United States Patent

Sucher et al.

[15] **3,665,575**

[45] **May 30, 1972**

[54] APPARATUS FOR INSERTING ELECTRODE RODS INTO POCKETS OF DOUBLE-WEB MATS FOR STORAGE BATTERIES

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[22] Filed: **Nov. 5, 1970**

[21] Appl. No.: **87,271**

[30] **Foreign Application Priority Data**

Nov. 11, 1969 Germany ..... P 19 56 569.6

[52] **U.S. Cl.** ..... **29/204 D**

[51] **Int. Cl.** **H01m 37/00**

[58] **Field of Search** ..... 29/204 D, 204 R, 203 R, 203 D

[56] **References Cited**

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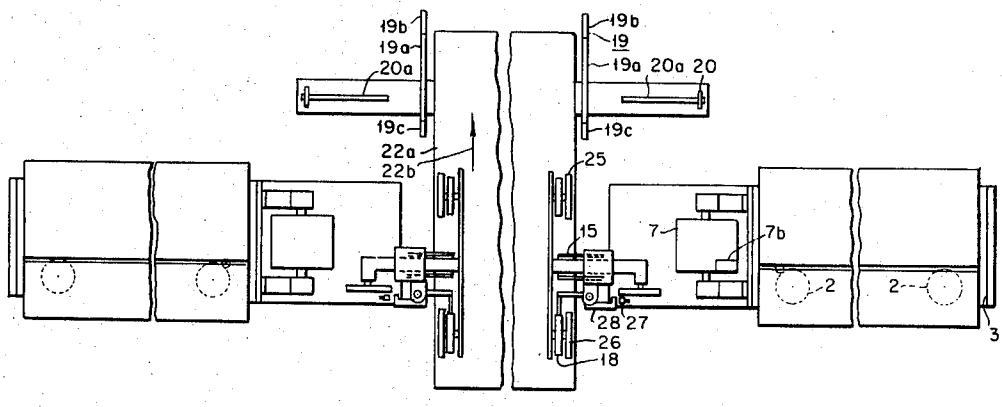
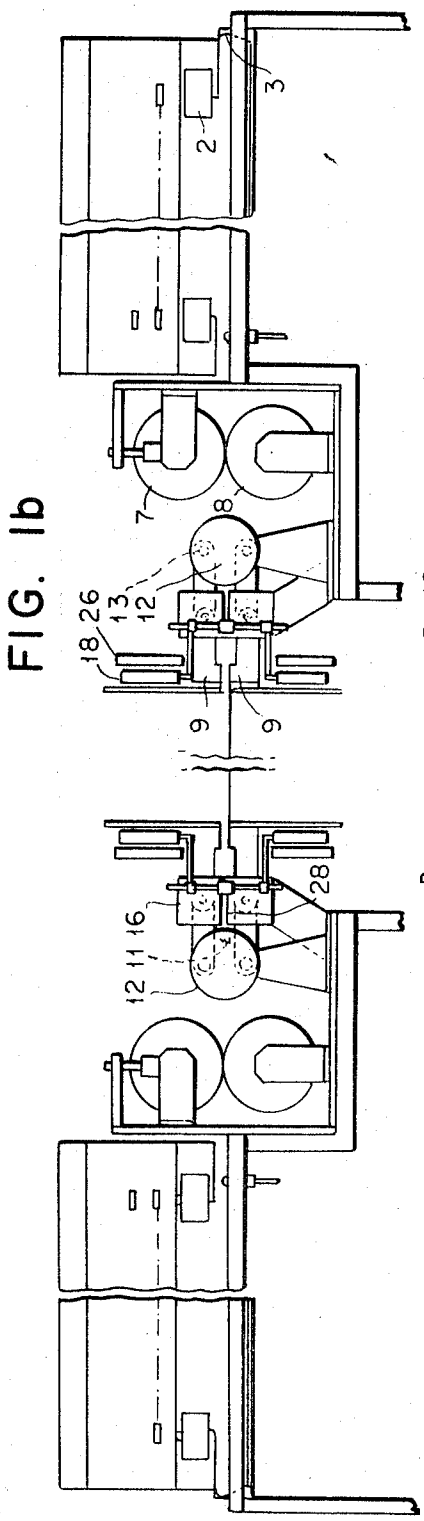
Attorney—Curt M. Avery, Arthur E. Wilfon, Herbert L. Lerner and Daniel J. Tick

[57] **ABSTRACT**

An apparatus for inserting contour rods into the pockets of double-web mats for storage-battery electrodes comprises a contour-rod magazine with dispensing means for releasing one rod at a time. A spreader device opens the pockets of the mat. Catch and guide means then engage the released rod and partially insert it into a pocket then spread open. Further transport means engage the partially inserted rod and completely shove it into the mat pocket. A control mechanism operates to actuate the above-mentioned component devices of the apparatus in the sequence described. Preferably two rod inserting apparatus are arranged on opposite sides of the double-web mat for simultaneously inserting respective contour rods from opposite sides into the pockets.

20 Claims, 14 Drawing Figures




3
2
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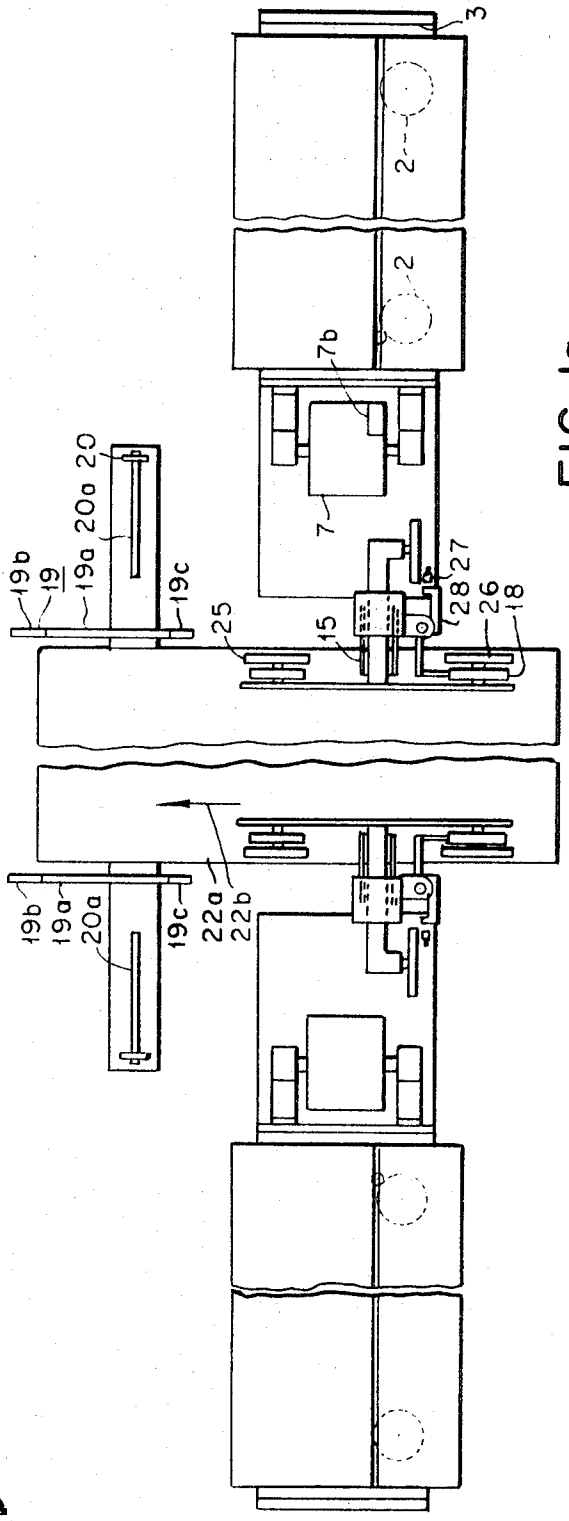
12

FIG. Ib


3
2
2
7b
7
20
20a
19b
19
19a
19c
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20a
19c
22a
22b

FIG. Ia

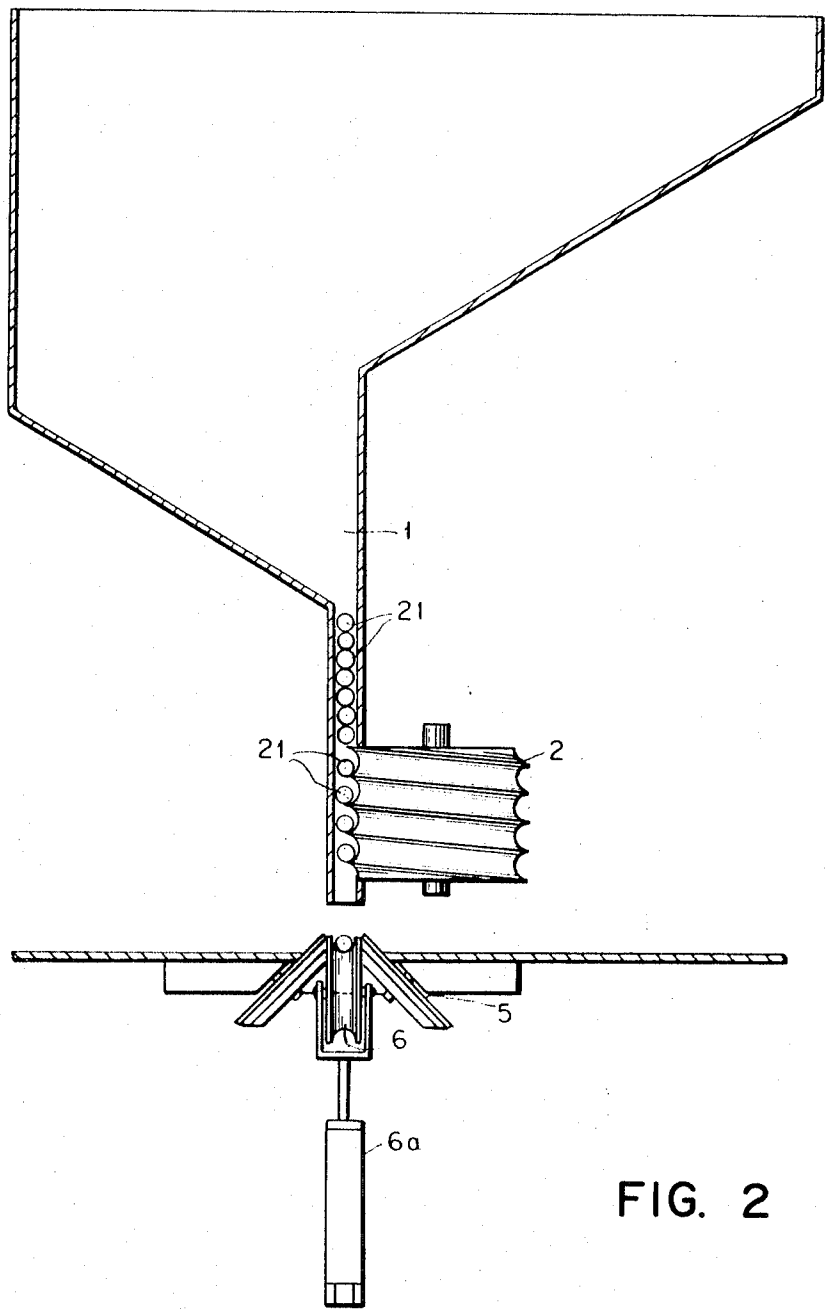


FIG. 2

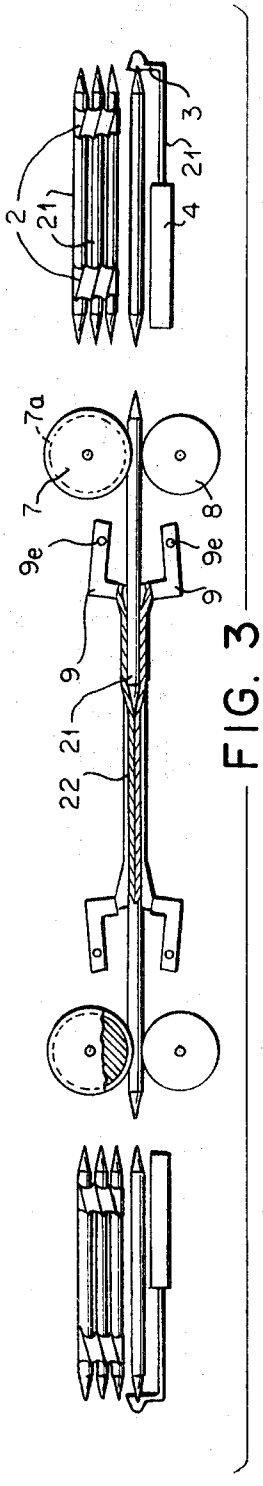


FIG. 3

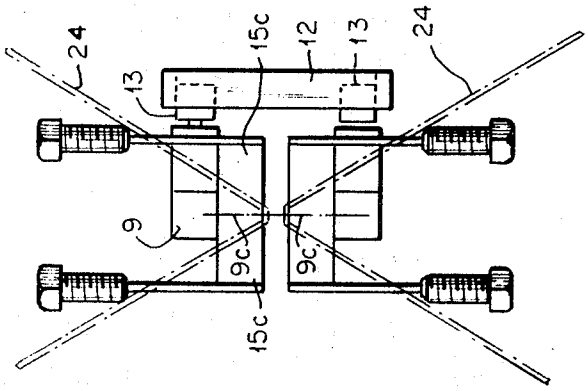


FIG. 4b

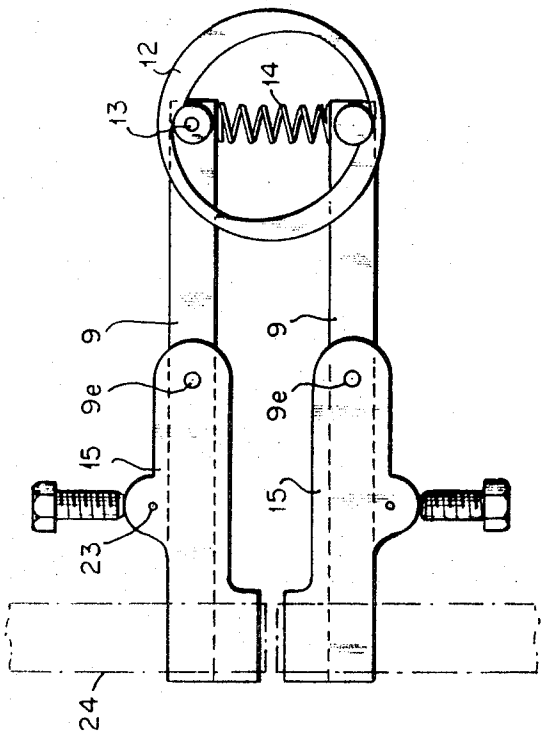
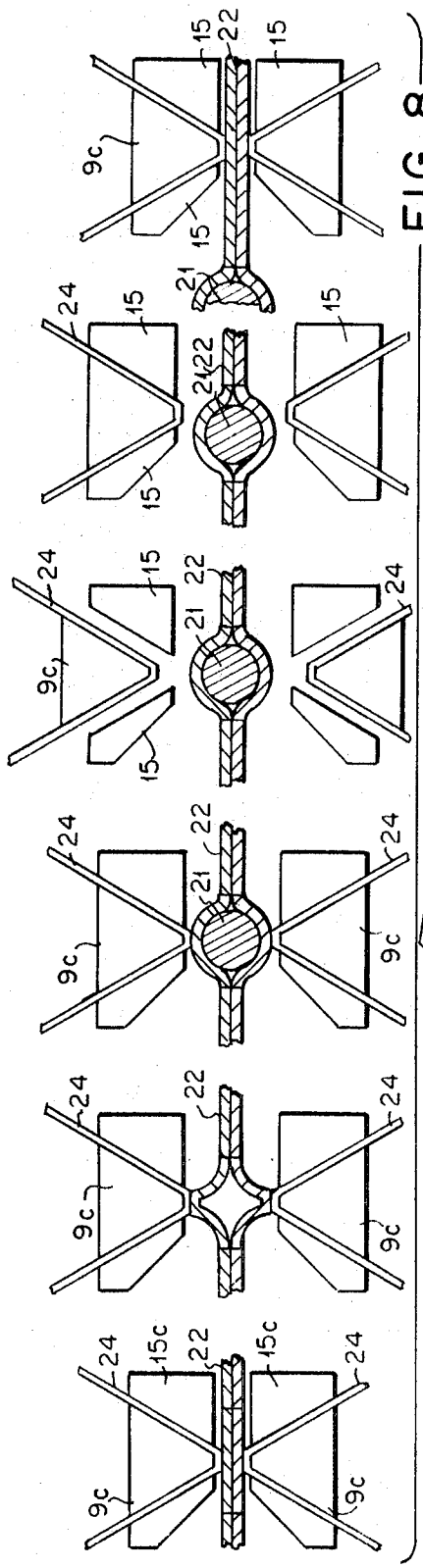


FIG. 4a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21
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9c
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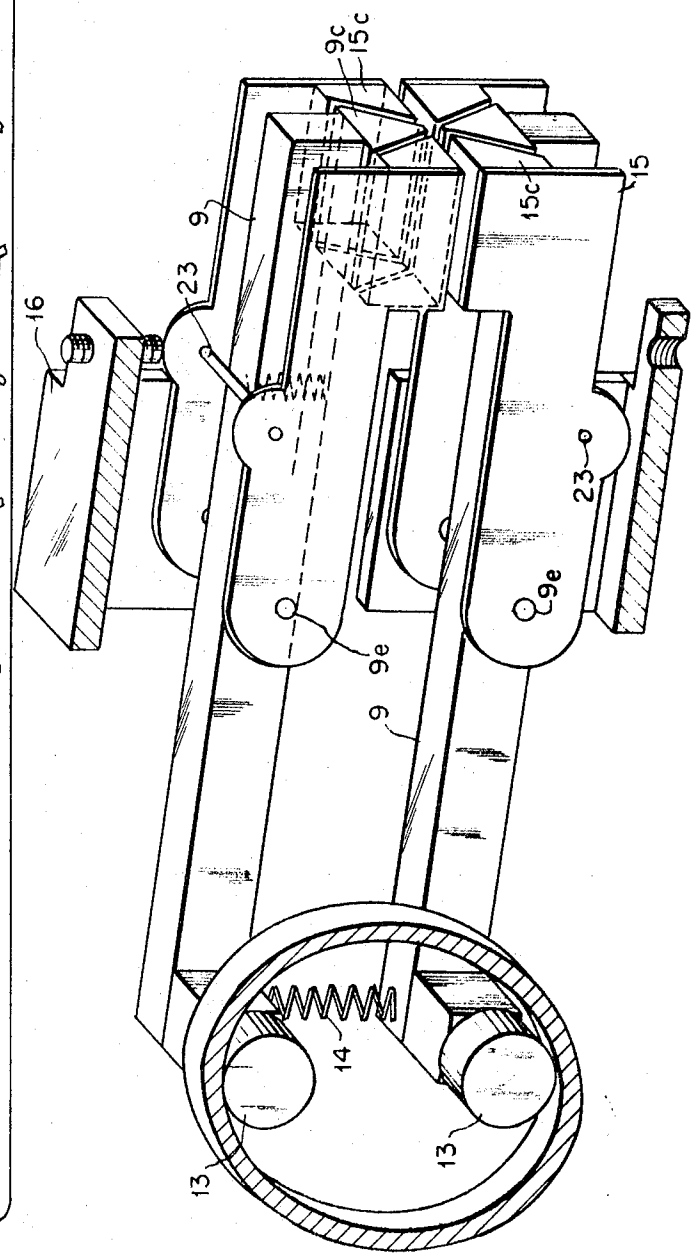
24
15c
22
15c
24
9c
9c

FIG. 8

FIG. 6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23
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9e
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13
13

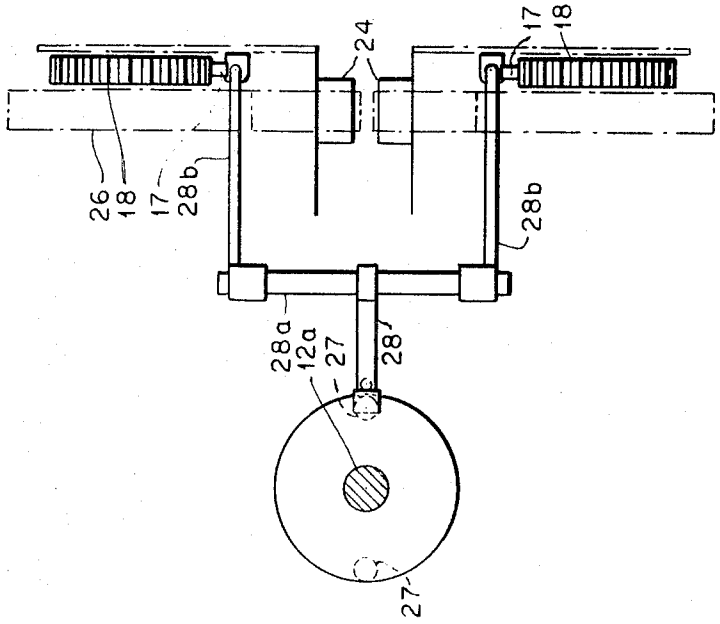
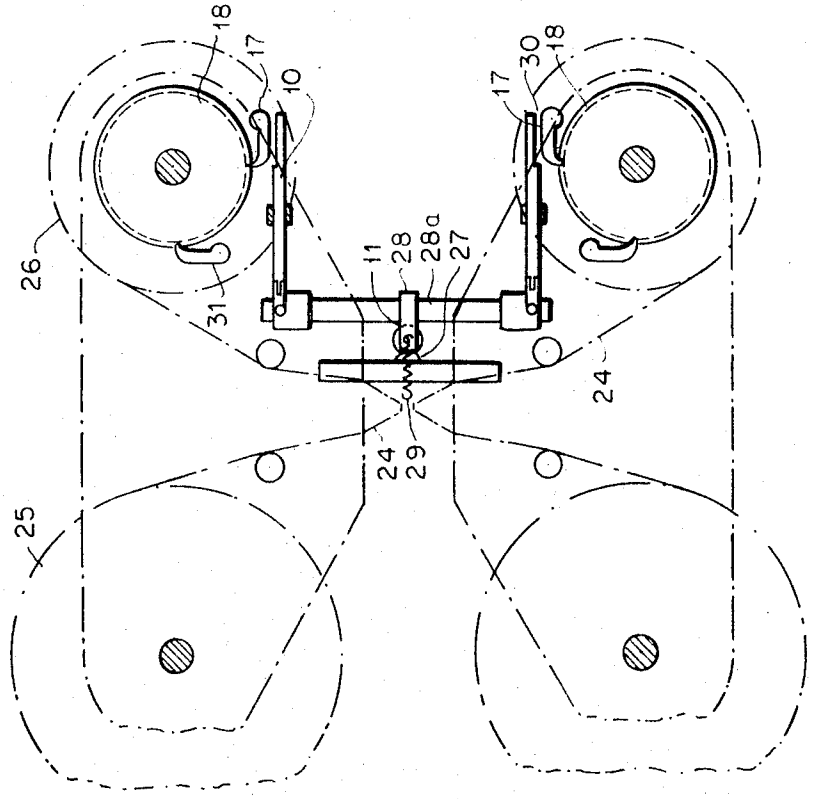

24
17
18
26
18
17
28b
28b
28a
12a
27
28
27

FIG. 5b


18
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17
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28a
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FIG. 5a

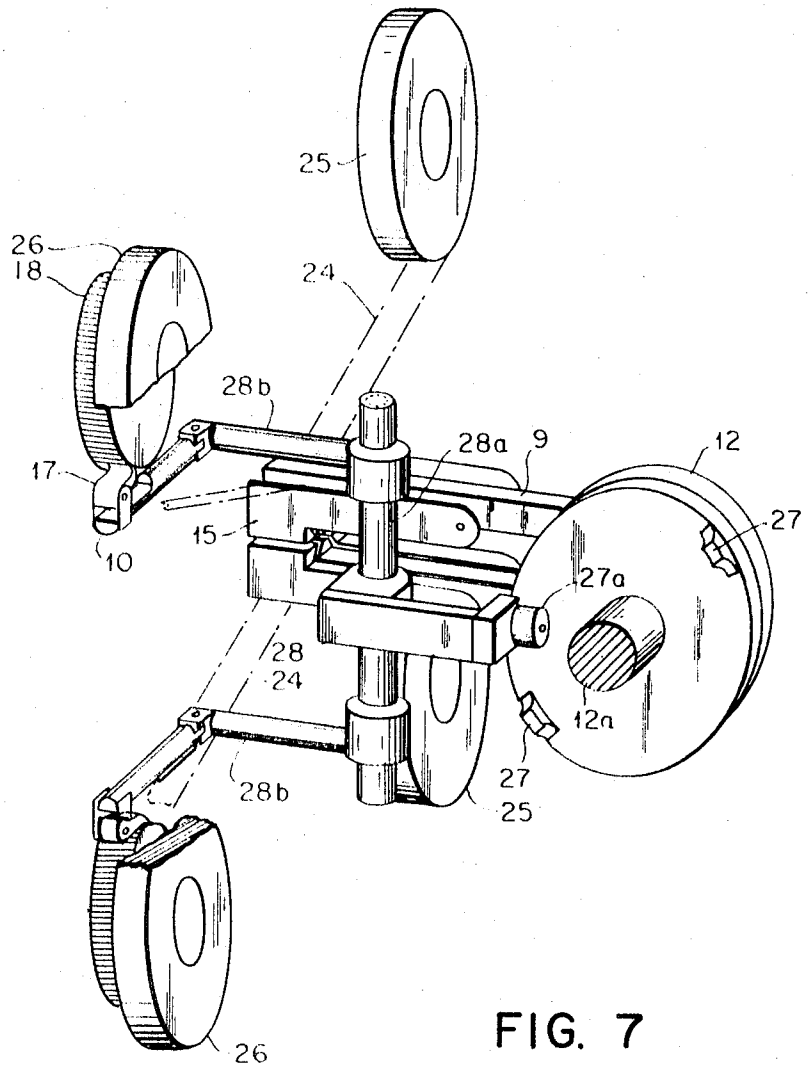
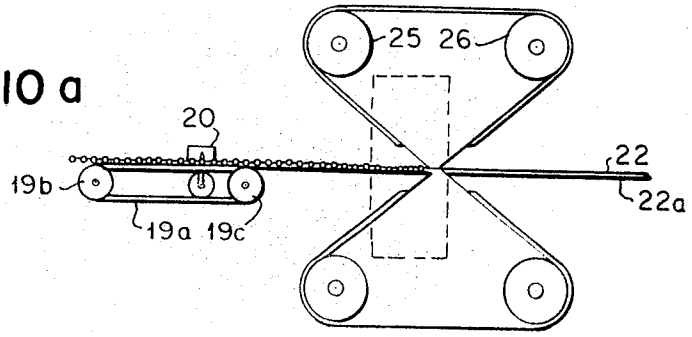


FIG. 7

FIG.10 a



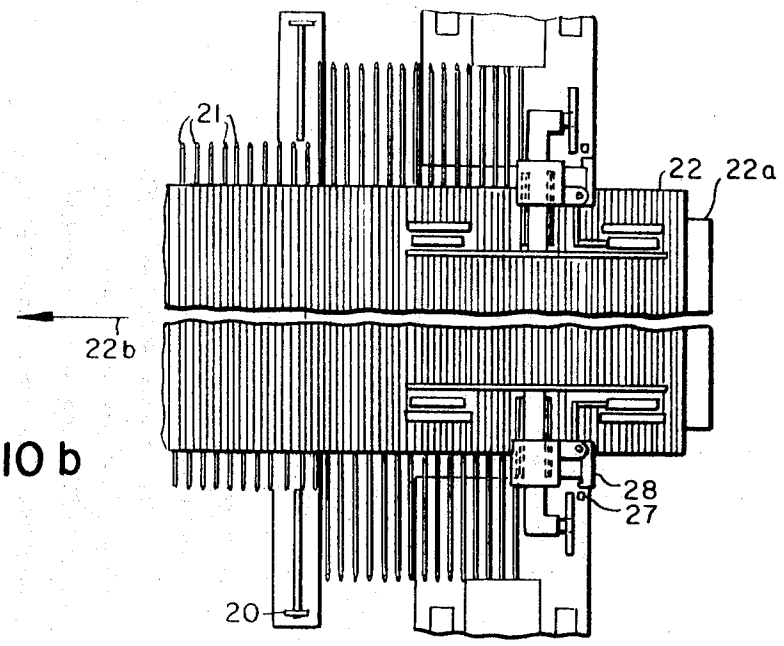


FIG.10 b

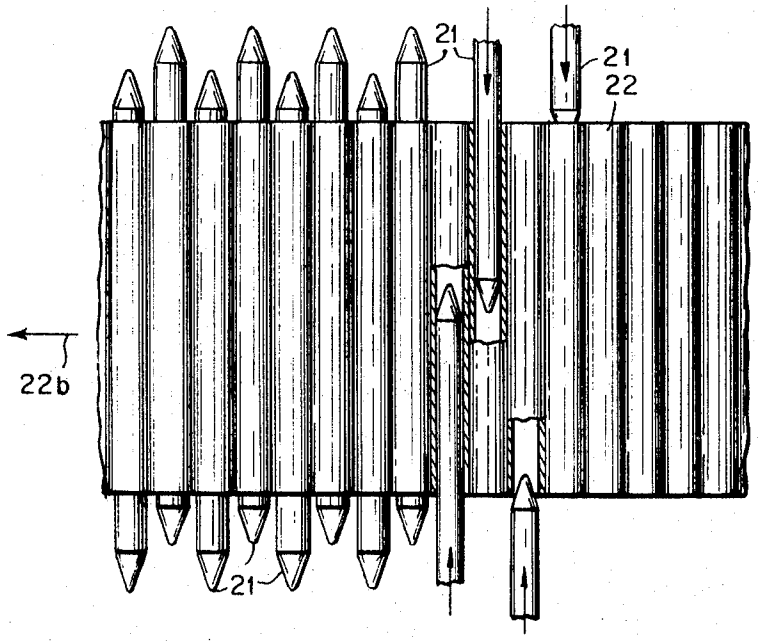


FIG. 9

APPARATUS FOR INSERTING ELECTRODE RODS INTO POCKETS OF DOUBLE-WEB MATS FOR STORAGE BATTERIES

Our invention relates to apparatus for automatically inserting contour rods into double-web mats for producing pocketed rod arrays to be used as storage-battery electrodes.

In a more particular aspect, our invention relates to positive electrodes consisting of a number of vertical rods made of conducting lead metal and interconnected by traverse connections to conjointly form a storage-battery electrode, the rods being parallel in mutually spaced relation and individually surrounded by active mass which is covered by tubular porous envelopes of insulating electrolyte-resistant material.

The envelopes may consist of various types of woven or other webs made of various materials. They serve to retain the active mass while permitting free access of the acid to the active mass. The envelopes can be made, for example, on weaving looms from acid and oxidation resistant plastic yarns and are constituted by a multiplicity of tube or hose configurations located parallel beside, and joined lengthwise with each other. When the double mat comes from the loom, it lies flat, the ultimate tubular shape of the pockets being formed by additional processing steps. These comprise, for example, the application of impregnation to the fabric unless the fabric is made from self-hardening synthetic plastic yarns. The further steps also comprise the insertion of shaping bodies, for example round rods, into the originally flat pockets, followed by thermal fixing.

The present invention especially concerns the operations of inserting the round or otherwise contoured rods into the woven or other double-web mats. For producing these tubular envelopes it is still customary to shove all of the rods manually into the mat material. This involves an undesirably large amount of manual labor and time.

It is an object of our invention, therefore, to render the production of such storage-battery electrodes more economical.

Another, more specific object of our invention is to devise machinery capable of automatically inserting the contour rods into the pockets of the mat so as to minimize or virtually obviate the need for manual work.

Still another object of the invention is to provide apparatus that affords shoving the shaping rods mechanically and continually from opposite sides simultaneously into two parallel and adjacent pockets of the mat.

To achieve these and such further objects as will appear hereinafter, and in accordance with a feature of our invention, we provide an apparatus for inserting contour rods into pockets of double-web mats for storage-battery electrodes, which comprises a contour-rod magazine with dispensing means for sequentially releasing the rods, one at a time. We further provide the apparatus with a spreader device which opens the pockets of the mat, and with drive means engageable with the released rod for axially shoving it into the pocket than spread open by the spreader device.

According to another feature of our invention, the just-mentioned rod drive means comprise catch and guide means which transfer each individually released rod from the dispensing means of the magazine toward and partially into the mat pocket then spread open by the spreader device, further transport means engageable with the released rod being then active to completely shove the rod into the mat pocket.

The invention will be more fully described by way of example with reference to the accompanying drawings illustrating a preferred embodiment of apparatus according to the invention.

FIGS. 1*a* and 1*b* show schematically a top view and a lateral elevation respectively of the entire apparatus, both illustrations being hereinafter collectively referred to as FIG. 1;

FIG. 2 is a partly sectional view of the rod magazine appertaining dispensing and guiding equipment;

FIG. 3 is a schematic diagram relating to details for elucidating the principle of the spreader device and the transport device for the contour rods;

FIG. 4*a* is a lateral elevation and FIG. 4*b* a front view of the spreader device proper, both illustrations being hereinafter collectively referred to as FIG. 4;

FIG. 5*a* is a front view of the same spreader device with adhesive tape supply means and appertaining transport rollers, and FIG. 5*b* is a lateral view of the same spreader, both illustrations being hereinafter collectively referred to as FIG. 5;

FIG. 6 is a partly sectional, perspective view of the spreader device according to FIGS. 4 and 5;

FIG. 7 is a partly sectional, perspective illustration of the same spreader device with appertaining adhesive tape means and transport rollers;

FIG. 8 is explanatory and schematically illustrates six sequential phases of operations relating to the insertion of the contour rods;

FIG. 9 is a top view onto a double-web mat partly equipped with contour rods;

FIG. 10*a* shows schematically a side elevation of a transport device which forms part of the apparatus according to FIG. 1; and FIG. 10*b* is a top view of the same device, both illustrations being hereinafter jointly referred to as FIG. 10.

The rod inserting apparatus represented by FIGS. 1 to 9 comprises the following main components or subassemblies:

A magazine 1 for the contour rods 21 (FIG. 1) and a rod presorting dispenser device 2 (FIGS. 1, 2, 3) for issuing individual rods from the magazine; rod driving means composed of a catch device 3, 4 (FIG. 3) and a transport device 7, 8 for the contour rods 21 (FIGS. 1 and 3); a spreader device 9 for opening the pockets of the mat 22 (FIGS. 1, 3 and 4); a transport device 10, 11, 12, 17, 18 for adhesive tapes (FIGS. 5, 6 and 7); a further transport device 19 for advancing the mat 22 perpendicularly to the rod inserting direction (FIG. 1); and a device 20 (FIG. 1) for positionally equalizing the rods which otherwise might protrude different distances from the mat.

The illustrated embodiment is a twin arrangement which comprises an apparatus of the above-outlined type on each of the two longitudinal sides of a table 22*a* (FIG. 1) for supporting the double-web mat 22. The following description, to the major extent, is limited to explaining only one of the two apparatus since the other side of the equipment constitutes essentially a symmetrically designed and simultaneously operating unit related in the sense of a mirror image to the one apparatus more fully described. It therefore also suffices to hereinafter mainly explain the functioning of the apparatus components situated on one and the same side of the mat table 22*a*.

The mat 22 is a double web composed of parallel pockets which extend across the width of the mat (FIG. 9) and are open at both ends. During the insertion of rods 21 into respective pockets, the mat 22 is at rest upon the table 22*a* (FIG. 1). Upon completed insertion of a rod, or rather the simultaneous insertion of two rods from opposite sides into adjacent pockets (FIG. 9), the mat advances stepwise to the next position, moving in the direction of the arrow 22*b* (FIG. 1) and driven by a frictional transport device 19.

Each magazine 1 (FIGS. 1, 2) into which bunches of contour rods 21 may be placed by hand, consists substantially of a container whose front and rear walls are shaped as irregular pentagons. The magazine container tapers downwardly and forms a dispensing gap whose width corresponds substantially to the thickness of the individual rods 21. The rods 21 (FIGS. 2, 3, 9) are pointed at both ends to facilitate shoving them into the mat. Located laterally at each end of the dispensing gap is a worm 2 (FIGS. 2, 3) so that the pointed rods, when reaching the lowest level of the magazine container 1, will engage the helical grooves of the worms which then laterally guide the rods. During rotation of the two worms 2, individual rods 21 are transported downwardly and are then individually released. To prevent the rods 21 in the individual turns of the worms 2 from dodging laterally, the dispensing gap adapted to the diameter of the rods is designed as a parallel guide and extends downwardly to shortly beneath the last turn of the worms 2 (FIG. 2). This lateral guidance also contributes to ensuring that only one rod per worm turn can travel downwardly

at a time. The gap opening is as elongated as the rods and is directed toward the table **22***a*.

When a rod arrives at the lowermost point of its dispensing travel, it is received by the catch device. This device comprises a catch hook **3** (FIG. 1,3) which is moved, preferably with the aid of a compressed-air cylinder **4** (FIG. 3), in the direction toward the mat **22**. During the first one-third of the first travel phase, the rods **21** are guided by three pairs of rollers **5** (FIG. 2). These are so arranged that the center lines of each roller pair define with each other an angle of 90°. The outer periphery of the rollers **5** has a profile mating the cross section of the rods. The further guidance is taken over by a profiled supporting roller **6** (FIGS. 2, 3) which, after termination of the first travel phase, is tilted away by means of a compressed-air cylinder **6***a*.

The hook **3** (FIG. 3) moves the rod **21** lengthwise up to a point where the rod has entered a few centimeter into the mat. Thence, a pair of transport rollers **7, 8** (FIGS. 1, 3) pushes the rod further into the mat until the rods pass beyond the rollers **7, 8**. The rollers **7, 8** are arranged one above the other. The upper roller **7** is externally threaded. Its screw thread **7***a* (FIG. 3) has a profile corresponding to the cross section of the rod. The pitch of the screw thread corresponds to a given, integral multiple of the pocket division of the mat. This is a consequence of the fact that the same arrangement of devices is located on the opposite side and to substantially form a mirror image of the one here being mainly described, so that two pockets next adjacent to each other in the mat **22** are simultaneously provided with respective rods from opposite sides of the mat (FIGS. **3,9**). Such simultaneous insertion from opposite sides is essential for minimizing or eliminating the mechanical stresses imposed upon the mat by the rod shoving operations and also makes it unnecessary to provide particular holding means for arresting the mat in the proper position during insertion of the rods. That is, the mat normally has the tendency to advance in the direction **22***b* (FIG. 1) under the entraining friction of the transport device **19**, but is held stopped as long as the mat is engaged by rods being shoved into the pockets.

The first turn of the upper roller **7** is milled away at **7***b* (FIG. 1) down to the shaft along one-half of the periphery. This secures during the first phase of operation a reliable and friction-free insertion of the rod by the hook **3** into the mat **22** (FIG. 3) when the pocket is kept open by the spreader device **9** (FIGS. 1, 3). The lower roller **8** (FIGS. 1, 3) serves as pressure roller and is covered with a glide resistant friction material such as synthetic plastic or rubber. After termination of the first phase of movement imparted to the rod **22** by the hook **3** under control by the pneumatic cylinder **4**, the threaded roller **7** has reached the rotational position in which the first turn of it screw thread becomes active. The seized rod **21** which has already penetrated a few centimeter into the mat, is then shoved into the mat **22** by the transport rollers **7** and **8**.

As shown in FIGS. **1, 4, 5, 6** and **7** the spreader device **9** for opening the individual pockets of the mat comprises a unilaterally open bearing block **16** (FIGS. **1, 6**) in which two protruding rocker levers **9** (FIGS. **1 3, 4, 6**) are pivoted. The ends of the levers **9** form four-sided prisms **9***c* above and beneath the plane of the mat (FIGS. **4** and **6**), the same arrangement being duplicated on the opposite side of the mat travel path in a mirror-image arrangement.

The other ends of the rocker levers **9** carry cam follower rollers **13** (FIGS. **4, 6**) which engage the inner periphery of a cam disc **12** (FIGS. **4, 5, 6, 7**). In cam **12** the rollers **13** scan a predetermined control path which, during rotation of the cam **12**, controls the spreading operation and all other working phases in proper time relation to one another. For this purpose the cam **12** also has lobes or dog pins **27** (FIG. **7**) more fully described hereinafter, and the same cam **12** or another cam mounted on, or driven by the same control shaft **12a** may be used to actuate the pneumatic cylinders **6***a* (FIG. **2**) and **4** (FIG. **3**) by controlling the appertaining valves either directly or by means of elective switches in any conventional manner.

A helical pressure spring **14** (FIG. **4**) attached between the two rocker levers **9***b* holds the rollers **13** in engagement with the cam **12**. The pivot **9***e* (FIGS. **4, 6**) of each rocker arm **9** is also the pivot for two retainer levers **15** arranged at the left and at the right of each rocker arm **9** in proximity to their four-sided prismatic ends **9***c* (FIGS **4,6,8**). The two retainer levers **15** flanking each arm **9** are interconnected by a movable and laterally secured pin **23** (FIGS. **4, 6**). Further prisms **15***c* at the outer ends of the levers **15** face the mat at opposite sides of the rocker-arm prisms **9***c* (FIGS. **6,8**) to perform a retaining function. The faces of the rocker-arm prisms **9***c* are parallel to those of the retaining prisms **15***c* at the left and right of the prisms **9***c*.

The faces of the retainer prisms **15***c* are roughened such as by serrations, projections and/or recesses. A gap is formed between the rocker-arm prisms **9***c* and the retainer prisms **15***c* located at the left and right respectively of the prisms **9***c* (FIG. **8**, working phase *d*). Two adhesive tapes **24** pass through the respective gaps above and beneath the mat plane, each tape **24** having a non-adhesive face adjacent to the rocker arm. The tapes are pulled off respective supply reels **25** and are rewound upon take-up reels **26** (FIGS. **5, 7**). The serrations of the retainer prisms **15***c* serve to firmly clamp the adhesive tapes **24** in a given position of the follower rollers **13** relative to the cam disc **12**; that is, the clamping of the tapes **24** takes place in a predetermined working phase.

As mentioned, the same device, substantially in the mirror symmetry, is located on the opposite side of the mat (FIGS. **1,3**).

The transport and guidance of the adhesive tapes will now be more fully explained with reference to FIGS. **5** and **7**. Two ratchet gears **18** are connected with respective take-up reels **26**. Each ratchet is engaged by two pawls or detents **17, 31**. Each of the two detents **17** is connected with a lever **28** fixedly seated on a shaft **28***a* which carries two arms **28***b* linked to the respective detents **17** through link members **10** on which the detents are pivoted.

During each full rotation of cam **12** its two dogs **27** (FIG. **7**) press twice against a roller **27***a* on arm **28** and thereby pull the detent **17** out of the ratchet **18**, whereafter a leaf spring **30** forces the detent **17** into the next tooth gap. As soon as dog **27** releases the lever **28**, the latter is pulled by a spring **29** back to its original position. This turns the ratchet **18** with take-up reel **26** one tooth division. While the lever **28** returns to its original position the second detent **31** of the same dimensions keeps the ratchet **18** arrested. As a result, the rocker arms **9** now engage new adhesive faces. While the adhesive tape **24** is being transported under control by the cam **12**, there exists a gap between each rocker-arm prism **9***c* and the retainer prisms **15***c* (FIG. **8**, working phase d; and FIG. **6**).

The mat transporting assembly **19** (FIG. **1**), located behind the inserting equipment proper, seen in the mat transporting direction, serves to shift the mat, now armed with rods, away from the mat-supporting table of the machine. The assembly **19** comprises two V-belt drives **19***a* at the left and at the right of the mat supporting table which have the same drive motor in common.

The rods **21**, after having been inserted into the mat, may non-uniformly protrude therefrom. The device **20** for equalizing the rod positions is disposed between the two direction-reversing sheaves **19***b*, **19***c* for the V-belts **19***a* of the transporting assembly. The equalizing device **20** comprises two plungers **20***a* operated by compressed air which are located on opposite sides of the rods relative to the travel direction of the double-web mat. After the mat **22**, equipped with rods (FIG. **9**) leaves the table, uniform lengths of the rods will protrude from the mat at the left and at the right.

The transporting assembly **19** (FIG. **1**), separately shown in FIG. **10**, has its two V-belts **19***a* located at the left and at the right respectively of the mat separating table **22***a*. The two belt sheaves **19***b* and **19***c* of each V–belt have a single drive motor in common. The mat **22***b*, now provided with the rods **21**, rests upon the respective top runs of the two V–belts **19***a*. Due to

the weight of the mat inclusive of the rods, the friction between the mat and the V-belts suffices to advance the mat in the delivering direction (arrow 22*b*).

The cooperation of the individual subassemblies in a machine according to the invention will be further elucidated with reference to an example.

At the beginning of the operations, the apparatus is set to a condition in which the rocker arms **9**, controlled by cam **12**, are open. The catch device **3** is in starting position, an individual rod **21** being located in front of the catch device. The helical turns of the worms **2** are individually occupied by rods **21**. The transport rollers **7**, **8** are in the position at which the cut-away first turn **7***b* (FIG. 1) along one-half of the periphery on the upper roller **7** permits the rod **21** to pass through. For starting the operation, one rod **21** is shoved by hand from each side into two parallel and juxtaposed pockets of the mat **22** (FIG. 9) until the two rods laterally overlap approximately 100 mm. This initially provides for proper arresting and guiding of the mat **22** so that it cannot follow the frictional pull of the mat transport device **19**.

Now, the machine can be switched into operation. During full performance of the machine, the individual working strokes take place in sequence as well as partly simultaneously. The following working phases a to e (FIG. **8**) occur during one-half rotation of the cam disc **12**.

Working phase a:

The rocker-arm prisms **9***c* surrounded by adhesive tape **24** are pressed against the mat **22**. The adhesive tape **24** adheres to the mat.

Working phase b:

The rocker arms **9** are spread apart and open the pockets due to the fact that the two webs of the mat mill remain adherent to the adhesive tapes **24**.

Working phase c:

The rods **21** are shoved into the open pockets by the action of the catch hooks **3** (FIG. 3) controlled by compressed air.

Working phase d:

The transport roller pair **7**, **8** (FIG. 3) commences to drive the rod. The adhesive tape **24** is pulled away from the mat **22** by additional spreading-apart of the rocker arms **9** and the simultaneous forward transport of the adhesive tape **24**.

Working phase e:

The shoving-in operation is terminated, the mat **22** is advanced by transporting assembly **19** (FIG. 1). A fresh adhesive tape surface is firmly pressed against the mat with the aid of the retainer prisms **15***c*.

Working phases f:

This phase is identical with initial phase a. The next one-half rotation of the cam disc **12** commences. The rocker arms press the adhesive tape **24** against the mat **22** to which the tape then adheres.

After the apparatus is switched into operation, the first two rods **21**, inserted by hand, are seized by the transport rollers **7**, **8** and shoved into the mat **22**. Simultaneously, the rod and the mat are displaced in the direction **22***b* (FIG. 1) transverse to the rod axis. As soon as the upper roller **7** has performed one full rotation, the rods have travelled in the direction **22***b* a distance that corresponds to the screw pitch of the upper rollers **7** and consequently to twice the pocket subdivision of the mat. After one full rotation of the upper roller **7** is completed, the second next pocket — counted from the pocket last filled with a rod — is located between the rocker arms **9**. While this operation takes place the rocker arms **9**, under control by the cam **12**, are lifted from a pocket now filled with a rod **21**, and the retainer prisms **15***c* release the adhesive tape **24** (FIG. **6**). One of the dogs **27** on cam **12** releases the detents **17** from the ratchets **18**. The detents **17** are then pressed by the leaf springs **30** into the next following tooth tap of the ratchets **18**. A return spring **29**, attached to the lever **28** that moves the detent **17**, pulls the lever **28** back to the original position as soon as dog **27** and hence cam **12** have moved a further extent. As a result, the ratchet **18** is rotated one tooth division and a fresh piece of adhesive tape **24** is thus placed about the rocker arms **9**. Due to the adhesion between the tape **24** and the mat **22**, the next following return movement of the rocker arms **9** causes the pocket to be spread open.

At this moment, the rod released by the sorting device and caught by the catch device **3** is inserted about 20 to 30 mm into the mat **22**. During the period of time in which the rod **21** is being moved by the pneumatic cylinder **4** and the catch hook **3** (FIG. 3), the gap now formed between upper roller **7** and lower roller **8** by the milled-away portion of roller **7**, permits the rod **21** to pass through. As soon as the rod, being pushed through this gap, has penetrated into the mat **22**, the transport rollers **7**, **8** catch the rod and complete the insertion. A portion of the mat **22** with fully inserted and partially inserted rods **21** is illustrated in FIG. 9.

While we have illustrated and described a preferred embodiment of our invention, it will be understood — upon a study of this disclosure — by those skilled in the art that with respect to arrangement, design of component subassemblies and various other respects, our invention can be modified and may be given various embodiments other than the one illustrated and described herein, without departing from the essential features of our invention and within the scope of the claims annexed hereto.

We claim:

1. Apparatus for inserting contour rods into the transverse pockets of double-web mats for storage-battery electrodes, comprising a contour-rod magazine having dispensing means for releasing one rod at a time, a spreader device for opening one of the pockets of the mat, and rod drive means engageable with the released rod for axially shoving it into the pocket of the mat then spread open by said spreader device.

2. In apparatus according to claim **1**, said rod drive means comprising catch and guide means disposed adjacent said dispensing means and engageable with the released rod for partially inserting it into said spread open pocket, and rod transport means engageable with said released rod for completely shoving it into said pocket.

3. Apparatus according to claim **2**, comprising sequence control means connected with said dispensing means and said spreader device and said rod drive means for controlling them to cyclically operate in the repetitive releasing-spreading-shoving sequence.

4. Apparatus according to claim **1**, comprising a mat-supporting table on which the mat is longitudinally advanceable with the mat pockets extending in a direction transverse to the mat advancing direction, said apparatus being arranged beside the mat advancing path of said table, said dispensing means of said magazine comprising an elongated slot dimensioned to let only one rod pass through at a time, said slot extending parallel to said transverse direction so that the dispensed rods are aimed substantially toward respective pocket openings of the mat.

5. In apparatus according to claim **4**, said dispensing means comprising conveyor worms rotatable at opposite ends respectively of said elongated slot and having respective worm gear turns engageable by the ends of a rod for controlling the individual dispensation of the rods from said magazine.

6. In apparatus according to claim **4**, said rod drive means comprising a catch device engageable with the rear end of a rod released by said dispensing device and movable toward said mat path of said table for partly shoving the rod into the mat pocket, and driven guide rollers engageable with the rod for seizing the rod and shoving it further into the pocket.

7. In apparatus according to claim **6**, said guide rollers comprising a pair of profiled rollers whose profile corresponds to the cross-sectional shape of the rods, and a hinged supporting roller also engageable with the rod between the rod-engaging localities of said pair.

8. In apparatus according to claim **2**, said rod transport means comprising a pair of upper and lower rollers, said upper roller being externally threaded and having a screw pitch that

is an integral multiple of the pocket width of the mat, said lower roller having a glide-resistant peripheral surface.

9. In apparatus according to claim **8**, the first thread turn of said upper roller having a cut-out portion extending along one-half of the roller periphery.

10. In apparatus according to claim **4**, said spreader device comprising a bearing block, a pair of rocker arms pivoted on said bearing block, one of said rocker arms being above the mat locality of said table, said other rocker arm being below said locality, said rocker arms being provided with pressure faces on the mat-facing side.

11. In apparatus according to claim **3**, said control means comprising a rotatable control cam, cam followers engaging said cam and connected to said respective rocker arms for controlling their operation in dependence upon rotation of said cam.

12. Apparatus according to claim **11**, comprising a spring link which interconnects said two followers to force them against said cam, and a pair of retainer levers situated on the two sides respectively of each of said rocker arms and interconnected for conjoint movement, said two retainer levers and said rocker arm intermediate said two retainer levers having a fulcrum axis in common.

13. In apparatus according to claim **12**, said two rocker arms having respect prismatic portions pointing toward each other, each pair of said retainer levers having ends adjacent to said rocker-arm prisms with lateral faces of said rocker-arm prisms parallel to lateral faces of said retainer-lever ends, said lateral faces of said retainer-lever ends having a rougher surface than the adjacent parallel faces of said rocker-arm prisms.

14. Apparatus according to claim **13**, comprising adhesive tape feeder means having when in operation a unilaterally adhesive tape extend around each of said two rocker-arm prisms with the adhesive side facing the mat, said tape being engageable by said ends of the two retainer levers flanking said rocker-arm prism, whereby said tape is held fixed against said rocker-arm prism by said retainer levers during operation of said spreader device.

15. In apparatus according to claim **14**, said tape feeder means comprising two tape supply reels and two tape takeup reels for each of two adhesive tapes, tape transport means for each of said tapes, said control means comprising a rotatable control cam, cam followers engaging said cam and connected to said respective rocker arms for controlling their operation in dependence upon rotation of said cam, said tape transport means having each a ratchet mechanism under control by said cam.

16. In apparatus according to claim **15**, said cam comprising two tape-transport control members, a spring-biased lever means operable by said members in opposition to the spring bias, said tape-transport ratchet mechanism comprising two ratchets joined with said respective take-up reels, two detent pawls engageable with each of said ratchets, said lever means being connected to one of said detents for releasing the ratchet under control by said cam, and spring means for causing said other detent to drop into the ratchet for arresting the ratchet while said lever means return to the inactive position.

17. A twin arrangement comprising two apparatus according to claim **4** arranged on opposite lateral sides of said mat supporting table and forming a substantially mirror symmetrical group, the respective spreader devices and rod drive means being directed from said opposite sides toward respective directly adjacent mat-pocket localities of said mat advancing path of said table.

18. Apparatus according to claim **17** comprising rod position equalizing devices arranged on both sides of said table at localities behind said spreader device and said rod drive means of each apparatus seen in the web advancing direction.

19. Apparatus according to claim **4**, comprising an auxiliary mat transport device frictionally engageable with the mat on said table whereby the mat tends to advance, the mat being temporarily stopped by operation of said spreader device and said rod drive means during insertion of a rod.

20. In apparatus according to claim **19**, said transport device comprising two endless V-belt drives extending parallel to each other at opposite longitudinal sides of said table, said respective belts being frictionally engageable with the mat on said table.

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