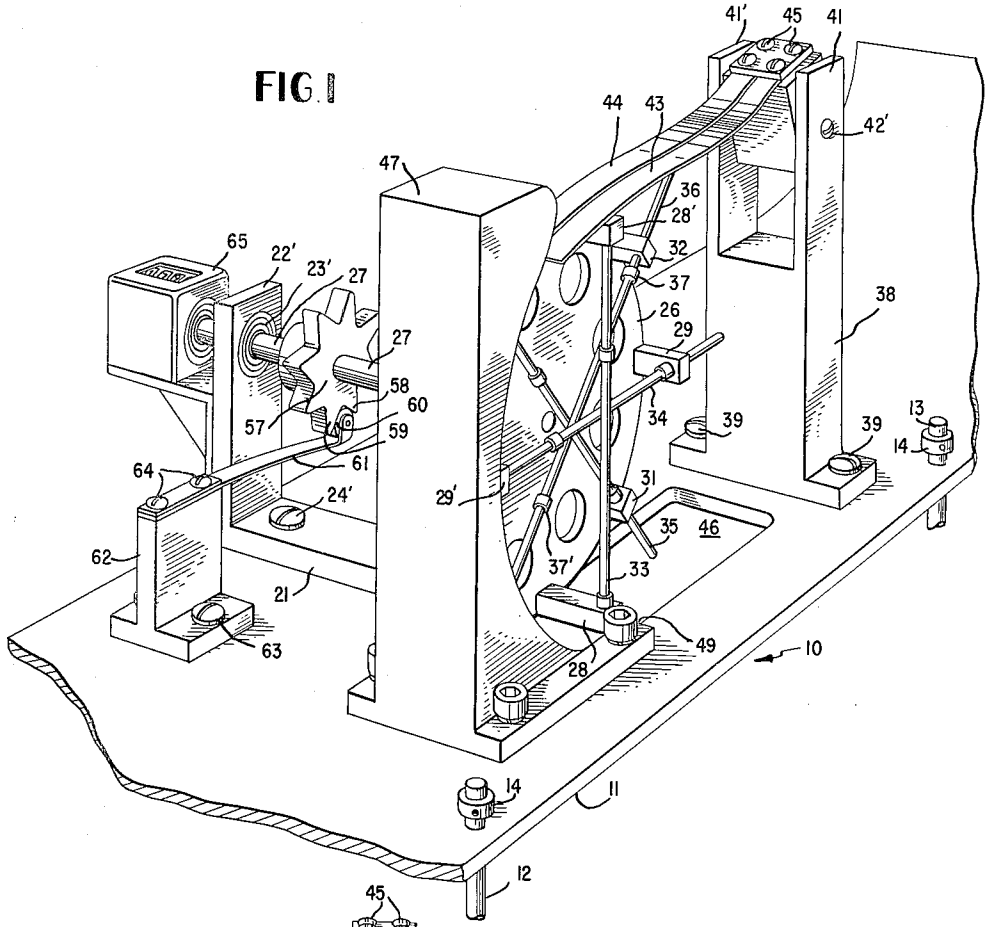
July 27, 1965 J. A. STEGENGA 3,197,136

COUNTER FOR THIN OBJECTS MOVING ON A CONVEYER

Filed Oct. 17, 1962

2 Sheets-Sheet 1

FIG. 1



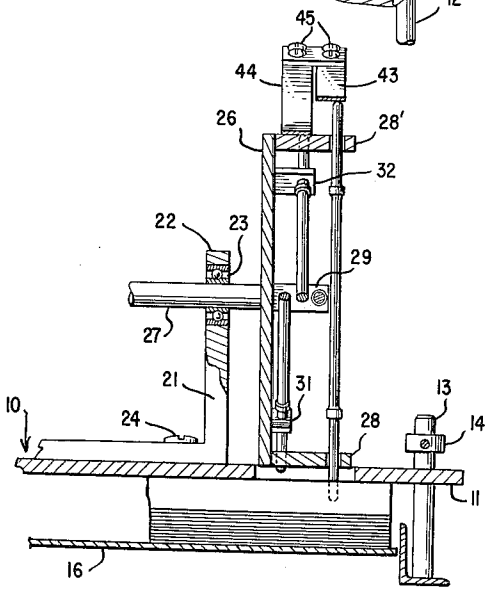


FIG. 4

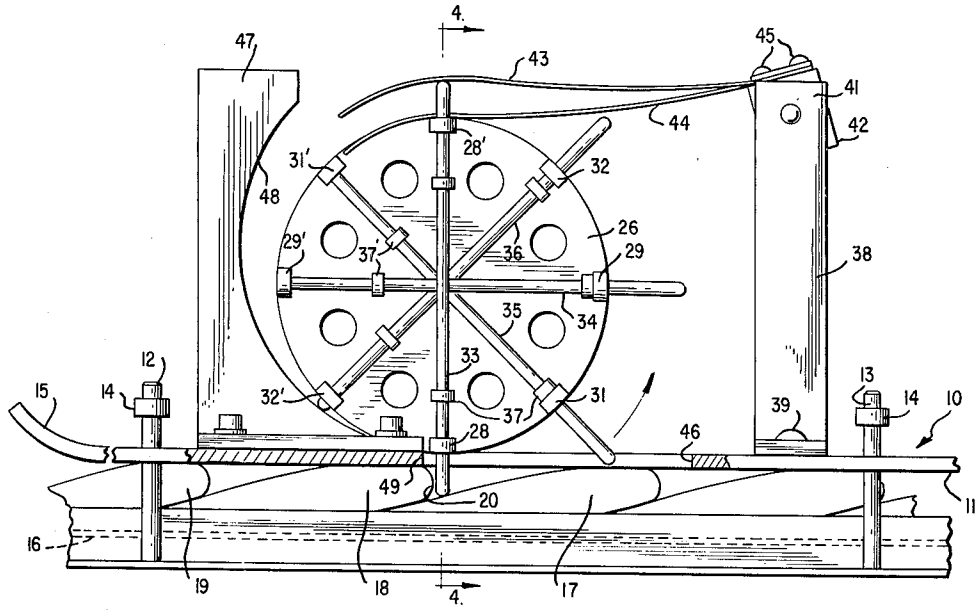
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FIG. 2



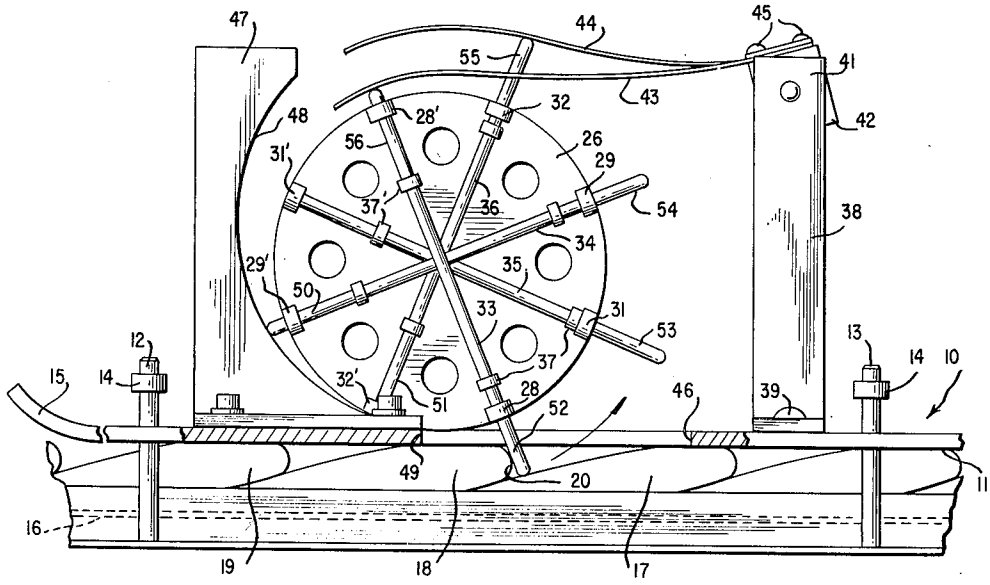


FIG. 3

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COUNTER FOR THIN OBJECTS MOVING ON A CONVEYER

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9 Claims. (Cl. 235—98)

This invention relates generally to the counting of objects moving along a conveyor in an automated process, and more particularly to the counting of folded paper products such as publications as they emerge from high speed presses.

In the automated manufacture or processing of sheet materials or other thin objects, such as in the printing of pamphlets, newspaper, and periodicals, it is frequently necessary to provide a rapid counting device for tallying the output of the product in terms of a precise count. Previous devices for this purpose have suffered from a number of disadvantages including the requirement of precise adjustment to each different thickness of articles to be counted, and the precise spacing of the articles in order that the counter may accommodate them without producing errors in the total count. It has also been observed that devices previously available are not effective for counting very thin paper products such as pamphlets, or for counting the production of thin sheet material where the thickness or size may vary from time to time. Some of these difficulties in previous devices arise from high counting rates or from the need to adjust the height on the counting mechanism or the amount of projection of the finger which is employed to sense the object being counted.

It is accordingly an object of this invention to provide a simple and inexpensive mechanism for the counting of thin folded objects passing a point on a conveyor system.

A further object of the invention is to provide an improved finger or pin mechanism adapted for immediate response to different sizes and thicknesses of objects counted, while maintaining a correct tally of the total.

A further object of the invention is to provide an improved counting wheel and supporting mechanism for a large variety of thicknesses of objects counted.

A still further object of the invention is to provide a simple and inexpensive mechanism for counting paper products, which requires no adjustment for a wide range of uses thereof and, at the same time, provides a high speed counting operation.

These and other objects of the invention will be seen in connection with the accompanying description of the invention in which:

FIG. 1 is a perspective view of a preferred embodiment of the invention;

FIG. 2 is a side elevation, partly in section, of the apparatus of FIG. 1;

FIG. 3 is a view similar to FIG. 2, showing a different stage of the operation of the counting mechanism; and

FIG. 4 is a section taken along lines 4—4 of FIG. 2.

The present invention accomplishes the foregoing objects by employing a wheel of light construction mounted on a simple sled which rides over the objects to be counted, regardless of their thickness, within wide limits, and has extensible fingers or pins which successively engage the articles passing underneath the sled, whereby the wheel is rotated and the counter is operated and, at the same time, the next finger or pin is placed in position to initiate the next count.

Referring to FIG. 1, a sled generally indicated at 10 consists of a rigid thin sheet of material, such as of aluminum, having a smooth under-surface 11 adapted to permit ready passage of thin or folded articles thereunder, and adapted to be carried at a fixed position on a conveyor by means of spacing pins 12 and 13, which are preferably arranged to pass through holes along one or both edges of the sled 10. Pins 12 and 13 may be arranged both on one edge of the conveyor and secured to a stationary portion thereof, the pins extending upwardly from the conveyor side rail a distance sufficient to accept any desired thicknesses of articles passing along the conveyor. Optionally, one of the pins may have a collar 14 secured thereto, preventing the accidental removal of the sled from the positioning pins. The sled is preferably provided with an upturned front end 15 in the form of a sled runner, or toboggan, such that it readily rides up over any newly arriving articles on the conveyor. The conveyor is illustrated at 16 having thereon a number of products such as 17, 18, 19, which may be newspapers, or the like. These articles are frequently arranged to each overlap the next preceding article passing along the conveyor, or to overlap in multiple layers, as may be desired. The spacing of the article 17, 18, 19 is such that it equals or exceeds the distance between successive pins on a wheel, later to be described, or a counter may be employed having a smaller wheel in accordance with any desired spacing of the articles on the conveyor. Each article is shown having a leading edge as at 20 over which the sled front 15 rides and against which each pin is adapted to impinge for the purpose of rotating the wheel to operate the counter.

Sled 10 is equipped with a bracket 21 having left and right upright ears 22 and 22' fitted with bearings 23 and 23' to carry the counting shaft. Bracket 21 is secured to the sled as by screws 24 and 24' in a position transverse to the motion of the conveyor. Bracket 21 carries a wheel 26 mounted on shaft 27 for rotation in bearings 23 and 23'. Wheel 26 is preferably of a size to extend approximately to the surface 11 of the sled 10 and is arranged to rotate with the lower periphery thereof parallel with the motion of the conveyor and the articles thereon. A pair of pin bearings 28, 28', arranged at diametrically opposite sides of the wheel 26, has a coaxial bore therethrough for receiving a straight pin, as will later be described. A second pair of oppositely disposed pin bearing brackets 29, 29', is located at right angles to the pair 28, 28'. Third and fourth pairs of brackets are also arranged with mutually perpendicular coaxial bores as in the case of the pairs 28, 28' and 29, 29', brackets 31 and 32 being intermediately disposed between 28 and 29, and between 29 and 28', respectively. By this means, a pair of symmetrical double ended pins 33 and 34 may be passed through the brackets 28, 28' and 29, 29', such that the pins 33 and 34 cross at the center of the wheel 26 in alignment with the end of shaft 27. Similarly, pins 35 and 36 are arranged at right angles to each other passing through like slide-bearings in brackets 31 and 32. By arranging successive pairs of opposite bearing brackets, each successively shorter than the one before, it is possible to provide four double ended pins, each slidably borne parallel to one particular diameter of the wheel 26, and in which each pair, 33, 34 and 35, 36 is a right angle pair adjacently placed for reasons which will later appear.

In order to limit the motion of each pin in its slide bearings there is preferably a pair of collars as at 37, 37' attached to each pin by pressed fitting or set screws such that the motion of the pin at each end is confined to

an extension beyond the periphery of the wheel which may vary from approximately 10% to 20% of the pin length. When 4 pins are employed, as illustrated, to provide pin ends separated at 45° intervals around the periphery of the wheel 26, the collars 37, 37' are conveniently arranged to provide an extension at either end of the pin from a position flush with the brackets to a position 15% of the pin length therebeyond, the collars 37, 37' being arranged on each pin between the oppositely disposed slide bearing brackets. By this arrangement each pin is permitted to slide freely in a direction parallel to its length along one diameter of the wheel 26, and may move by gravity to engage the successively passing objects to be counted.

Positive actuation of pin motion in the slide bearings is preferably provided to assure accuracy of the counting and to permit use of the counter in any other position. A bracket 38 is secured to the sled 10 by screws 39 to have an upright portion including ears 41, 41' for the securing of a spring tensioning block 42 by means of adjustment screws 42'. The spring block 42 carries a pair of leaf springs 43 and 44 secured thereto by screws 45. Pairs of pins 33, 34 and 35, 36 are adjacently disposed with respect to spacing from the disk of wheel 26 such that the ends of pins 33 and 34 engage spring 43 as they are rotated in the vicinity of the upper vertical position, while pins 35 and 36 engage the spring 44. By this means, it may be seen that the springs 43 and 44 are each effective on a pair of pins 90° apart, and no interference of the spring action on one pin with respect to the spring action on another pin is experienced because the springs are effective each in alternating order to provide spring actuated pins over travel arcs considerably in excess of 45°.

Sled 10 is provided with an aperture 46 extending beneath the central portion of the wheel 26 from the vicinity of the vertical projection of the shaft 27 along the conveyer surface toward the bracket 38 such that the pins, when fully extended into the opening 46, do not interfere with the rotation of the wheel 26 in one direction.

A cam bracket or stand 47 is attached to the sled 10 at a position forward of the aperture 46 and is provided with a camming surface 48 arcuately curved to retract each pin and as it rotates thereagainst toward a vertical position below the shaft 27. Surface 48 may be a right circular cylindrical section of which the cylindrical diameter considerably exceeds the diameter of the wheel 26 and in which the surface 48 terminates in a thin cam edge 49 which is disposed above the aperture in such a position that each pin as it rotates toward the lower vertical position is released at 49 to fall through the aperture 46 to the level of the surface of the top article then passing thereunder. As each article passes further along thereunder the extended pin may extend further as necessary to contact the surface of the previously counted article under pressure of spring 43, or spring 44, in order to firmly engage the leading edge 20 of the then passing article. While the cam bracket 47 is illustrated as having cam edge 49 approximately above the leading edge of the aperture 46, it will be understood that the aperture 46 might extend further along the conveyer, and that the positioning of the bracket 47 adjusts the position in the rotation of the wheel 26 at which each of the sliding pins is caused to enter the aperture 46. The cam bracket 47 is illustrated as secured to the slide 10 by means of a conventional bolting arrangement, but might also be provided with well known locating means for the purpose of adjusting the rotary position at which each pin is released by the cam edge 49 to engage the next succeeding article to be counted.

The operation of the counting fingers or pins and the wheel 26 with respect to the cam 47 and the opening 46 will be better understood by reference to FIGS. 2 and 3 in which FIG. 2 shows the pin 36 nearly retracted by the action of the cam surface 48 and just commencing its

cocking or energizing action on the spring 44. Pin 33 is shown as sufficiently extended to engage the leading edge of an article to be counted, which article has already initiated the motion of the wheel 26. It will be noted that the spring 43 is not fully relieved for the reason that pin 33 is not fully extended, but extends in each case below the surface 11 by approximately the thickness of the succeeding articles passing under the sled. In FIG. 3 a partially cammed pin 34 has a pin end 50 which is nearly retracted and a pin end 54 correspondingly extended to nearly its full extent. Pin 36 has one end 51 fully retracted and the opposite end 55 in a position fully energizing spring 44. Pin 33 has one end 52 nearly fully extended since the pin has rotated beyond its vertical position and still engages the leading edge 20 of an article 18 on which the count has nearly been completed. Pin 35 shows one end 53 fully extended since neither gravity nor the action of the spring 44 has yet caused retraction thereof.

By the means described, it will be seen that sled 10 may be caused to ride over articles 17, 18 and 19 as they move along the conveyer, with little regard to the actual thickness thereof, and that the distance of the surface 11 from the conveyer 16 will be determined by the thickness of the individual articles and the number of layers thereof passing underneath the counting device. In the case of very thin materials, each pin end will extend only slightly below the surface 11 as necessary to accommodate to the thickness of the articles passing under the sled, but in each case the pin is strongly urged against the surface of the already counted moving article so that it is caught by the next leading edge 20 and carried along to rotate the wheel 26 until the pin is disengaged near the downstream end of the aperture 46. The spring-urged pins are seen to accommodate to the various thicknesses of the material and to the variable number of layers of paper products and the like which may be passing underneath the counting device. It will be observed that the wheel will be rotated approximately 45° on each occasion before the leading edge 20 passes beyond the reach of the pin end, as will be determined in part by the positioning of the collars 37 and 37' on the respective pins.

Wheel 26 may be rotated freely in the counter clockwise direction as seen in the various figures, but it may not be rotated clockwise for the reason that each pin in the aperture 46 would strike the cam edge 49 and thus be restrained from movement in that direction. Normally, no back motion is encountered, but to provide a greater certainty in the positioning of pins as they drop through the opening 46 for engagement with the next passing article there is provided on the shaft 27 a toothed or pronged wheel 57, having the same number of teeth as the number of effective pins on wheel 26. As illustrated, adjacent teeth 58 and 59 are provided with a V groove therebetween to receive a roller 60 carried by a leaf spring 61 on bracket 62 so biased as to provide a detent action each time roller 60 passes over one of the teeth of detent wheel 57. Bracket 62 is preferably secured to sled 10 by means of screws 63 which may be provided with slotted apertures for adjustable accurate location of roller 60. Spring 61 may also be adjusted by screws 64 to position the roller 60 to cause wheel 26 to assume accurately fixed orientations or stopping points after each actuation.

Shaft 27 may be supplied at the end opposite wheel 26 with a conventional counting mechanism illustrated at 65, including an internal or external gear reduction of 10 to 8 when 65 is a decade counter, to give a counter of one for each passage of roller 60 over a tooth 58, 59 of wheel 57. Conveniently the counter may be mounted beside shaft 27 and coupled thereto by the reduction gear. Equivalently, the counter 65 might be electrically operated by a switch actuated when the roller 60 is caused to pass over a tooth of wheel 57, and the counter 65 might thereby be of electrical rather than mechanical actuation.

While the invention has been described with respect to

a mechanism which might be manufactured of aluminum or other light-weight metal, it is to be understood that a small lightweight unit of low rotary inertia could be built of stainless steel or brass to also have excellent characteristics with respect to low sliding friction between the parts, especially at the pin slide bearings. Similarly, the apparatus might be built partly of plastic of suitably selected properties to provide an inexpensive and reliable mechanism manufactured by mass production methods.

The described structure relates to a wheel **26** bearing pins at 45° intervals therearound, and for this purpose, permitted pin extensions beyond the periphery of the wheel of approximately 15% are found desirable. It will be understood that six pin units, having twelve effective pins, might be located on the wheel in place of the four illustrated to provide pin spacing of 30° around the wheel, provided generally that the degree of pin extension beyond the periphery of the wheel be not so great as to cause a double count when a very thin object such as a single folded paper product passes underneath the sled. It is likewise contemplated that the pins may be released to rest positions for receiving a further object to be counted 10° to 20° prior to reaching the vertical position, provided only that the pins be restrained by collars **37**, **37'** so as not to extend far enough to produce the second count for a single actuation, due to a large movement of the wheel **26**. Under normal operation no difficulty of this type will arise and only a single count will be registered over wide limits of adjustment and of article thickness, particularly in view of the positioning action of the roller **60** operating against the detent wheel **57**. It will also be understood that the sled need not rest upon the passing folded articles, but could ride thereabove, with the weight of the counting mechanism at least partly compensated by springs, or the like. By providing a variable height for the sled which depends on the article thickness and arranging the pin extension limits to correspond with the separation of the circumference of wheel **27** from a tangent line thereto (substantially surface **11**) each pin operates the wheel through a fixed arc regardless of the article thickness.

While the invention has been described with reference to a particular embodiment it will be understood that other equivalent structure is comprehended, limited only by the scope of the appended claims.

What is claimed is:

1. A counting device for registering passage of a series of flat products along a conveyer, comprising

a supporting sled mounted in fixed longitudinal position on the conveyer above said products as they pass therebeneath,

an elongated aperture in said sled,

stand members mounted on said sled, rotatively supporting a shaft extending transversely of the conveyer,

a wheel carried for rotation with said shaft and having a periphery extending to said aperture,

two pairs of pins extending diametrically across one face of said wheel, the pin ends being at 45° spacings,

means supporting said pins for limited free longitudinal motion beyond said periphery at each end thereof,

means retracting each pin end as it is rotated toward said aperture,

means releasing each pin to enter said aperture as the wheel rotates in one direction,

means urging each pin downwardly within said aperture when released, thereby to engage said products in succession as they pass thereunder,

means stopping said wheel after it is rotated by one said pin sufficiently to cause the next said pin to enter said aperture, and

means counting successive rotational increments of said wheel.

2. A device according to claim **1** wherein said wheel includes slide bearings retaining each pin in fixed angular setting while allowing free radial movement of said pins to substantially 15% of the length thereof.

3. A device according to claim **1** wherein said retracting means includes a substantially cylindrical surface having a greater diameter than said wheel, said surface terminating at an edge adjacent said aperture.

4. A device according to claim **1** wherein said means urging the pins downwardly includes spring means separately contacting the upper ends of said pins while in orientations near vertical.

5. A device according to claim **1** wherein said stopping means includes a spring-urged roller thrust against an eight position detent wheel fixed on said shaft to provide a partially relaxed spring tension position for each pin as it passes said releasing means.

6. A counter for registering the number of layered articles passing along a conveyer, comprising

support means for said counter including an apertured sled stationed in fixed longitudinal position above the conveyer and at an elevation thereabove determined by the thickness of said articles passing therebeneath,

a shaft mounted on said support means for rotation about an axis transverse to said conveyer,

wheel means for driving said shaft fixed thereon above an aperture in said sled,

a plurality of pins extending diametrically across said wheel means at equal angular separations, each pin being slidably supported for extending limited variable distances therebeyond into said aperture,

cam means effectively retracting each pin as the lower end thereof is rotated toward a vertical position during wheel rotation and releasing said pin at a fixed position to extend through said aperture,

spring means effective to urge said pins in succession toward said articles during extension through said aperture, and

means counting the number of pins passing said cam means as each extended pin is moved along by successively passing articles.

7. A counter for overlapping folded paper products passing along a conveyer, comprising

a support member horizontally positioned to ride over said products,

a shaft transversely mounted above said member for rotation about an axis transversely disposed to said conveyer,

a plurality of double ended pins mounted perpendicularly to said shaft for longitudinally slidable extension to variable positions below the level of said member,

means slidably supporting said pins at equally separated angular dispositions about said shaft,

camming means retracting the lower end of each pin as it rotates toward a vertical position and thereupon releasing it,

aperture means in said support member beneath said pins disposed to receive said lower ends of the pins in succession as they are released by said camming means, whereby shaft rotation successively places extended pins in the path of said products passing along the conveyer, and

counting means registering successive movements of said shaft as said products strike said pins.

8. A counting device for a succession of flat objects moving thereunder, comprising support means mounted to override said objects moving thereunder,

wheel means mounted on said support means and having a wheel periphery movable in adjacent relation to said objects,

a plurality of longitudinally extensible spoke members distributed around said periphery, each positioned

to be extended to engage a leading edge of one said object as it passes,

means variably extending said members to engage successive said leading edges throughout movement thereof away from said periphery as the wheel means rotates one spoke spacing interval,

counting means responsively connected to said wheel means for registering one count each time one said object engages one said spoke member.

9. A counting device associated with a series of moving folded objects disposed in overlapping relation, comprising

carriage means disposed in overriding relation to said objects,

rimmed wheel means mounted on said carriage means for rotation with the periphery thereof adjacent the path of said objects,

longitudinally extensible spoke means attached at fixed points around said periphery for engagement with successively arriving objects when downwardly extended,

means causing extension of said spoke means during a fixed portion of their rotation with said wheel means, said extension being of an amount to engage a next arriving said object at a location beneath said wheel means,

means retracting said spoke means as they approach said location upon rotation of the wheel means in response to a previously passing object, and

means counting the rotative motions of the wheel means.

References Cited by the Examiner

UNITED STATES PATENTS

1,019,011	2/12	Olmer	38—2 X
2,146,150	2/39	Liacos	235—98
2,174,480	9/39	Raymond	235—98
2,320,021	5/43	Welk	235—98
2,337,813	12/43	Grossenbacher	235—98

FOREIGN PATENTS

131,321	6/02	Germany.
596,142	4/34	Germany.

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