam **28** (which rotates at the same speed) so that the brush engages one of the contacts at substantially the same time that one of the points of cam **31** is in an arm engaging position. Also, the brush thus engages a contact just as immediately prior to the engagement of a slat by the pusher lugs **19**, the arcuate length of the contacts being sufficient to cause the brush to remain engaged therewith while the slat travels from between the plates to a position overhanging or in line with the deflector plate **22**.

Referring now to the electrical system or circuit used in conjunction with the above described mechanism, the numeral **33** indicates a tube of the gaseous triode type—such as a "grid glow" tube. The filament **34** of the tube is energized by a 2½ volt current supplied through wires **35** which lead from a transformer **36** whose secondary winding is tapped and grounded as at **37**. Current is supplied to the transformer **36** from a 110 volt A. C. circuit **38**.

The plate **39** of the tube is connected by wire **40** with one terminal of one winding **41** of the opposed winding electromagnet **26**. The other terminal of winding **41**, which is normally deenergized, is connected by wire **42** with the brush **32** of commutator **31**. A spark suppressor **43** is wired across the winding **41**. The other and normally energized winding **44** of the electromagnet is grounded at one end, as at **45**; the grounding wire including a suitable resistor **46**. The remaining or other terminal of winding **44** is connected by wire **47** to one output terminal of a conventional power supply unit **48**, and a branch **47***a* of wire **47** leads to the commutator. The power supply unit is supplied current from circuit **38** through wires **49**.

Another terminal of the power supply unit is connected with a wire 50 which leads to a resistor 51. A voltage divider, indicated generally at D, is wired between wires 47 and 50; the wire 47 carrying a high voltage (+200 v.), while wire 50 carries a low voltage (—10 v.). Another resistor 52, preferably of less resistance than resistor 51, is connected with a wire 53 which forks and is connected to both of the contact plates 9 and 10. Wires 54 ground the contact blocks 11 and 12. The resistors 51 and 52 are wired in series by wire 55; another wire 56 leading from wire 55 to the grid 57 of tube 33. A ground wire 58 likewise leads from wire 55 and has a fixed condensor 59 interposed therein.

When the apparatus is operating, the tube is biased and no appreciable current passes between the filament and plate; the winding 41 of the electromagnet thus being deenergized. As winding 44 is always energized, arm 23 is held clear of the cam. However, when a warped slat is moved between contact plates 9 and 10 and supported on contact blocks 11 and 12, one portion or another of such warped slat will engage one or both of such plates. When this occurs, the biasing potential of the tube grid 57 is grounded, as will be obvious, and thereafter the tube will "fire" and current will pass through that portion of the circuit including winding 41. This energizes winding 41 which in turn nullifies or negatives the effect of winding 44, releasing arm 23 for actuation by cam 28. By this time, the defective slat has begun to advance again and the deflector plate deflects such slat in the manner previously described. After such slat is deflected, the commutator breaks the circuit for winding 41 and the electromagnet again holds the arm clear of the cam until the operation is repeated due to another warped slat being passed between the contact plates.

By varying the resistance of resistors 51 and 52, the same may be used, in combination with condensor 59, to effect a certain time delay between the time a warped slat engages contact plates 9 and 10 and the time the tube "fires" and actuates the segregating mechanism. This may be desirable in order to assure proper timing between the time the slat leaves the plates and until it reaches the segregating mechanism.

While this apparatus has been particularly designed for use with pencil slats, it is obvious that said apparatus could be employed to test or segregate other articles.

From the foregoing description it will be readily seen that we have 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 our invention, what we claim as new and useful and desire to secure by Letters Patent is:

1. A slat segregating device comprising a conveyor unit to advance the slats in single file order, a normally inactive segregating mechanism, a plate adjacent said mechanism parallel to the path of movement of the slats being advanced and positioned to substantially register with the successive slats individually, means mounting the plate for movement toward and from the slats in a plane at right angles thereto, a relatively small element fixed with and projecting from the central area of the plate and adapted to be engaged by the corresponding face of each slat inwardly of its edges as the slat moves into register with the plate whereby to maintain the engaged portion of said slat face spaced from the plate, normally inactive means to actuate the segregating mechanism and means to place said actuating means in operation by contact of another portion of the slat with said plate; said mechanism being positioned to act on said slat.

2. In a slat segregating device including a warp detecting unit, a conveyor to feed slats through said unit, and an electrically actuated segregating mechanism having a circuit normally open at one point therein, said mechanism being disposed beyond the unit and adapted when actuated to segregate warped slats detected by said unit; said unit comprising a pair of metallic contact plates disposed in spaced face to face relation, adjacent faces of the plates being plane and having a surface area as large as each slat and positioned to substantially register with the successive slats individually, said adjacent faces of the plates being spaced apart a distance so that a true slat may pass therebetween in clearance relation but so that a warped slat will contact at least one plate, a relatively short and small metal block projecting inwardly from each of said adjacent faces centrally thereof, said blocks being insulated from the plates and adapted to engage and support each registering slat on opposite sides thereof and inwardly of its edges, the plates being connected in parallel with one side of said normally open circuit and the blocks being connected in parallel with the other side of said normally open circuit.

3. An article segregating device comprising a conveyor unit to advance articles, a segregating mechanism positioned to engage articles being advanced, a pair of spaced elements disposed in face to face relation ahead of said mechanism, and between which true articles as advanced pass in clearance relation; normally inactive means to actuate the segregating mechanism, means to place said actuating means in operation by contact of an untrue article with either of said elements, and relatively small members mounted in connection with the elements for engagement with each article on opposite sides to maintain the elements clear of true articles as the same pass therebetween.

4. In a device for segregating flat articles having a warped surface from articles having a true surface, including a conveyor to advance the articles in single file order, a normally inactive segregating mechanism mounted in position to engage articles being advanced by the conveyor, a pair of plates having contact faces parallel to each other and to the path of movement of the articles and between which plates said articles pass ahead of the mechanism, said plates being spaced to clear all true articles but so that at least one contact face will be engaged by a warped article, relatively small blocks projecting from the central area of said contact faces for engagement with each article on opposite sides thereof and inwardly of its edges, the article engaging faces of the blocks being parallel to the adjacent contact faces, means mounting one plate and its block for movement in a plane at right angles to the other plate, means to actuate the segregating mechanism, and means to place said segregating mechanism in operation by contact of a warped article with either contact face.

5. In a device for segregating articles having a warped surface from articles having a true surface, said device including a conveyor to advance the articles, a plate having a unbroken contact face of a size and configuration to fully register with the surface of any one of the articles, means mounting the plate in position so that at one point in the path of movement of said articles the surface of each thereof registers with said contact face in adjacent face to face relation, and an article engaging element on and projecting from the contact face to said plate, said element being of a size and positioned to engage the surface of each registering article only some distance inwardly of the edges thereof as the article reaches said one point, and the article then being positioned by said element so that only an article having a warped surface makes contact with said face.

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