Nov. 18, 1969 V. J. SIGODA 3,478,451

COMBINED SEWING AND IRONING MECHANISM

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Fig. 1.

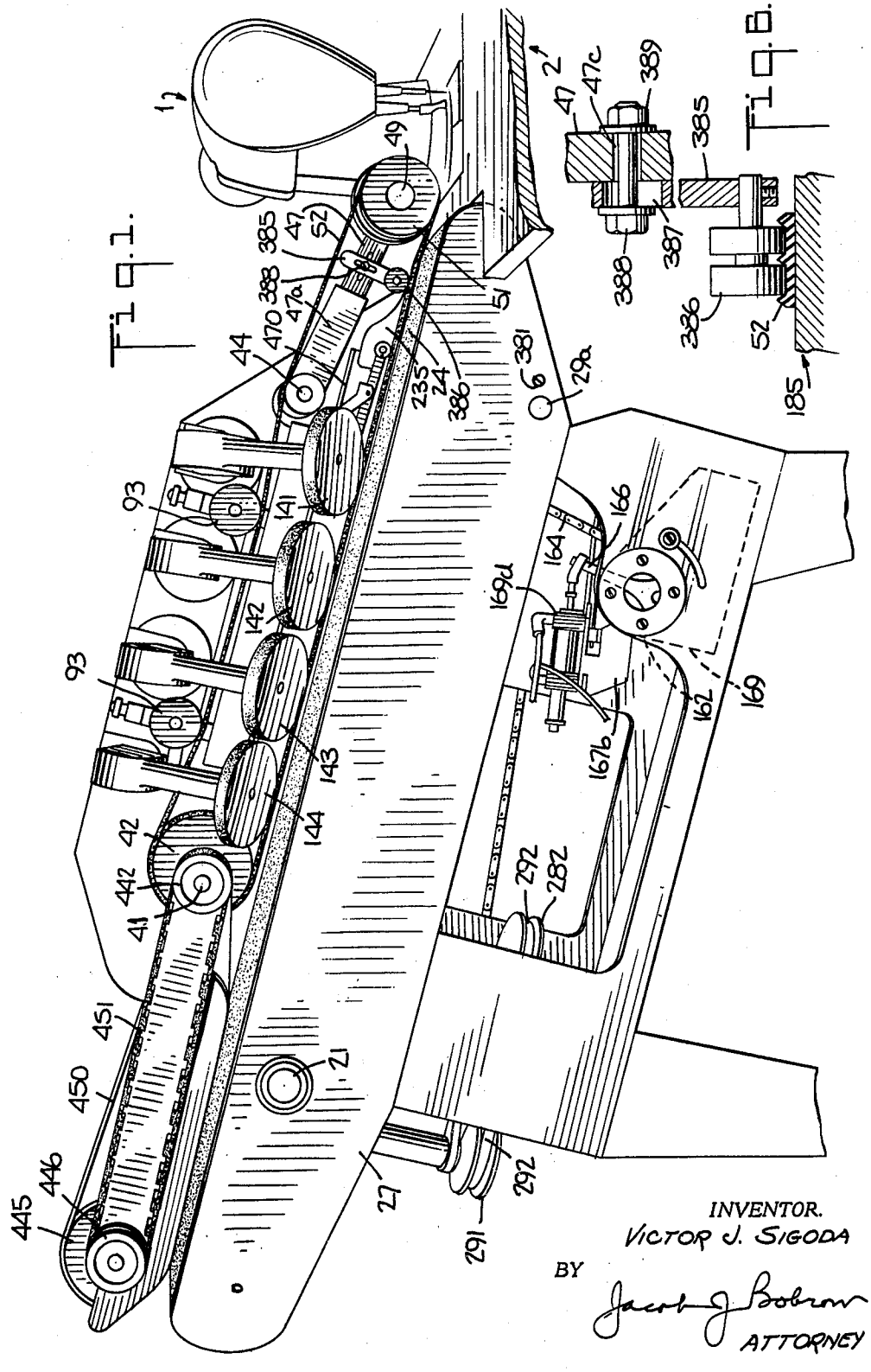

Fig. 8.

INVENTOR.
VICTOR J. SIGODA

BY Jacob J. Bobrow
ATTORNEY

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COMBINED SEWING AND IRONING MECHANISM

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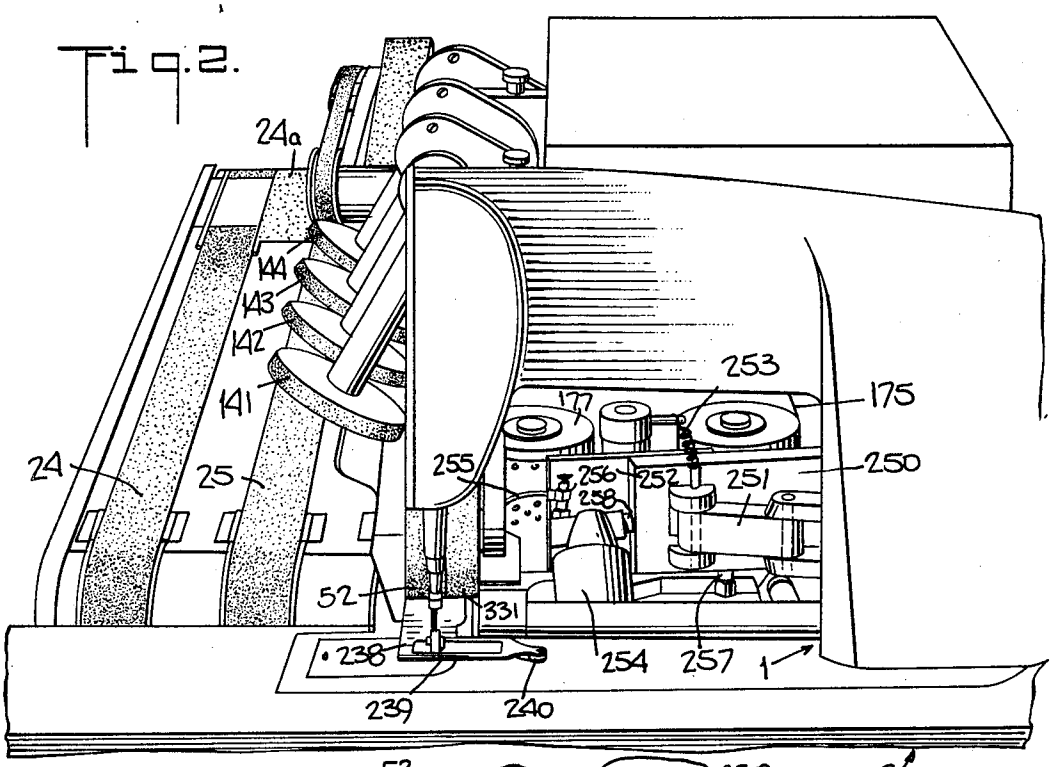
Fig. 2.



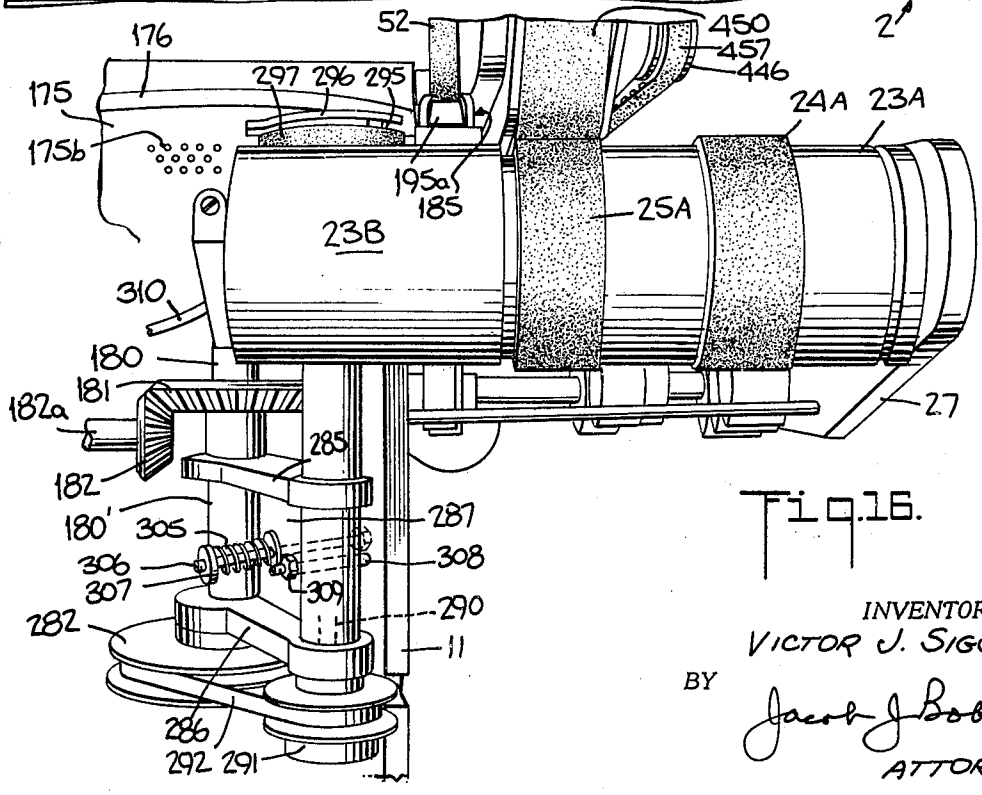


Fig. 1b.

INVENTOR.
VICTOR J. SIGODA

BY Jacob J. Bobrow
ATTORNEY

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COMBINED SEWING AND IRONING MECHANISM

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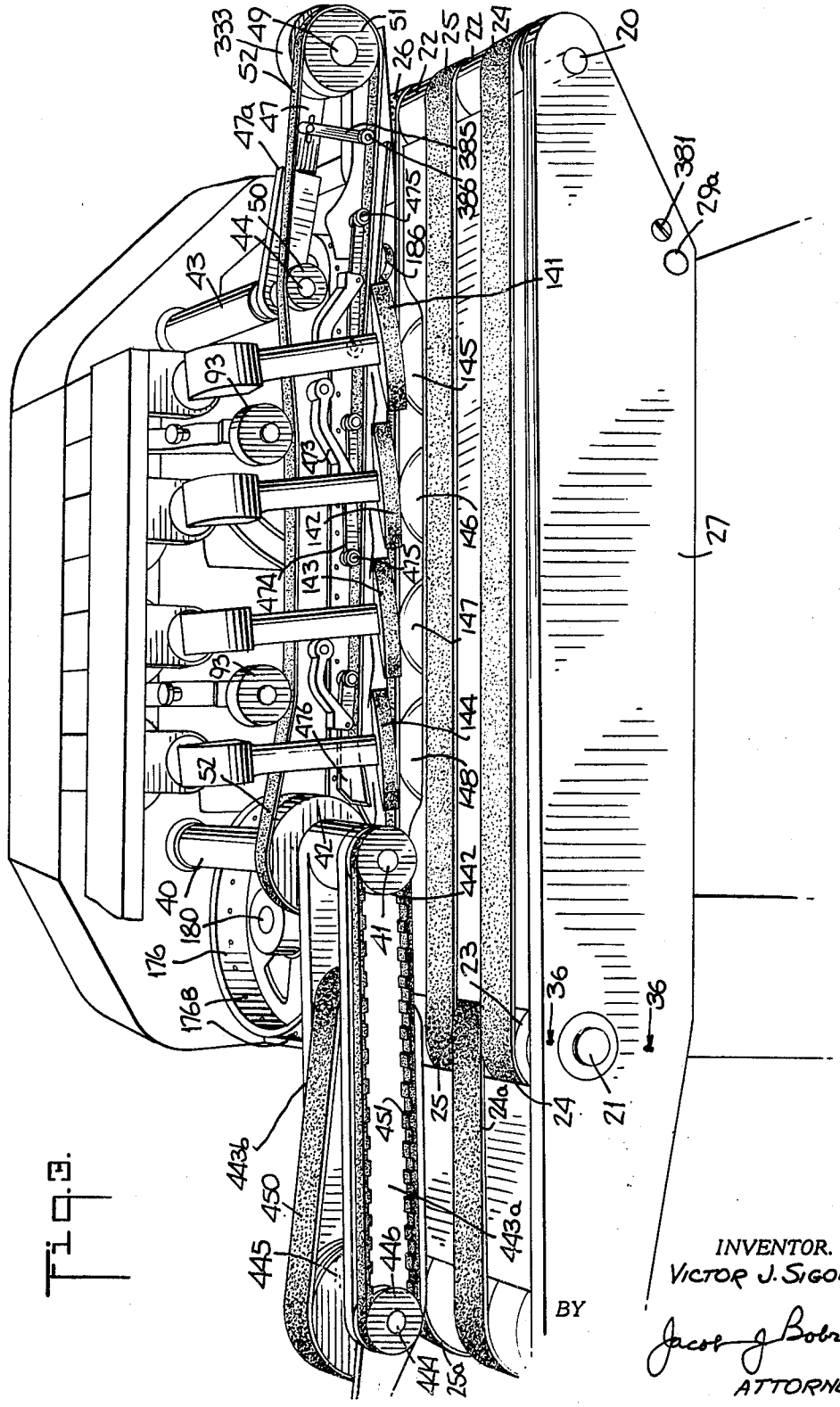

FIG. 3.

INVENTOR.
VICTOR J. SIGODA

Jacob J. Bobrow
ATTORNEY

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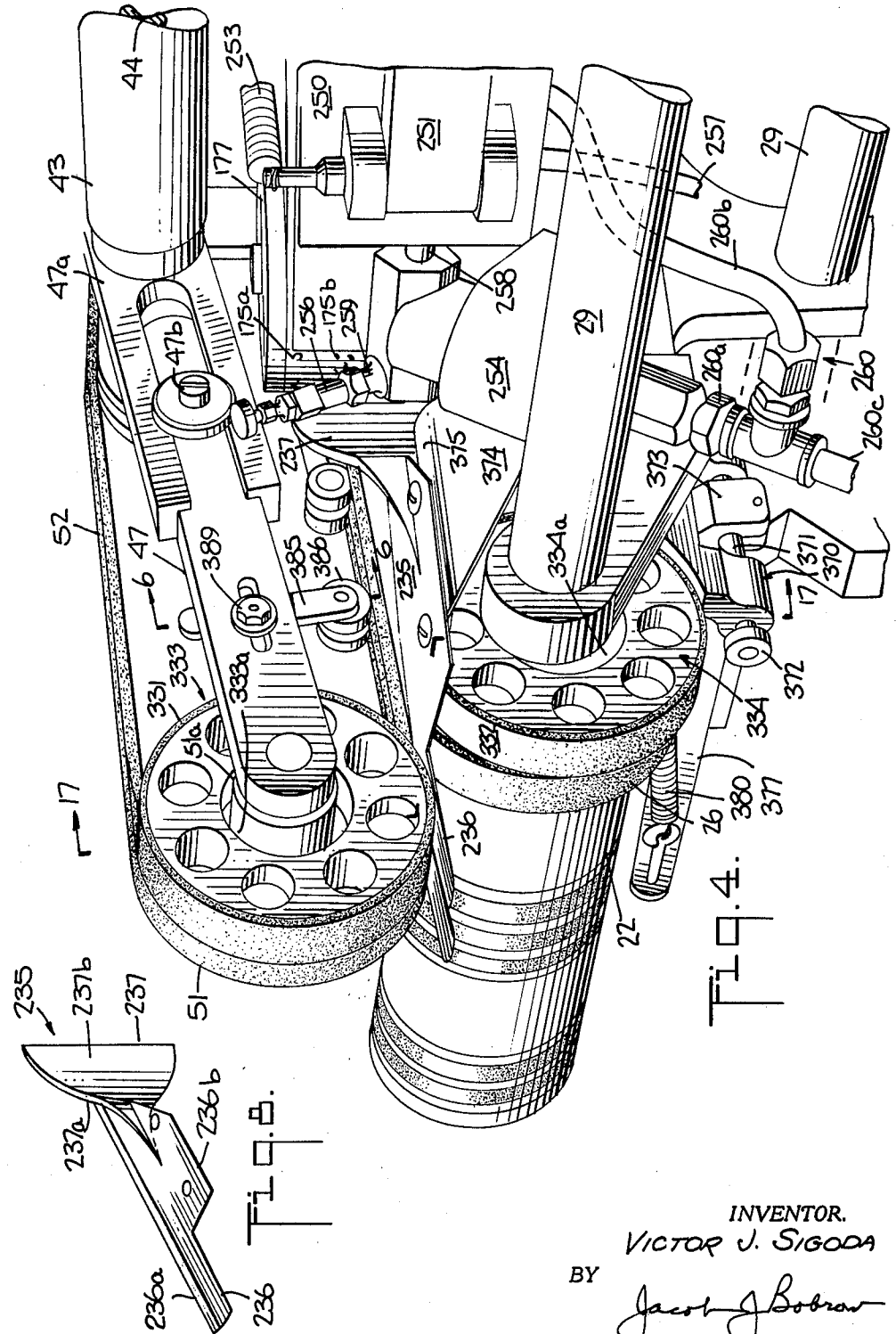

FIG. 4.

FIG. 8.

INVENTOR.
VICTOR J. SIGODA
BY
Jacob J. Bobrow
ATTORNEY

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COMBINED SEWING AND IRONING MECHANISM

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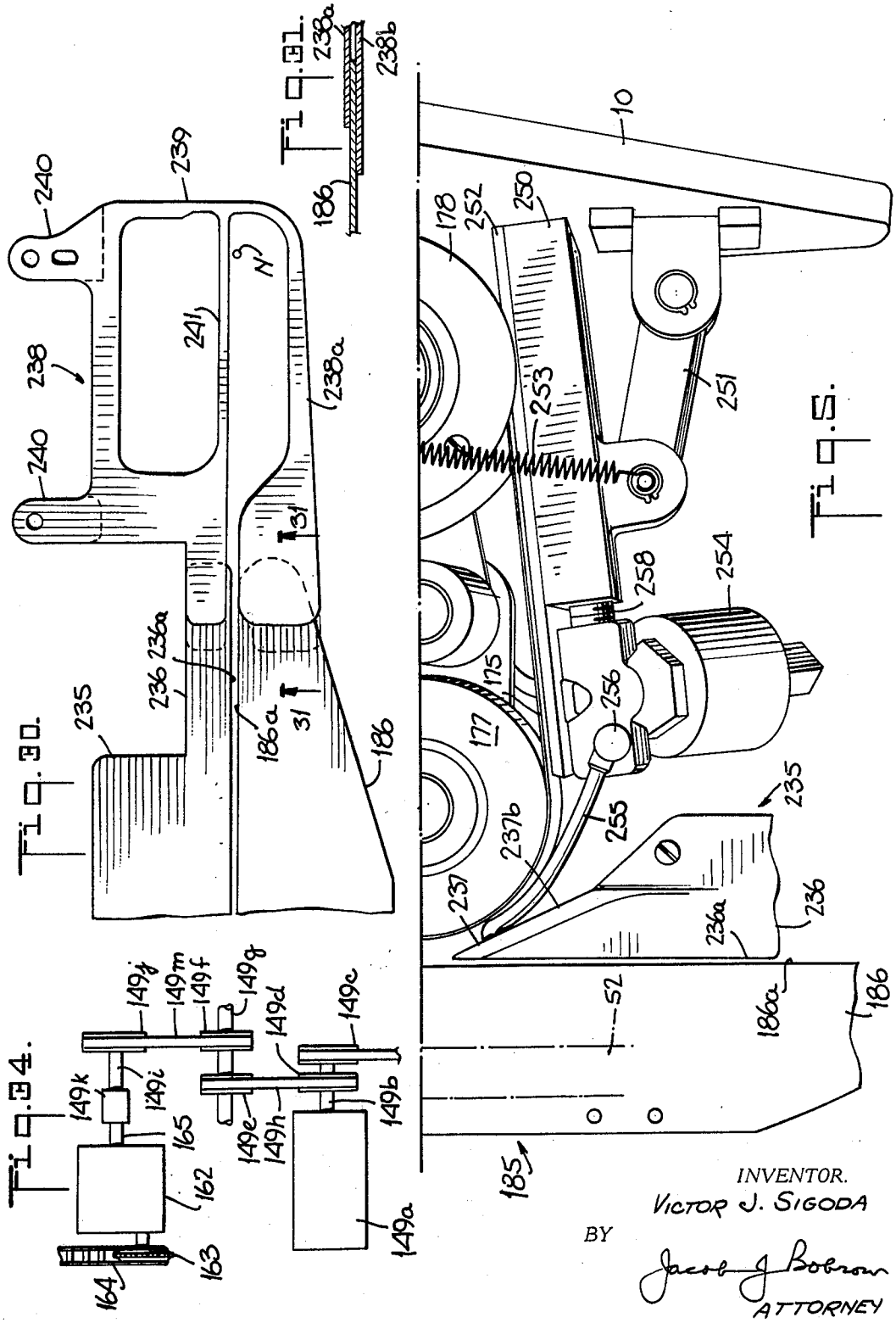

INVENTOR.
VICTOR J. SIGODA
BY
Jacob J. Bobrow
ATTORNEY

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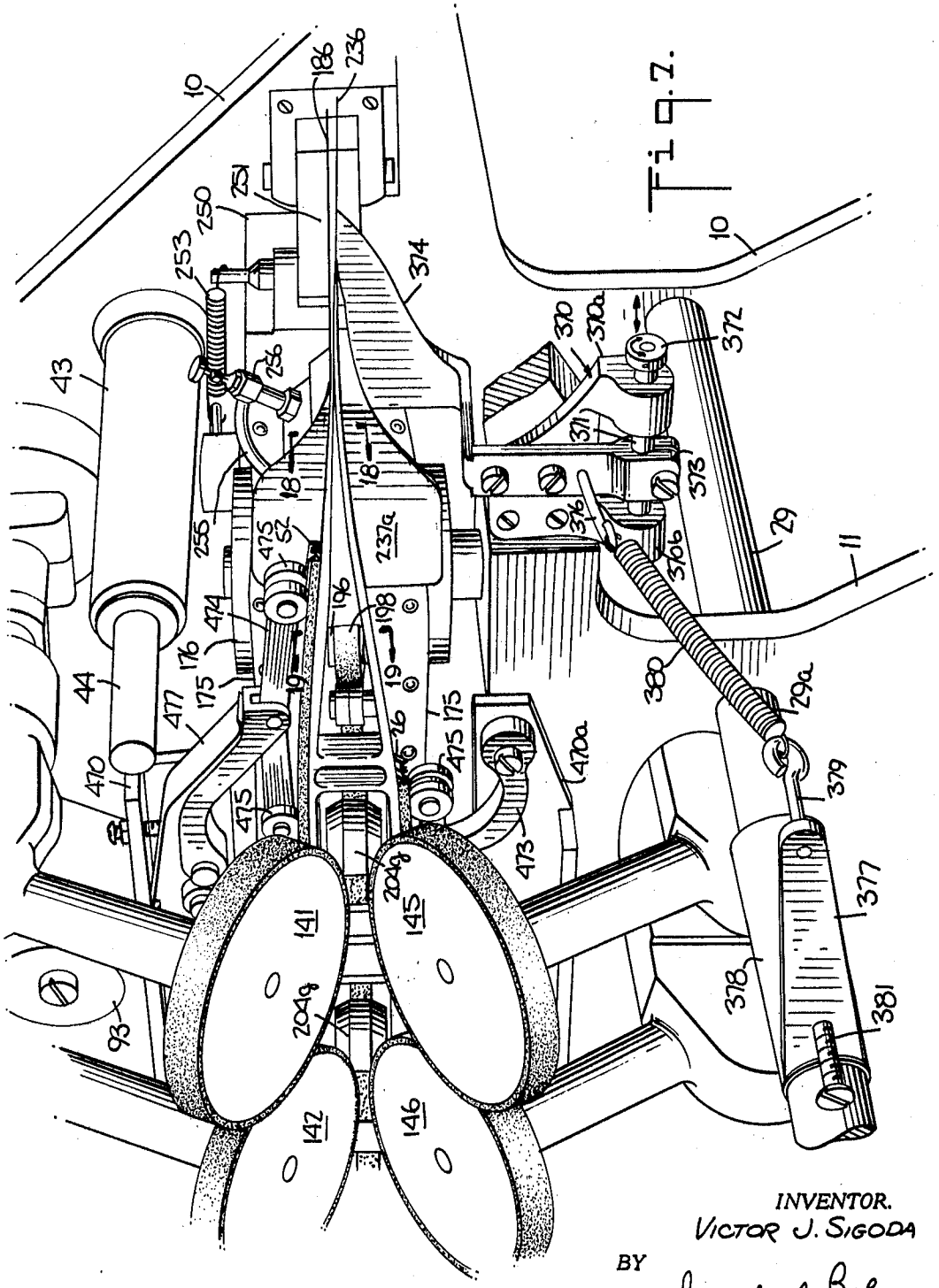
Fig. 7.



INVENTOR.
VICTOR J. SIGODA

BY Jacob J. Bobrow

ATTORNEY

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Fig. 9.

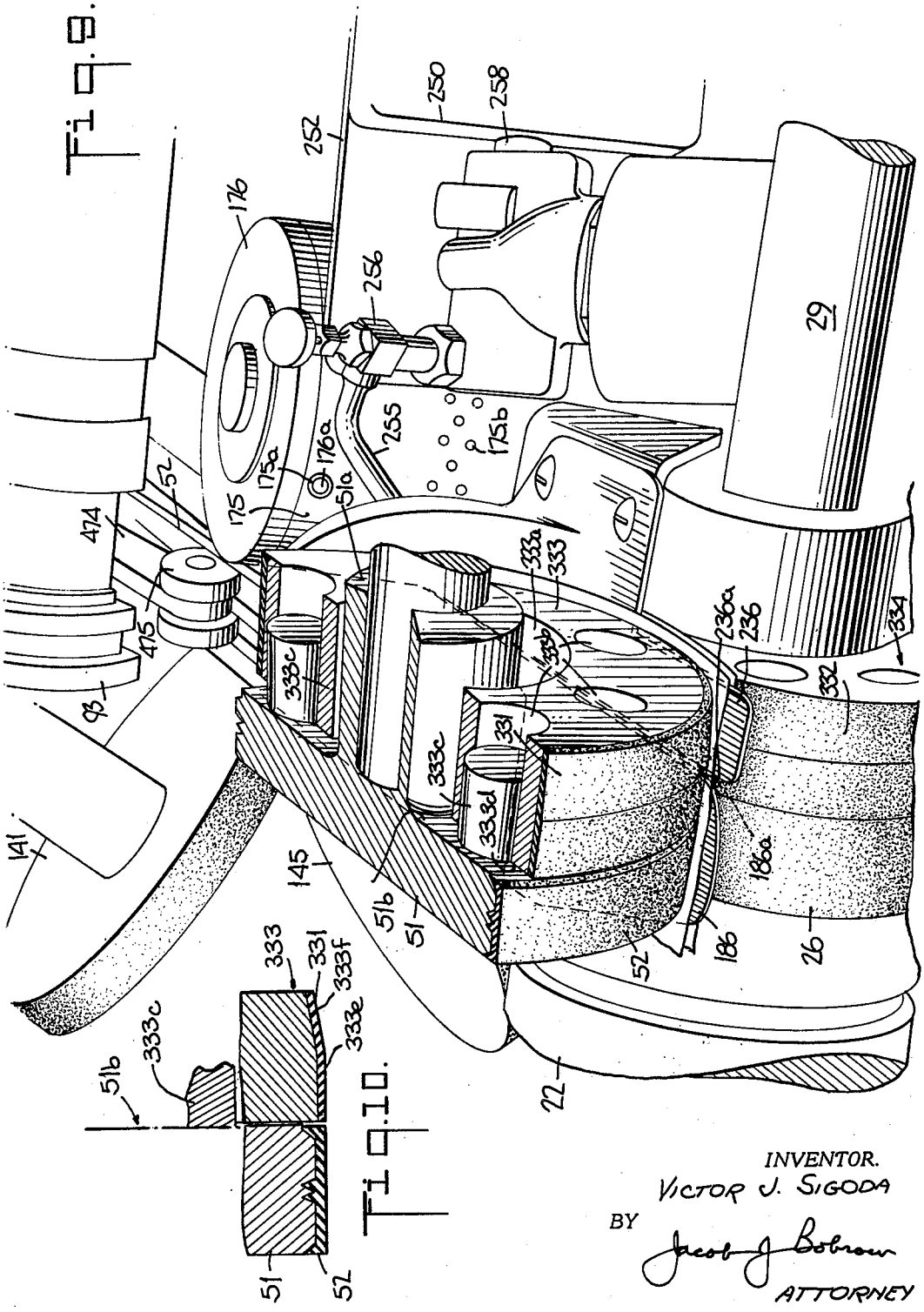

Fig. 10.

INVENTOR.
VICTOR J. SIGODA
BY Jacob J. Bobrow
ATTORNEY

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Fig. 12.

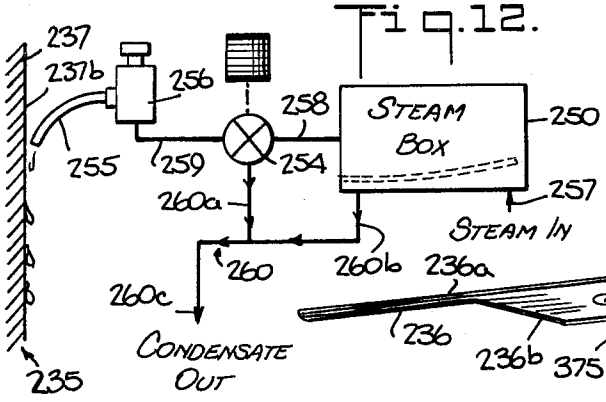


Fig. 11.

Fig. 17.

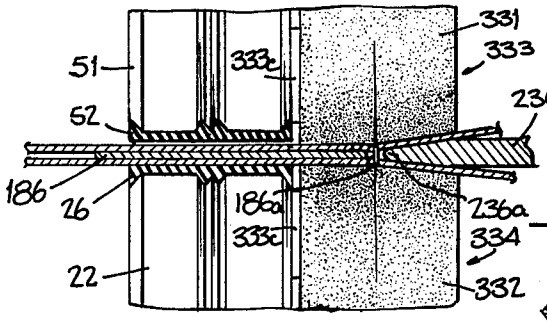


Fig. 18.

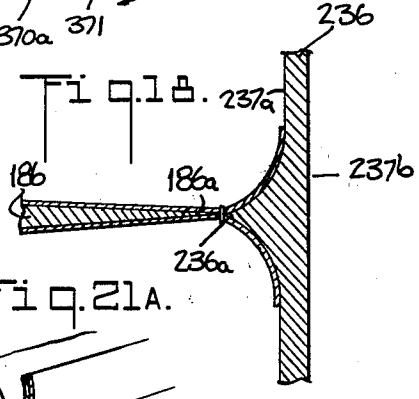


Fig. 21A.

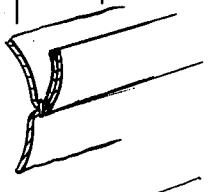
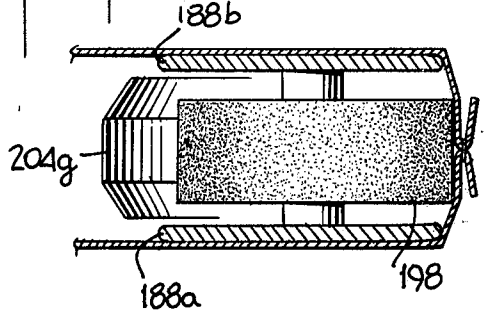


Fig. 19.



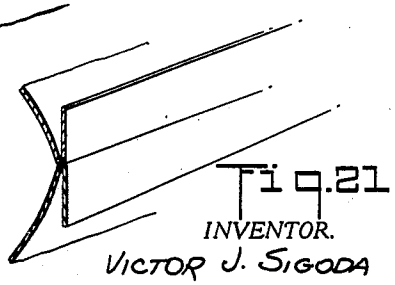


Fig. 21

INVENTOR.
VICTOR J. SIGODA

BY

Jacob Bobrow
ATTORNEY

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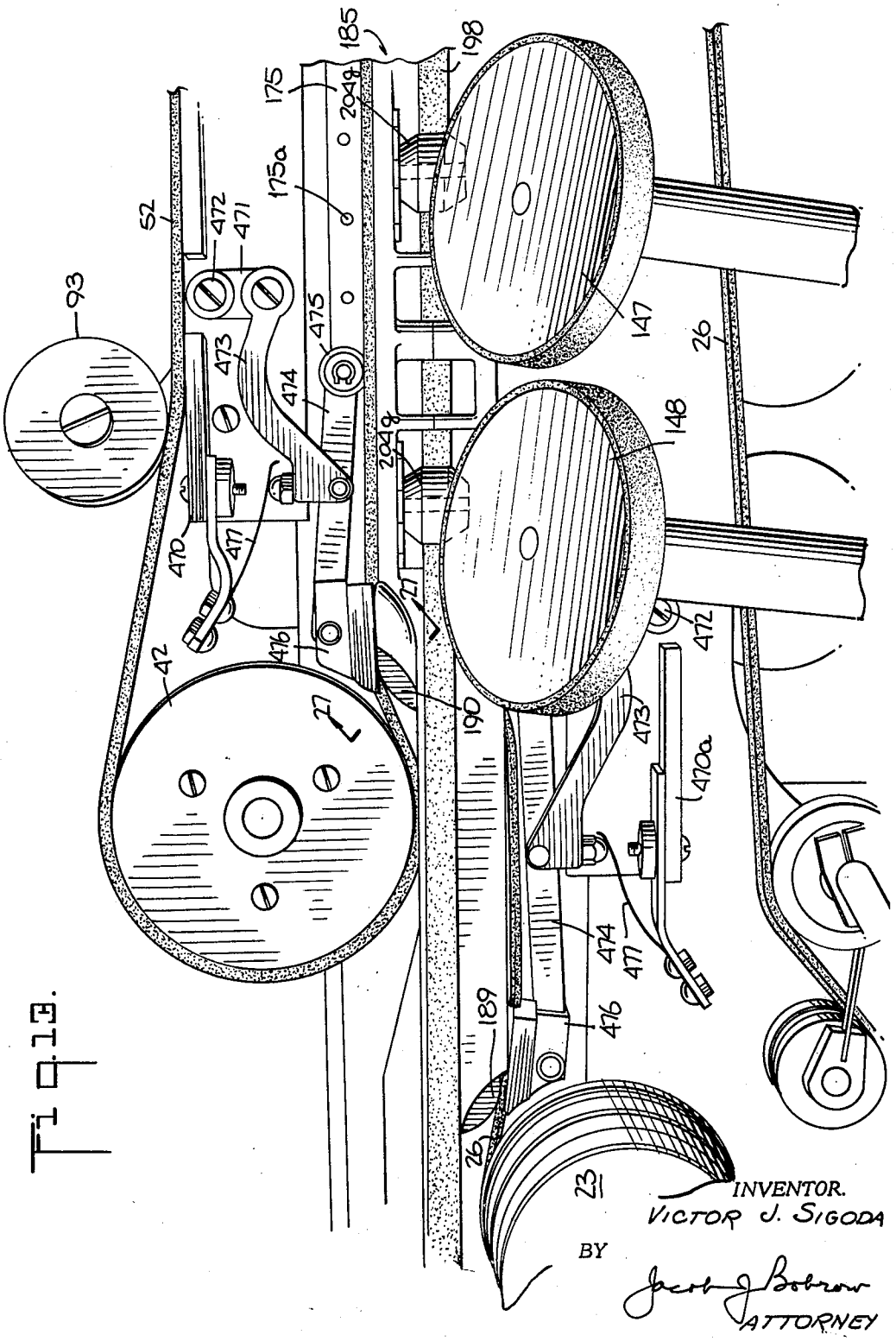

Fig. 13.

INVENTOR.
VICTOR J. SIGODA

BY

Jacob J. Bobrow
ATTORNEY

Nov. 18, 1969 V. J. SIGODA 3,478,451

COMBINED SEWING AND IRONING MECHANISM

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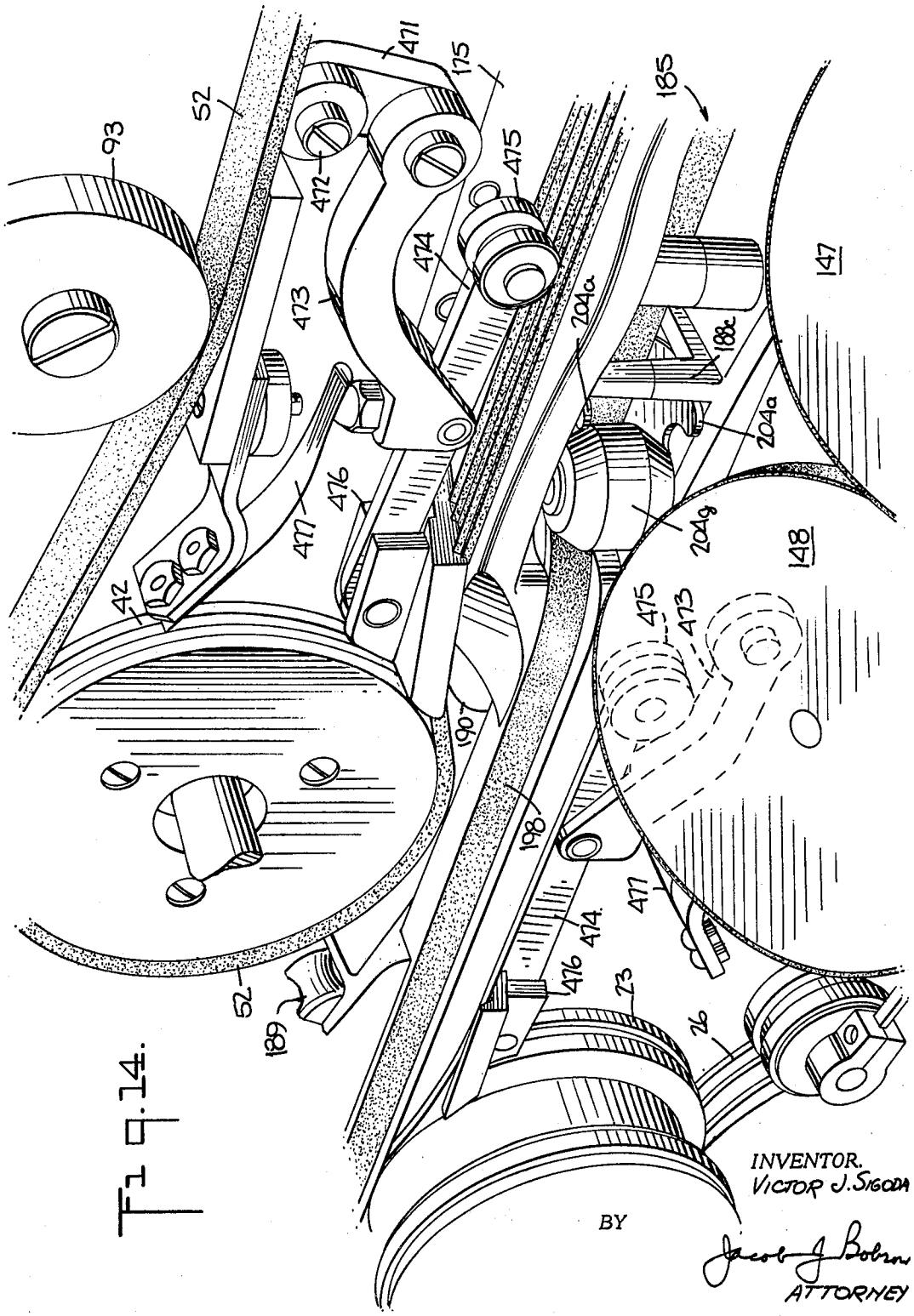

FIG. 14.

INVENTOR.
VICTOR J. SIGODA

BY

Jacob J. Bobrow
ATTORNEY

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COMBINED SEWING AND IRONING MECHANISM

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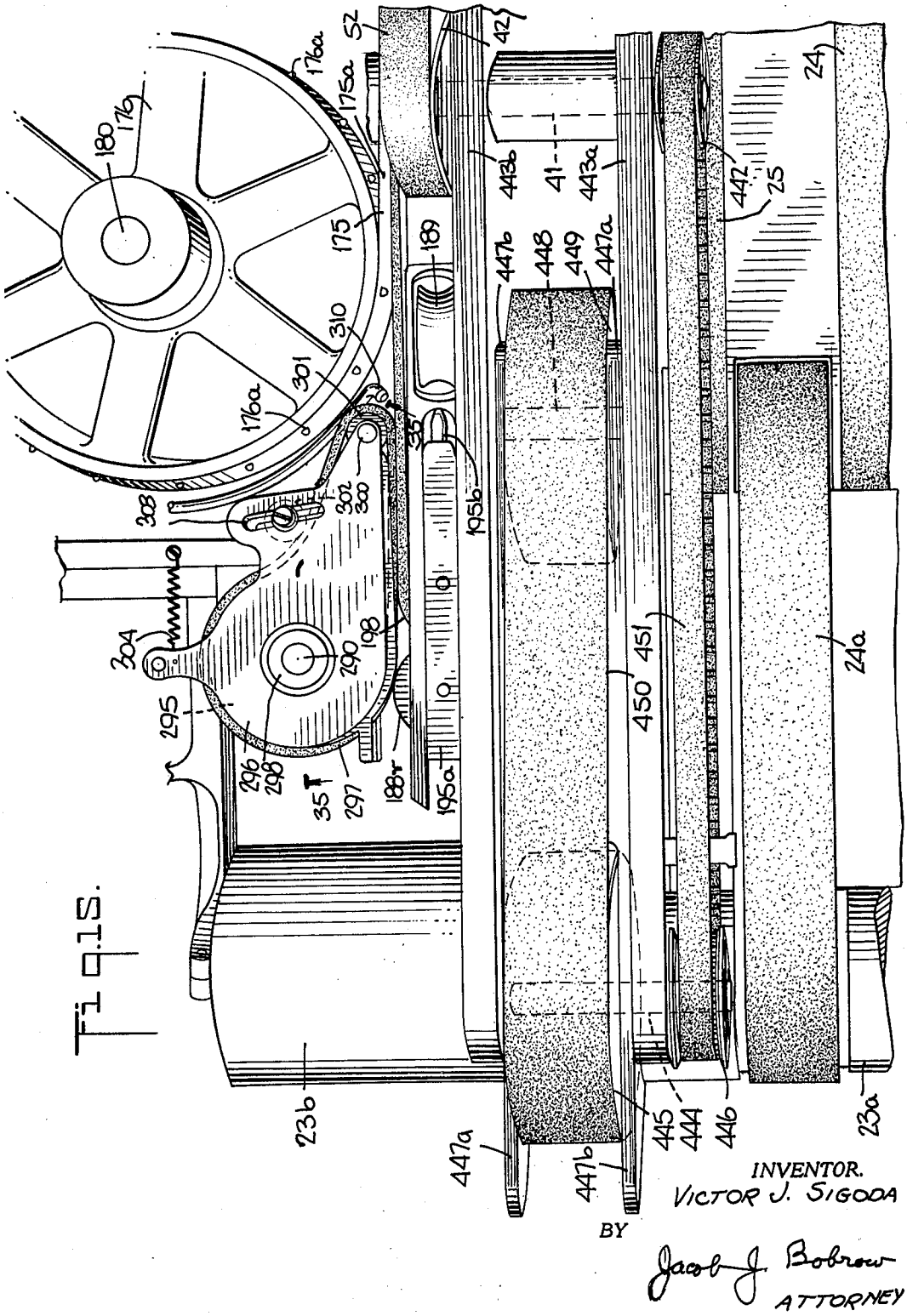

Fig. 15.

INVENTOR.
VICTOR J. SIGODA

BY

Jacob J. Bobrow
ATTORNEY

Nov. 18, 1969 V. J. SIGODA 3,478,451

COMBINED SEWING AND IRONING MECHANISM

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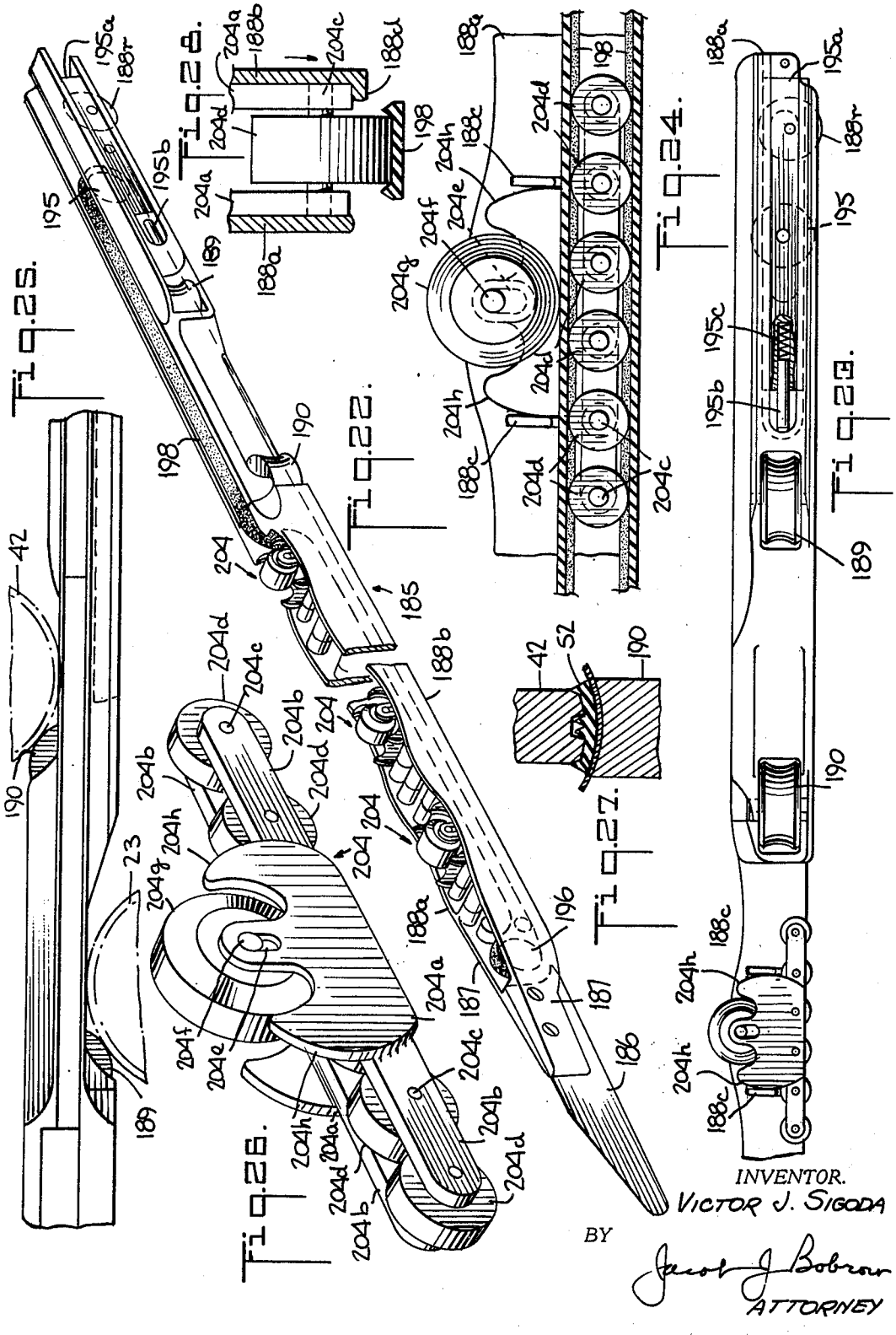

INVENTOR.
VICTOR J. SIGODA

BY

Jacob J. Bobrow
ATTORNEY

Nov. 18, 1969 V. J. SIGODA 3,478,451

COMBINED SEWING AND IRONING MECHANISM

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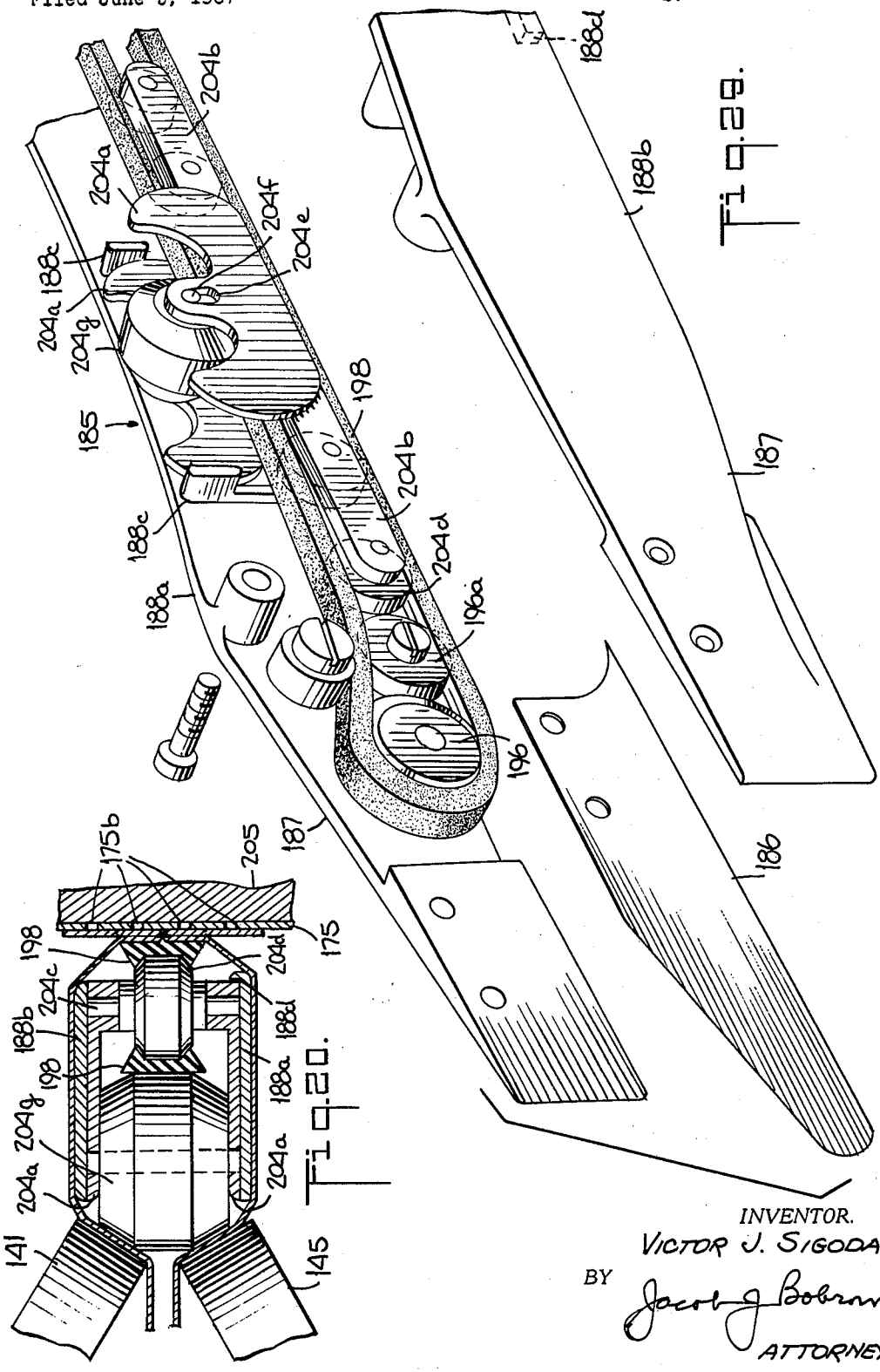

Fig. 2B.

Fig. 2D.

INVENTOR.
VICTOR J. SIGODA
BY Jacob J. Bobrow
ATTORNEY

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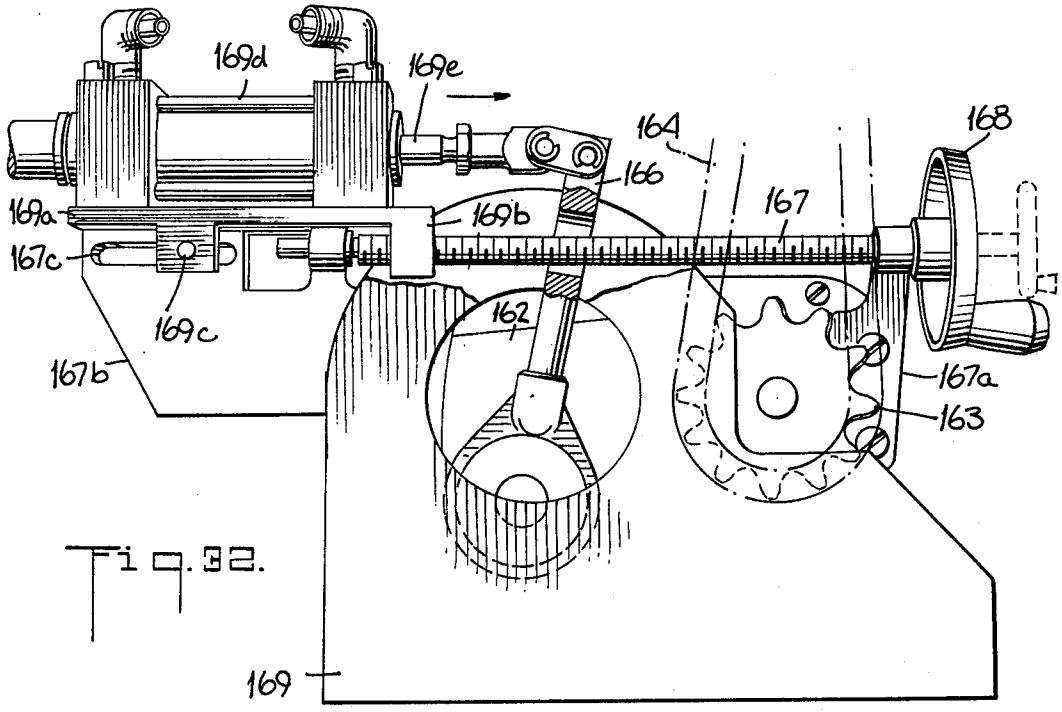

Fig. 32.

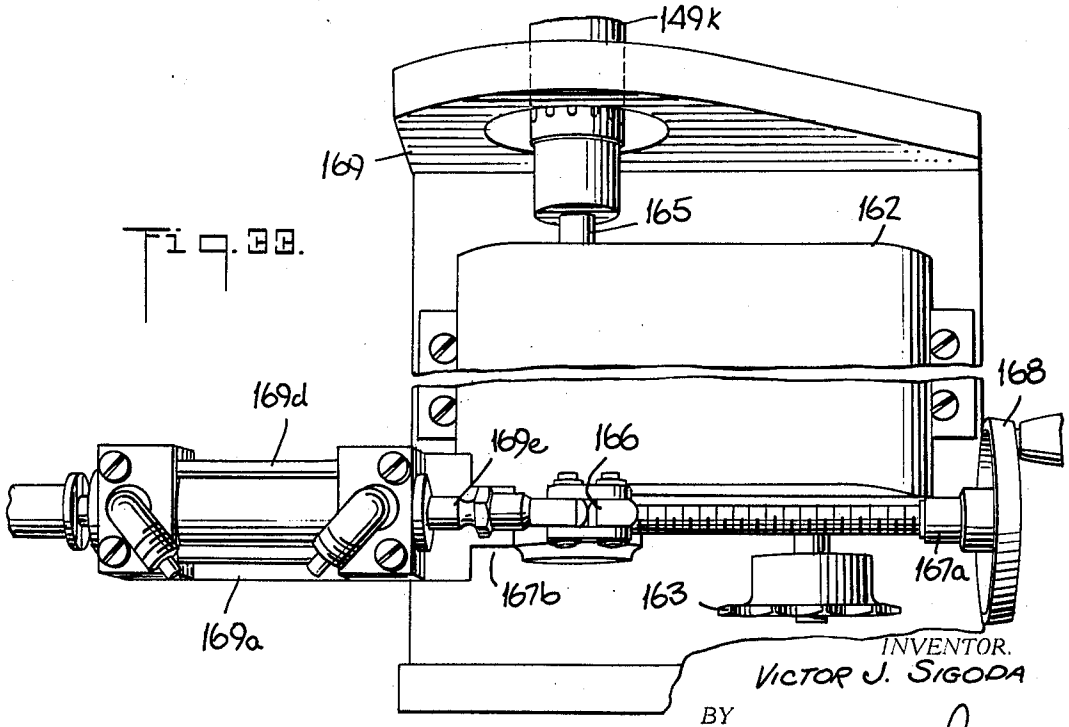

Fig. 33.

INVENTOR.
VICTOR J. SIGODA
BY
Jacob J. Bobrow
ATTORNEY

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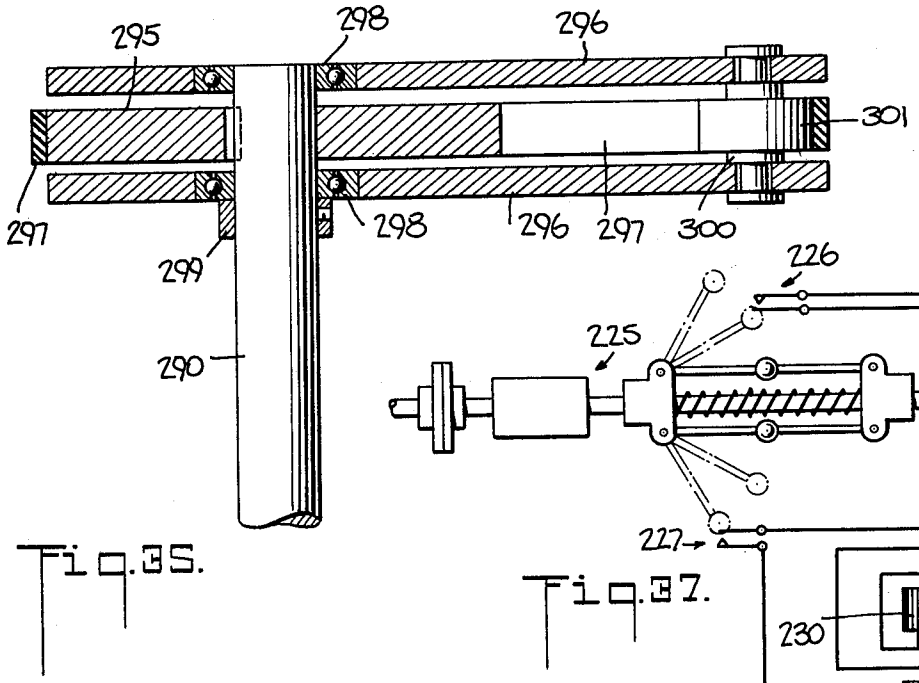

Fig. 35.

Fig. 37.

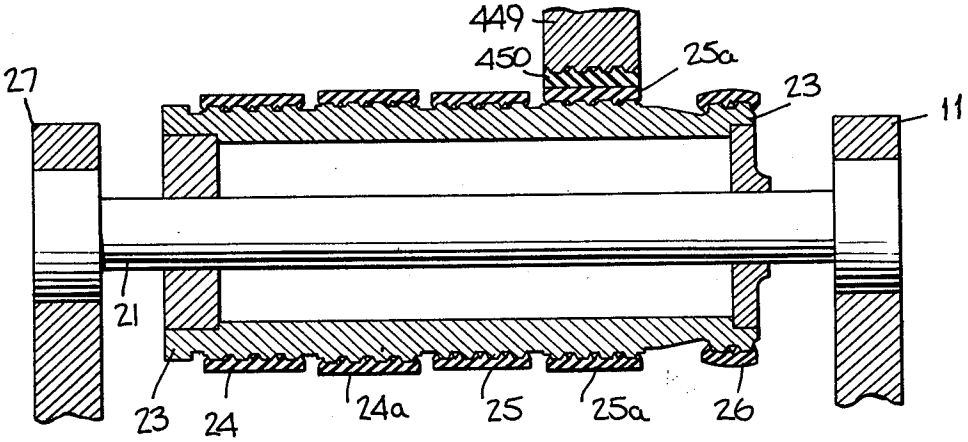

Fig. 36.

INVENTOR.
VICTOR J. SIGODA
BY Jacob J. Bobrow
ATTORNEY

United States Patent Office 3,478,451 Patented Nov. 18, 1969

3,478,451

COMBINED SEWING AND IRONING MECHANISM

Victor J. Sigoda, Great Neck, N.Y., assignor to Man-Sew Corporation, New York, N.Y., a corporation of New York

Continuation-in-part of application Ser. No. 481,522, Aug. 23, 1965. This application June 5, 1967, Ser. No. 643,458

Int. Cl. D06f *69/02, 27/00*

U.S. Cl. 38—10 48 Claims

ABSTRACT OF THE DISCLOSURE

Ironing mechanism for use independently or with a sewing machine in which the ironing members are retractable pods which engage a moving, thin, heat transfer belt, and a floating buck. The buck has a moving internal belt in contact with the fabric and which is driven in unison with the heat transfer belt by pressure exerting, driven rollers. Transversely shiftable and swivellable inserts mounted in the buck are adapted to compensate for fabric irregularities. The buck also has an internal lip which limits transverse shifting of the inserts in one direction. The mechanism also includes a prepuller having magnetically coupled feed discs, and a post puller which stretches the freshly ironed fabric as a cooling air blast sets the fabric. Steam applied to the fabric is supplied from a circulating system having condensation reducing features, and a steam heated radiator preheats the transfer belt.

This application is a continuation-in-part of parent application Ser. No. 481,522 filed Aug. 23, 1965, now patent No. 3,372,497 issued Mar. 12, 1968. That application concerns improvements in seam ironing mechanisms capable of use independently of, but preferably with, sewing machines to produce pressed open sewn seams such as are found in men's and women's trousers and slacks, skirts, and sleeve jackets. The improvements herein reside both in the cooperation of the ironing mechanism with the sewing machine and in the ironing mechanism.

The prior art is typically shown in United States Patents 1,683,412 and 1,702,271. A more recent apparatus is shown in the patent to Korioth, No. 3,246,616 of Apr. 19, 1966. The earlier patents employ long bucks as part of the ironing mechanism which is the arrangement utilized in this and in the parent case, but the Korioth mechanism uses heated opposed rollers. The primary distinguishing feature of applicant's improvements is the use of a floating long buck which is neither anchored at the rear as in the mentioned patents, or at the front as shown in other art. This arrangement makes possible continuous sewing and ironing of long tubular garment sections such as trousers legs and jacket sleeves without having to stop to swing the buck aside to remove each garment section after ironing is completed. In the arrangement disclosed herein, the use of the long floating buck makes is possible to pull the sewn together fabric plies transversely during ironing so that the joined plies emerge in true butt relationship without overlap, and without the pressure marks which often accompany roller pressing of superposed plies.

Features and other advantages of the apparatus disclosed herein will become apparent from the following detailed description and the drawings, in which:

FIG. 1 is a side elevational view of the sewing machine and the ironing mechanism in tandem arrangement as they appear when operating in combination; showing a version of the ironing mechanism which is mounted so that it inclines upwardly away from the sewing machine;

FIG. 2 is a front elevational view corresponding to FIG. 1 showing the preheating arrangement for the heat transfer belt; and belts which convey the unpressed portion of the garment section;

FIG. 3 is a perspective side view of the ironing mechanism showing additional belts which assist in conveying the garment section during ironing, and the post pulling members;

FIG. 4 is a perspective view of the inlet portion of the ironing mechanism without the main horizontal conveying belts, showing the upper and lower front feed pulleys and the magnetically retained rollers driven thereby; and also showing the free ply edges separator and its support members; the heat transfer belt and its preheating radiator; the steam supply solenoid valve and the adjustable valve for regulating the amount of steam supplied to the steam nozzle;

FIG. 5 is a plan view showing the inlet portion of the ironing mechanism; the relative positioning of the steam nozzle with respect to the separator, metal heat transfer belt, and the buck (the showing of the buck being merely representational, and the spacing between the adjacent edges of the separator and buck being exaggerated); and also showing structural details of the arrangement for preheating the metal belt;

FIG. 6 is a sectional view taken on line 6—6 of FIG. 4 showing the structure of the adjusting means by which downward pressure applied at the inlet portion of the ironing mechanism by the upper conveying belt can be counteracted to reduce the effectiveness of feeding by the belt in that area;

FIG. 7 is a perspective view of the inlet portion of the ironing mechanism with the upper and lower front feed pulleys and their companion magnetically retained rollers removed; showing the input portions of the buck and separator from another angle and slightly displaced vertically from their normal in line arrangement for visibility; and also showing the structure of the support and tensioning members for the separator;

FIG. 8 is a detail view in perspective of the separator as it appears when removed from the ironing mechanism;

FIG. 9 is a view partly in section showing the structure of the upper front drive pulley and its companion magnetically retained roller; and also showing the manner in which they cooperate to draw the sewn garment section from the sewing machine to the inlet portions of the buck and separator as the garment section travels to the ironing members;

FIG. 10 is a sectional view of fragments of the upper front feed pulley and its companion magnetically retained roller showing in exaggerated scale the taper on a portion of the perimeter of the roller;

FIG. 11 is a view in perspective of the free ply edges separator and its support members showing the compensating structure which permits longitudinal as well as lateral rocking movements of the separtor for the purpose of accommodating differences in bulk in the seam about to be ironed;

FIG. 12 is a representational view of the steam supply system indicating the circulating arrangement for the steam and the manner in which water condensed from the steam drains from the system; and also showing the relationship of the rear wall of the separator and the outlet of the steam supply nozzle as they cooperate to deflect from the fabric any drops of water condensing from the steam as it is applied to the fabric just before the beginning of the ironing operation;

FIG. 13 is a view of an intermediate portion of the ironing mechanism showing the rear portion of the buck and two of the lower drive rollers which draw the fabric of the garment section wrapped about the buck, along the

buck for ironing, and which rollers also rotate the smaller belt operating rollers in the two buck inserts shown to drive the buck internal belt; and also showing the upper and lower horizontal drive belt tensioning and lint scraping and lateral confining mechanisms, and the stop rollers in the buck and how they cooperate with the drive pulleys to limit rearward movement of the buck;

FIG. 14 is a perspective view showing the structure of some of the mechanisms illustrated in FIG. 13 in greater detail;

FIG. 15 is a plan view of the outlet end of the ironing mechanism showing the post pulling horizontal and vertical belts which pull the freshly ironed fabric taut just after it leaves the ironing members; and indicating one location for the air nozzle from which a chilling blast is applied to set the taut fabric to reduce the possibility of subsequent wrinkling;

FIG. 16 is an elevational view of the outlet end of the ironing mechanism showing the structure of the drive mechanism for the vertical post puller; the stop member which limits inward swing of the support arrangement for the vertical pulling belt; and also showing the yieldable arrangement which urges the vertical pulling belt toward the rear roller of the buck;

FIG. 17 is a sectional view taken on line **17—17** of FIG. 4 representative of the early stages of the separation of the sewn garment section as it passes over the inlet portion of the buck and of the initial separation of the free ply edges by the inlet portion of the separator as the garment plies are being drawn along such inlet portions by coaction of the upper and lower feed belts wrapped around the front set of pulleys, and by their companion magnetically retained upper and lower rollers respectively;

FIG. 18 is a sectional view taken on line **18—18** of FIG. 7 showing a later stage of separation of the garment plies and of the free ply edges;

FIG. 19 is a sectional view taken on line **19—19** of FIG. 7 at a still later stage;

FIG. 20 is a sectional view showing the free ply edges fully separated and folded back in opposed relationship, the buck with the fabric of the garment section wrapped about it, and the upper and lower large drive rollers bearing against the outer surface of the fabric and in contact through the fabric with the large roller of one of the buck inserts for driving the internal buck belt; and also showing one of the series of small pressure rollers of the buck inserts which maintain the outer run of the internal belt in ironing contact with the fabric of the garment section, and through the fabric, urged toward the metal heat transfer belt and the heat pod; and also showing the lip or projection which extends longitudinally in the buck, in its normal spaced relationship with a portion of an insert which can shift the buck frame laterally by coming into contact therewith;

FIG. 21 is a detail view of a fragment of one type of ironed seam with the free edges folded in opposed relation as it appears after emerging from the apparatus,

FIG. 21*a* is a similar view of another type of seam;

FIG. 22 is a perspective view of the buck as it appears removed from the ironing mechanism, a repetitive portion having been omitted between the broken lines; showing the manner in which the internal belt passes around the pressure rollers and is engaged by the large drive roller of each insert to be driven thereby;

FIG. 23 is a plan view of the outlet portion of the buck without the internal belt; showing the rearmost insert installed; and also showing the slack takeup arrangement for the internal belt, the two concavely surfaced stop rollers, and the rear roller which is engaged by the vertical pulling belt of the post puller;

FIG. 24 is an enlarged plan view showing one of the buck inserts with the six idler pressure rollers supported thereon and the laterally extending projections which form the recesses in which the inserts are retained and which limit longitudinal movement of the insert without interfering with its rotational and transverse movements;

FIG. 25 is a detail view of another portion of the buck (in inverted relationship), showing the concavely surfaced stop rollers and indicating how they cooperate with the drive pulleys to restrain rearward movement;

FIG. 26 is a perspective view showing one of the four inserts as it appears removed from the buck;

FIG. 27 is a sectional view taken on line **27—27** of FIG. 13 showing one of the stop rollers and its cooperating drive pulley and how their respective concave and convex peripheries coact through the conveying belt and fabric when restraining rearward movement of the buck;

FIG. 28 is a sectional view of the buck structure showing the lip engaged with the insert to shift the buck frame in the direction of the arrow; and also showing the cross section of the buck belt and its longitudinally extending side projections and how they encompass the roller to prevent lateral displacement of the belt as it moves;

FIG. 29 is an exploded view of the front portion of the buck showing details of construction and assembly;

FIG. 30 is a detail view of the bridging member which guides the sewn garment section emerging from the sewing machine onto the inlet portions of the buck and separator;

FIG. 31 is a sectional view taken on line **31—31** of FIG. 30 indicating the overlapping sandwich arrangement of the outlet portions of the bridging member and the inlet portions of the buck and separator;

FIG. 32 is an elevational view showing the variable speed transmission means which can be selectively actuated by the operator to suspend or reduce operating speed of the ironing mechanism without affecting the operating speed of the sewing machine;

FIG. 33 is a view in plan of the mechanism shown in FIG. 32;

FIG. 34 is a representational view of the common drive means for the sewing machine and ironing mechanism;

FIG. 35 is a sectional view taken on line **35–35** of FIG. 3 showing structural details of the support for the vertical pulling belt of the post puller;

FIG. 36 is a sectional view taken on line **36–36** of FIG. 15 showing details of the driving arrangement for the lower horizontal belts of the post puller; and

FIG. 37 is a schematic representation of a modification of the arrangement shown in FIG. 21 of the parent case now Patent No. 3,372,497 for engaging one or more of the heat pods in proportion to the velocity of the garment section through the ironing mechanism.

In the following description, members and portions of the ironing mechanism and the sewing machine of this application which are similar to members and portions of the apparatus of the parent case have been related thereto wherever applicable, by use of the same or similar numbering.

General organization and operation

Referring to the drawings, FIG. 1 shows an ironing mechanism of the same general construction as that disclosed in the parent case combined with a typical industrial sewing machine **1** mounted in a conventional sewing table **2** which is provided with the usual sewing machine drive source **149***a* (FIG. 34) consisting of a combined motor and clutch assembly known in the trade as a transmitter. There is an operating connection including variable speed transmission **162** between the sewing machine and the ironing mechanism by means of which the ironing mechanism normally operates whenever the sewing machine is operated.

The sewing machine shown is representative of any conventional single seam lock or two thread chain stitcher used for joining two fabric plies together as for example in stitching the leg portion of men's trousers. The combination of sewing machine and ironing mechanism is not restricted to that type of sewing machine but could

also be used with other sewing machines such as for example the type shown in U.S. Patents 3,192,887 and 3,246,620, which simultaneously produce three lines of stitching, one being the same as that produced by the single seamer mentioned and the other two being separate and independent overcastings of each of the free ply edges. The sewing machine could also be associated with an edge pinker to finish the free ply edges with pinking.

The sewn garment section emerging from the sewing machine of whatever type, passes over the bridging arrangement indicated in FIG. 2 and shown in detail in FIGS. 30 and 31, to leadon member **186** of the buck **185** and leadon portion **236** of the separator on the way, as indicated in FIG. 9, to being ironed between moving metal belt **175** and moving buck belt **198** as shown in FIG. 20. It will be noted that the pressure applied during ironing is concentrated in the relatively narrow cross dimension of the outer surface of belt **198** rather than the cross dimension of the buck itself.

When the fabric of the garment section reaches the leadon member and portion, it is initially engaged by sets of upper and lower opposed feed members as indicated in FIG. 9 until the fabric is brought into full engagement with the upper and lower horizontally operating conveying belts shown in FIGS. 1, 2 and 3, and elsewheres. The portions of the fabric of the garment section which become wrapped about the buck are also drawn in one vertical plane between metal belt **175** and the buck belt **198** as indicated in FIG. 20, and in another substantially vertical plane by engagement of two opposed upper and lower series of large drive rollers **141** to **148**, indicated in FIG. 3 and elseweres.

As the fabric section passes over the leadon member and portion, the contoured surface of separator **235** causes the free ply edges to fold back upon the fabric as shown in FIGS. 17 to 20, and just prior to the point at which the fabric meets metal belt **175**, as indicated in FIG. 5, a jet of steam is directed at the fabric. As the fabric of the garment section wrapped about the buck is drawn by the various conveying belts with the surfaces to be ironed clamped between belts **175** and **198**, heat is applied to the metal belt by heat pods **205** and **220**. As explained in the parent case, the heat pods are brought into engagement with the metal belt only when certain predetermined operating speeds of the conveying members are reached. In this case, the operating speed of the sewing machine is transmitted through variable speed transmission **162**.

However, by means of the mechanism shown in FIGS. 32 and 33, it is possible to continue operation of the sewing machine while either reducing the speed of or suspending operation of the conveying members of the ironing mechanism. This permits production of slack in the fabric between the ironing members and the sewing machine which allows certain types of curved portions of the garment section to be sewn despite the clamping effect of the conveying members of the ironing mechanism. Since engagement of the heat pods with the moving metal belt is dependent upon the operating speed of the conveying members, whenever the operator actuates the mechanism to either reduce speed or suspend operation of the conveying members, the heat pods are withdrawn. This prevents burning or scorching of the fabric at such times.

The fabric of the garment section leaving the conveying members which draw it between the ironing members is engaged by other sets of vertical and horizontal post pulling members which operate at a somewhat faster rate than the first sets of conveying members. The difference in speed causes tightening of the freshly ironed fabric. Just before the fabric emerges from the first sets of conveying members, a blast of cold air is directed at the still warm, taut fabric to set it.

In the version of the ironing mechanism shown in FIG. 1, it is inclined upwardly away from the sewing machine. The outlet of the sewing machine being usually about thirty inches above floor level, this places the outlet of the ironing mechanism approximately forty inches above floor level. This arrangement provides a number of significant advantages among which is the fact that with the outlet raised in this manner, the entire combination of sewing machine and ironing mechanism occupies less floor space. It also permits a commercially available stacker to be positioned at the outlet of the ironing mechanism, using less floor space than with the horizontal arrangement of the ironing mechanism shown in the parent case.

Another advantage is that instead of a stacker, a simple slide can be installed at the outlet of the ironing mechanism, and because of its height, the garment can be returned for subsequent operations, at the level of the sewing machine, either to the same operator, or in the straight line production system to another operator.

A less obvious but more significant advantage is utilization of gravity to offset some of the drag produced by the conveyor belts and drive rollers which engage the fabric of the garment section wrapped about the buck. The drag tends to draw the floating buck with the moving fabric wrapped around it. As explained in the parent case, such rearward movement is restrained by engagement of belt drive pulleys mounted on the main frame of the apparatus with stop rollers in the buck. The drag is sufficient however to cause the stop rollers in the buck to bear against the fabric of the garment section passing between the stop members with enough pressure to pinch the fabric which produces marking of some materials. Inclination of the entire ironing apparatus applies gravity to the buck so that the effect of the drag is partially offset and reduced, and this tends to eliminate pinching and consequent marking. Gravity also causes the buck to slide downwardly toward the sewing machine whenever movement of the conveying belts is suspended or when the fabric passes off the buck.

To facilitate use of the stacker, a photoelectrically operated sensor may be used to determine where one garment section ends and another begins and this determination may be utilized to actuate a cutting shear to part the entwined threads between garment sections, and to also operate the stacker.

The bridging arrangement

As seen in FIGS. 2 and 30 bridging member **238** is mounted on the bed of the sewing machine surrounding the needle, the needle hole being indicated at N. As shown in FIG. 31, this member consists principally of two superposed, thin layers **238*a*** and **238*b*** of flexible metal such as nickel silver or stainless steel. The layers are joined together by soldering, brazing or welding except in the portions shown in the sectional view of FIG. 31. Pads **240** are provided on the underside of member **238** as indicated in FIG. 30 so that when mounted on the machine bed as shown in FIG. 2, clearance is provided for passage of one or more fabric plies under layer **238*b***.

The layers are cut out as shown in FIG. 30 to leave a wire-like, longitudinally extending bridge **241** which assists in separating the plies after they are sewn together. This bridge is positioned adjacent the needle path when member **238** is installed as indicated in FIG. 30, with the bridge centered in a mating groove in the sole of the presser foot (not shown). The outlet ends of layers **238*a*** and **238*b*** are separated to permit passage between them of the stitching formed in the plies by the sewing instrumentalities.

Under layer **238*b*** is somewhat longer than the upper layer and somewhat thicker since it is desirable to have the upper layer more flexible than the lower layer so that when the sewing machine is turned bodily backwards as for threading or servicing, layer **238*a*** may flex without being damaged. Because layer **238*a*** is somewhat shorter, leadon member **186** of the buck and portion **236** of the separa-

tor may be easily interleaved between the free ends of the layers.

The layers overlap member **186** and portion **236** in the direction of passage of the garment section from the sewing machine to the ironing mechanism. Passage of the sewn together plies over and under the layers tends to compress them into a tight sandwich with member **186** and portion **236** interleaved, to form a continuous bridge extending from the outlet of the sewing machine to the inlet of the ironing mechanism.

This interleaved arrangement permits the buck to shift longitudinally in either direction without breaking the bridge. Layers **238***a* and **238***b* are long enough so that when the drag draws the buck rearwardly, the bridge is not disrupted. Shifting in the opposite direction when bumps pass between the stop members of the buck and main frame, or when the conveying members cease operation, merely causes buck leadon member **186** to move further downwardly between the layers.

The arrangement makes it convenient to remove the sewing head from the combination apparatus for replacement by another without requiring removal of, or damaging the bridging member.

Separation of the fabric plies

As the stitched plies pass over the bridging member they automatically pass onto the leadon member and portion (see FIG. 9) with the free ply edges disposed about portion **236** and the part of the garment section which will subsequently be wrapped about the body of the buck disposed about member **186**. Member **186** and portion **236** are of relatively thin cross section so that very little separation of the plies takes place initially. In order to retain control of the garment section during the interval between leaving the sewing machine and entry between the ironing members, it is desirable to maintain the plies in this relatively unopened state until they approach the position at which metal belt **175** and internal belt **198** can clamp the fabric between them.

Innner edges **186***a* and **236***a* of the leadon member and portion are positioned closely together so that each edge can butt against its side of the line of stitching within the sewn plies (see FIGS. 9 and 17). This positioning, together with clamping pressure applied to the sewn portion as well as to the free ply edges by tires **331** and **332** on the peripheries of magnetically driven rollers **333** and **334** effectively restrains the sewn together plies from wandering as they travel toward the body of the buck and keeps the stitchline between the free ply edges aligned with the centerline of belt **198**.

As the sewn together plies move further rearwardly, the free ply edges pass along the contoured inner surface **237***a* of the separator and spread apart as shown in FIG. 18 in which it will be noted that edges **186***a* and **236***a* are maintained in the desired close proximity and alignment which prevent wandering during ironing. As indicated in FIG. 19, the free ply edges will be almost fully turned back by contoured surface **237***a* as the rearwardly travelling fabric first reaches belt **198** and just slightly before it meets metal belt **175**. FIG. 20 shows the fully opened free ply edges clamped between the belts.

The separator

Referring to FIG. 8, separator **235** has a thin forwardly extending leadon portion **236** and a vertically tapering, rearwardly expanding section **237**. The inner edge of portion **236** is designated **236***a* and the portion by which the separator is supported is designated **236***b*. Portion **236** adjoins a tapering, contoured surface **237***a* on the inner wall of section **237**. This contoured section is shaped to progressively fold back the free ply edges of the fabric of the garment section as it travels rearwardly along portion **236**, and is generally similar to that indicated in FIGS. 11, 12 and 16 of the parent case, except that rear section **237** has a much larger vertical dimension than the corresponding section of the separator of the parent case.

Section **237** is relatively wide so that its outer surface **237***b* may act as a deflector to direct droplets of moisture condensing from the steam away from the fabric of the garment section as indicated in FIG. 12. Although as shown this surface is flat, in practice, it has a slight downwardly inclined contour which assists in deflecting the droplets.

In FIG. 5, it will be seen that the outlet of steam nozzle **255** is directed toward the area of the ironing mechanism at which section **237** converges with metal belt **175** and buck **185**. Steam emerging from the nozzle is first directed at section **237** to deflect the moisture and then through the narrow vertical separation between the end of the separator and belt **175**. This will be described more fully in connection with application of steam prior to ironing.

Support arrangement for the separator

Referring to FIGS. 7 and 11, yoked bracket **370** mounted on the main frame of the apparatus, supports shaft **371** between arms **370***a* and **370***b* which are provided with journals which permit shaft **371** to move axially forwardly and rearwardly and also, to rock about its axis, in the directions indicated by the arrows. Stop collars **372** fixed at either end of shaft **371** limit the extent of longitudinal movement. Arm **373** clamped to shaft **371** carries support bracket **374** which has a top surface **375** on which separator **235** is mounted. Eyebolt **376** is secured to arm **373**.

Shaft **29** which extends between main plates **10** and **11** has an extension **29***a* which supports tie-plate **27** (see FIG. 1). Arm **377** has a long hub **378** by which it mounts on shaft portion **29***a* for slidable movement axially along the shaft. Eyebolt **379** is attached to the free end of arm **377** and spring **380** is anchored between the eyes of eyebolts **376** and **379**. Tension adjusting screw **381** rotatably anchored in plate **27** (see FIG. 1) is threaded into arm **377** (see FIG. 7). Turning screw **381** so that it draws arm **377** toward plate **27** increases the tension exerted by spring **380** to oppose transverse rotational movement of arm **373** and shaft **371**, and accordingly also of separator **235**. The tension is initially adjusted so that the separator is urged toward leadon portion **186** and to resist displacement therefrom.

Any bump or bulkiness occurring in the seam will shift the separator to the right until passage of the bump. Tension exerted by spring **380** will then return the separator to the initial position. Such bulkiness in the seam may also shift the entire buck to the left. It will subsequently be explained how the buck is caused to return bodily by coaction of its internal lip with the buck inserts. Such lateral displacement of the buck may not be overcome quickly enough by the action of the buck inserts on the lip to maintain the desired close spacing between edges **186***a* and **236***a* to retain alignment of the stitching with the centerline of belt **198**. In such instances, spring **380** will bring about immediate shifting of the separator so that it will follow lateral excursions of the buck.

Since shaft **371** is also free to move axially, the drag on the fabric previously mentioned also causes the separator to shift toward the rear of the apparatus, but whenever a bump passes between the stop members of the buck and main frame at the rear of the apparatus, the separator can move forwardly in unison with similar movement of the buck to accommodate passage of the bump.

Since leadon portion **236** of the separator is interleaved between overlapping layers **238***a* and **238***b* of the bridging member, such compensating movements of the separator will not disrupt connection with the outlet of the sewing machine.

The conveying mechanisms

As in the parent case, feeding of the garment section through the ironing mechanism is accomplished in part by coaction of horizontal upper belt **52** and lower belt **26** (see FIG. 4). Belt **52** is wrapped around idler pulley **51**

and engages the upper ply of the garment section, and belt **26** is wrapped around pulley **22** and engages the lower ply. A prepuller and a post puller have been added to improve handling of the fabric through the ironing mechanism. The prepuller utilizes feed members **333** and **334** to draw the fabric after it leaves the sewing machine and before engagement by the main conveying members. It assists in overcoming any tendency to wander during the subsequent ironing operation of the line of stitching between the opened free ply edges.

The prepuller

The constructional details which follow also apply to member **334**. Referring to FIG. 9, member **333** is a disc having a somewhat larger diameter than pulley **51** and a large central bore **333***a* which surrounds hub **51A**. A series of spaced openings **333***b* are disposed about the central bore. A corresponding series of cylindrical magnetic slugs **333***c* are press fitted into openings **333***b*.

Pulley **51** is made of a magnetic material such as iron and is provided with flat face **51***b*. Slugs **333***c* project slightly beyond a similar flat face **333***d* of disc **333** to reduce frictional engagement between the flat faces when member **333** is coupled with pulley **51**. Since the slugs are magnetically attracted to face **51***b* of the pulley, disc **333** becomes attached to the pulley and rotates with it. The clearance between hub **51***a* and bore **333***a* permits the disc to slip in any direction across face **51***b* until restrained by contact of the wall of the bore with the hub and contact of the tire **331** on the periphery of the disc with members **186** and **236** through the fabric being fed.

As indicated in FIG. 10, the periphery of disc **333** is made up of a straight section **333***e* and a slightly tapered section **333***f*, both of which are surrounded by the tire. The tire is made of material such as a member of the rubber family, which will provide good frictional engagement with all types of fabrics.

Because the disc has a larger diameter than the pulley, as the disc rotates with the pulley, its periphery tries to go faster than the periphery of the pulley. This results in an action by which tire **331** is thrust against the fabric with considerable pressure which produces good feeding engagement between the tire and fabric. Although the entire disc can be displaced as necessary to accommodate any bumps, as it rotates it always tends to come back into engagement with the fabric after passage of bumps.

In order for the free ply edges to be opened right up to the line of stitching, they must negotiate the complex slopes on both faces of portion **236** of the separator which are part of the contoured surface **237***a* which effects the eventual opening up of the edges as shown in FIGS. 19 and 20. These slopes increase laterally to the right as viewed in FIG. 17 and also to the rear as viewed in FIG. 8. the rearwardly moving fabric resists transverse movement across these slopes which is necessary for full opening up. Unlike the other portions of the fabric plies which are wrapped around the buck and which are pulled transversely in the opposite direction by the action of the large drive wheels such as **141** and **145** in FIG. 20, the free ply edges cannot be pulled transversely to bring about the desired full opening up.

A transverse pushing vector is therefore provided in the rearward feed action by putting a slight taper on the peripheries of the discs. Referring to FIG. 10, it can be seen that the rotational speed of a point on the line of junction between portions **333***e* and **333***f* is greater than that of a point on a line at the right edge of portion **333***f* because of the difference in diameter. This differential in speed causes the fabric passing under these respective portions of the periphery to travel at different rates which skews the right side of the free ply edges to the right as the ply edges move rearwardly, and this causes the free ply edges to ride up the slopes until the stitching between the plies is restrained by contact with edge **236***a*. This transverse pushing vector works in conjunction with the close positioning of edges **186***a* of the buck and **236***a* of the separator previously mentioned to effect full opening of the free ply edges right up to the stitching just prior to engagement by the metal and buck belts.

Referring to FIG. 17, feeding of the plies by the discs is effected on the line of stitching joining the plies. Since this line of stitching is confined in a horizontal plane between edges **186***a* and **236***a*, and held in the slot or track formed between these edges in a vertical plane by the pressures applied to the top ply by disc **333** initially and on the bottom ply by disc **334** a little later, the stitchline is retained in correct relation so that when the fabric moves rearwardly to open up the free ply edges, the stitchline between the open free edges will be aligned with the horizontal centerline of buck belt **198**. This results in an ironed seam in which the plies are in true butt relation without any overlap either upwardly or downwardly.

Another aspect of the prefeeding of the fabric plies is treated below in conjunction with the traction reducing arrangement.

Belt takeup

Referring to FIG. 3, as in the parent case, pulley **51** rotates on shaft **49** carried by arm **47** supported from shaft **44** which is journalled in support **43**. In order to provide a takeup arrangement for belt **52**, new arm **47***a* is attached to shaft **44** in place of arm **47**. The new arm is provided with an internal, longitudinally extending slot (see FIG. 4) in which arm **47** is fitted and in which it can be shifted as required to tighten belt **52**. Tightening bolt **47***b* clamps arm **47** in adjusted position to arm **47***a*.

Traction reducing arrangement

The portions of the fabric plies which become wrapped around the buck are pulled transversely by the action of the large drive rollers, and the extent of this transverse component is determined by the angling of the drive rollers which can be adjusted to suit the needs of various fabrics. The transverse vector in the opposite direction in the free ply edges provided as mentioned above to effect full opening of the plies right up to the stitching, is produced by the taper on the peripheries of discs **333** and **334**. Obviously this vector is much less effective than that of the large drive rollers which operate rearwardly of the tapered discs, but whose effect is reflected through the continuity of the fabric to the portion which passes under belt **52** in the area in which pulley **51** also drives disc **333**.

With some fabrics, it is desirable to lessen the effectiveness of the traction provided by the forward portion of belt **52** to reduce this reflected effect and this is accomplished by an arrangement which transfers engagement of the fabric in this area from belt **52** to disc **333**. Arm **47** supports a depending arm **385** which carries a pair of rollers **386** at its lower extremity. The rollers fit in mating grooves of the lower run of belt **52** in a location at which the belt passes over a non-flexible portion of the buck which is supported by belt **26** and pulley **22**. This provides a support arrangement for arm **47** which prevents pulley **51** from exerting downward pressure through belt **52** to deflect flexible leadon member **186**.

As indicated in FIG. 6, arm **47** has a horizontally extending slot **47***c* and arm **385** has a vertically extending slot **387** which permit both horizontal and vertical shifting of arm **385**.

In making a positional adjustment, belt **52** is positioned so that clearance exists between it and the surface of the fabric and the adjusted position is fixed by tightening bolt **388** and nut **389**. This clearance is indicated in FIG. 17.

The steam system

As mentioned, just before the garment section is brought into engagement with metal belt **175** and belt **198**, a spray of steam is applied to the fabric. Application of steam is desirable to obtain satisfactory ironing of many

fabrics. However, since some of the newer fabrics now used in garment manufacture cannot tolerate even slight amounts of water without becoming permanently spotted, it is necessary to avoid application of droplets of water with the steam.

Belt **175** is made of stainless metal which has a high heat loss characteristic to prevent charring or scorching of the fabric during those intervals when the garment section conveying members are either operating at low speed or are at rest. Although the heat pods are withdrawn under such operating conditions, the metal belt remains in contact with the fabric. If the belt were capable of storing a substantial amount of heat for any appreciable time, damage to the fabric might result.

However, a high heat loss characteristic favors condensation when steam is applied, and since steam is introduced just prior to the start of the ironing operation, any water resulting from condensation would be carried on the metal belt to the fabric.

This is minimized by providing a preheating radiator which is maintained in contact with the metal belt at a location just ahead of application of steam to the fabric. This radiator raises the temperature of the belt sufficiently to reduce condensation.

The preheating radiator

Referring to FIG. 5, box **250** is pivotally mounted from plate **10** by support link **251**. Plate **252** is attached to the box to close it off to form a steam receiving chamber or plenum. The plate also serves to transmit heat derived from introduction of steam into the plenum, to the metal belt with which it is held in contact by spring **253**.

Plate **252** also supports solenoid valve **254** which is fed from the plenum and which, when actuated, furnishes steam to nozzle **255** which directs the steam jet to the fabric of the garment section. Steam coming into contact with the preheated portion of the metal belt does not condense thereon as would occur without the preheating arrangement.

Solenoid valve **254** is automatically actuated whenever the forward heat pod **205** is thrust toward belt **175** as the speed sensitive switch is actuated by the conveying members reaching the first critical speed as described in the parent case. Regulator valve **256** can be adjusted to fix the amount of steam sprayed.

Reduction of condensation

Although deposit of droplets of moisture on the fabric is reduced by preheating the metal belt, additional steps are necessary to minimize the amount of water developed in the steam system by condensation. Referring to FIG. 12, it will be seen that steam is fed into the system through inlet pipe **257** from a supply source which normally includes a water trap and drain to dispose of condensate which develops in the supply system. Nipple **258** connects the outlet of box **250** with the inlet of solenoid valve **254** and nipple **259** connects the outlet of the solenoid valve with the inlet of regulating valve **256** which feeds nozzle **255**. These connections are as short as possible and and are made up of piping of very small inside diameter to reduce the amount of steam that can be stored. Since some condensation is unavoidable, this very small steam storage capacity holds the amount of water condensing in the system to a minimum. Drain **260** is provided to remove such condensation with one branch **260***a* connected to solenoid valve **254** and another **260***b* connected to the plenum. The connections are shown in physical form in FIG. 4. Drip **260***c* conducts the collected water to a suitable receptacle or drain line through a trap (not shown).

It will be noted that the piping has been arranged so that the steam system is of the circulating type, that is, steam fed into the plenum can circulate through the solenoid valve by connection **258** and out through drain branch **260***a*, and also from the plenum by connection **260***b*, to the drain outlet **260***c* to the steam trap. This arrangement maintains the entire system at a higher temperature and is conducive to reduction of condensation within the system.

In the intervals between application of steam to the fabric, that is when the operator temporarily stops sewing, steam remaining in the system and particularly in the cooler portions, tends to condense. The droplets of moisture developed will be ejected along with the next spray of steam. The droplets are heavier than the gaseous component of the steam and so the outlet of nozzle **255** is shaped to direct the droplets downwardly against surface **237***b* (see FIG. 12) to deflect them away from the vertical slot between the end of the separator and the metal belt through which the gaseous component of the steam moves to the fabric.

Main conveying members

Since the main members which convey the sewn garment section through the ironing mechanism are much the same as described in the parent case, only significant differences are mentioned below.

Metal belt **175** is now positively driven from large drive pulley **176** (see FIG. 15) by series of pins **176***a* which project from its perimeter and which are engaged by eyelets **175***a* which are fastened in the belt near the upper and lower outer edges of the belt. In FIG. 9, one of the eyelets near the upper edge of the belt is shown.

The belt is also provided with another series of holes **175***b* at its midsection as also shown in FIG. 9 and elsewheres. These holes have several important functions. On the side of the belt in contact with heat pods **205** and **220**, they reduce the amount of belt surface in contact with the hard, heat transmitting faces of the pods and thereby lessen frictional engagement between the belt and pod faces as the belt moves. In FIG. 20, the holes are shown engaged with the fabric of the garment section. The pressure exerted on the softer fabric by the buck belt forces the fabric into the holes which provides good engagement for assisting in transporting the garment section through the ironing mechanism and also prevents the fabric from riding up or down during passage through the ironing members.

Belts **24** and **25** are wider than their earlier counterparts to provide better transport, but as before, are driven by pulley **23** on shaft **21** (FIG. 3) through the sprocket and chain arrangement described in the parent case, from variable speed transmission unit **162**.

Referring to FIG. 3, journalled support **40** is provided for shaft **41** which carries pulley **42** to drive belt **52**. Shaft **41** which is also driven by the sprocekt and chain arrangement described in the parent case, has an extension which carries the post puller driving pulley which will subsequently be described.

Journalled support **43** is provided for shaft **44** on which arm **47***a* previously mentioned is pivotally mounted, and on which idler pulley **50** which supports the forward portion of the upper run of belt **52**, is also rotatably mounted.

Belt tensioning arrangements

Tension is applied to the upper run of belt **52** by two assemblies **93** which resiliently urge rollers downwardly against the outer surface of the upper run of the belt in much the same manner as that described in the parent case. A similar arrangement (not visible) is provided to tension the lower run of belt **26**.

Tension is applied to the lower run of belt **52** and the upper run of belt **26** by series of resiliently urged assemblies visible in FIGS. 3, 13 and 14.

Referring to FIG. 13, upper and lower L-shaped support brackets **470** and **470***a* are attached to the main frame of the apparatus to support these assemblies. Each assembly includes a link **471** which is secured to the bracket but is capable of rocking movement about pivot screw **472**. In each, curved link **473** is pivotally connected to the link and is also pivotally connected near the midpoint of a bar **474**. Each of bars **474** carries members

which fit grooves in belts **52** and **26**. As seen in FIG. 3, in each of the two right assemblies which cooperate with belt **52**, the bars have a pair of rollers **475** at each end. These rollers engage the belt grooves in much the same manner as that shown in end view in FIG. 6 except that bar **474** is disposed between each pair of rollers.

Referring to FIG. 14, it will be seen that the left upper and lower assemblies differ in that each bar carries a pair of rollers at one end only and that the other end pivotally supports a member **476** which scrapes lint, threads or dust from the traction side of the belts before they pass around their respective drive pulleys, and prevents lateral displacement.

Tension is resiliently applied to maintain each of the assemblies in contact with its respective belt portion by a springing arrangement such as leaf spring **477** or some suitable equivalent.

The floating buck

In general, the constructional concept of the floating buck follows that of the parent case, but some important changes provide improved performance.

Referring to FIG. 29, buck **185** has a main frame made up of body **188***a* and cover plate **188***b*. Leadon member **186** is retained between their tapering front portions **187** when the cover plate is attached to the body. When assembled as shown in FIG. 22, recesses are formed between the body and cover plate in which a series of unitary inserts **204** are received. They function in much the same manner as do the individual upper and lower inserts **201** and **202** of the parent case. Each insert is individually separated from every other insert and is capable of shifting laterally independently of any movement of the other inserts.

The inserts

Each insert consists of two spaced apart, plate-like main members **204***a* from which outrigger arms **204***b* extend in both directions (see FIG. 26). Between the members and arms (see FIG. 24) spaced parallel shafts **204***c* are mounted, each of which rotatably supports an idler roller **204***d*. The rollers are preferably of ball or roller bearing construction, and as seen in FIG. 20, fit within the V-shaped projections at each edge of belt **198**. This arrangement prevents the belt from being displaced laterally.

Members **204***a* have in-line elongated slots **204***e* in which shaft **204***f* is retained with large roller **204***g* rotatably mounted on the shaft. The slots permit the shaft and large roller to shift transversely as required to accommodate occasional variations in thickness of belt **198** and in shifting of the buck. This provides constant effective driving of belt **198** by roller **204***g*, as explained below, which is not possible without some provision for transverse compensatory shifting bodily of roller **204***g*.

When the buck is assembled, as shown in FIG. 24 belt **198** passes between small rollers **204***d* and large rollers **204***g* in each of the inserts, with the flat peripheries of rollers **204***g* bearing against the outer surface of the inner run of belt **198**, and with the small rollers separating the inner and outer runs of the belt.

Buck belt drive

In the parent case, belt **198** is passively driven by frictional engagement with the moving fabric of the garment section in contact with the outer or ironing run of the belt. Such frictional engagement permits slippage to occur and also produces undesirable drag which distorts the fabric of the garment section when certain types of fabrics pass along the body of the buck. Distortion of the fabric as it passes between the ironing members results in wrinkling which is impressed into the fabric.

Drag due to this cause has been eliminated by providing an active drive for belt **198** which operates at the same velocity as that of the other conveying members. Referring to FIG. 20, the rims of the pressure rollers such as typically **141** and **145**, are resiliently maintained in contact (as explained in the parent case) with the upper and lower bevelled peripheries of the rollers **204***g* so that when the pressure rollers are driven, rollers **204***g* in the inserts rotate in unison therewith, and as explained above, the flat peripheries of the rollers **204***g* in contact with the outer surface of belt **198** cause the belt to be driven. Although not indicated, rollers **204***g* are urged against belt **198** with sufficient force to bend the belt inwardly between adjoining spaced rollers **204***d* of the inserts. This provides wraparound of belt and drive roller which assures good traction.

Longitudinal movement of the inserts with the moving belt is restrained by transversely extending projections **188***c* (see FIG. 29) which form the recesses in the assembled buck in which the inserts are retained. There is sufficient clearance to permit the inserts to move transversely between the projections, and because portions **204***h* of the insert main members are arcuately shaped, the inserts can also swivel or rock within the recesses.

Belt **198** wraps around idler roller **196** fixed in position at the front end of the buck body **188***a* and is also wrapped about idler roller **195** at the rear end of the buck body. Roller **195** however is rotatably supported on carrier **195***a* which is part of a slack takeup arrangement. The carrier is slidably retained in a longitudinal rectangular or dovetail slot the rear portion of the buck body and is urged by pin **195***b* and spring **195***c* bearing against the closed end of the slot to tighten belt **198**.

Roller **188***r* which cooperates with the vertically operating belt of the post puller as will subsequently be explained, is also rotatably mounted on carrier **195***a* near the rear end of the buck body, with its periphery projecting somewhat beyond the periphery of roller **195**.

The lip and its function

Lip **188***d* indicated in FIGS. 20, 28 and 29, extends longitudinally on buck cover member **188***b* along the edge adjacent the ironing run of belt **198**. The outer edge of one of the main members **204***a* of each insert can bear against this lip, but is normally not in contact therewith as shown in FIG. 20. The lip limits transverse movement of the individual inserts independently of lateral bodily movements of the entire frame of the buck, so that the inserts can only move to the left to accommodate bumps in the seam which distort or bend belt **198**.

The large drive rollers such as **141** and **145** in FIG. 20 constantly exert pressure on each buck insert individually to urge the insert toward metal belt **175** which is relatively thin and flexible. Normally this pressure is offset by that exerted by the heat pods such as **205** as indicated in FIG. 20, when thrust against the metal belt. With the heat pods retracted when sewing is interrupted by the operator, in the absence of lip **188***d*, each insert would be urged with considerable pressure against the contacting portion of belt **198** and this pressure could be enough to permanently distort or damage the metal belt, or to bring the distorted belt into contact with the retracted heat pod. The presence of the lip maintains the entire buck frame and belt bodily pressed against the metal belt which distributes pressure more uniformly along the line of contact with the belt and therefore minimizes the possibility of damage.

The lip also serves to return the buck frame to the right after passage of bumps occurring in some portions of the garment section, particularly when such bumps pass the non-yieldable front idler roller **177** and the large rear drive pulley **176** about which the flexible metal belt **175** is wrapped. At such times, both inserts and the frame of the buck are shifted leftwardly for accommodation.

Because the inserts are individually urged rightwardly by their respective pressure rollers, the inserts always return after passage of such bumps, but without the lip, the frame of the buck would not. Since the leadon member

is retained at the front of the buck, uncounteracted frame shifting would destroy the desired close relationship of edges **186***a* and **236***a*, which as previously explained, is necessary to hold the line of stitching aligned with the centerline of belt **198** to prevent wandering during the ironing operation.

Normally, front roller **196** of the buck is positioned in line with idler roller **177**, and a small roller (not shown) is positioned in line with the large drive pulley **176**. These rollers prevent the buck from shifting to the right which might produce crossover of edges **186***a* and **236***a*. Crossover could restrict passage of the garment section or damage the fabric. Occasionally the buck shifts forwardly, either to accommodate a bump passing between the stip rollers at the rear or when gravity draws the entire buck body downwardly. Since belt **198** is flexible, when such forward shifting occurs, either the front or the rear of the buck could shift to the right. At such times, roller **196***a* (see FIG. 29) at the front of the buck and the small roller at the rear of the buck prevent crossover.

Swivelling of the inserts

Passage of some bumps may distort or bend belt **198** inwardly and this will cause progressive leftward shifting of the individual inserts. The arcuate shape of the main members of the inserts allows a swivelling action by each insert which enables the insert to follow the progressive movement of the bump as it passes the portion of the belt in contact with the insert and this prevents cocking or locking of the inserts between the restraining projections. After the apparatus has been in use for some time, lint and threads gradually accumulate in the recesses, and the accumulation could eventually restrict transverse movement of the insert. The swivelling action assists in loosening and dislodging such accumulations from the recesses.

Stop rollers

As shown in FIGS. 25 and 27, stop rollers **189** and **190** of the buck and drive pulleys **42** and **23** respectively coact to restrain rearward longitudinal movement of the buck. These members are now provided with corresponding circular cross sections at their perimeters, the buck rollers being concave and the pulleys being convex. This configuration allows the fabric passing between the stop members to find a more natural drape over the members which helps to reduce bunching or pleating at such places. The drag exerted on the buck by the passing fabric brings the stop members into tight engagement through the fabric and the drive belts. The new shape of these members reduces impression of pressure markings in certain fabrics which occur with the original shape, and is also conducive to good retention of the belts on the drive rollers to provide better traction.

The post puller

Vertical pulling members.—As in the parent case, heat transfer belt **175** is driven from transmission unit **162** by large pulley **176** which is attached to vertical shaft **180** (see FIGS. 3 and 5 of the parent case and FIGS. 15 and 16 herein). Vertical shaft **180** carries bevel gear **181** which meshes with mating bevel gear **182**. In the parent case, gear **182** is attached to sprocket **183**, but in this embodiment, both are carried by shaft **182***a* which extends from the sprocket, and hence rotation of shaft **180** is effected in the same manner as before.

Shaft **180** has been lengthened by downward extension **180'** which is suitably journalled and on the lower end of which V-belt pulley **282** is mounted.

A support yoke made up of horizontal members **285** and **286** joined together by vertical block **287**, has journals in members **285** and **286** which fit around shaft extension **180'** so that the yoke is rotatable as a unit about the axis of the shaft. Journals are also provided in members **285** and **286** in which vertical drive shaft **290** is rotatably supported. The lower end of the shaft **290** carries pulley **291** driven from pulley **282** by V-belt **292**, and the upper end carries drive pulley **295** as indicated in FIG. 15.

A pair of superposed plates **296** are supported on shaft **290**, one above and the other below pulley **295**, with sufficient space between for travel of the vertical pulling belt **297** driven by pulley **295**. The plates are supported in an arrangement which permits them to remain relatively stationary despite rotation of shaft **290**. Bearings **298** with their outer races retained in the plates surround shaft **290** with their inner races fast on the shaft (see FIG. 35). The inner race of the lower bearing rests upon collar **299** fast on shaft **290**. The position of the collar can be fixed on shaft **290** so that belt **297** will be in line with belt **198** and roller **188***r* of the buck.

Stub shaft **300** mounted vertically between the spaced plates rotatably support idler roller **301**. Belt **297** engages drive pulley **295** and roller **301** and slack in the belt is taken up by shifting the position of roller **302** in corresponding slots **303** of plates **296**.

Belt **297** operates in conjunction with belt **198** and roller **188***r* to draw the freshly ironed garment section from the apparatus.

Rotation of shaft **290** urges belt **297** toward buck belt **198** and roller **188***r*. In addition, spring **304** also urges belt **297** in the same direction and resists displacement. Bumps passing only between the belts cause plates **296** to swing about the mounting on shaft **290** for accommodation, but bumps which also pass between roller **188***r* and belt **297** are accommodated by turning of the support yoke about the axis of shaft **180** which allows shaft **290** and the plates assembly supported by it to rotate bodily as needed.

Such shifting is resiliently opposed by a spring arrangement which includes spring **305** coiled about shaft **306** which is anchored in wall **11** (see FIG. 16). The spring is compressed between vertical wall **287** and thumbnut **307** which can be manipulated to increase or decrease the pressure exerted by the spring.

Pulley **295** biased toward wall **11** by this arrangement would normally displace the rear end of the buck laterally because it bears against roller **188***r* through belt **297**. This is prevented by adjustable threaded stop **308** which is retained in vertical wall **287**, with its free end bearing against wall **11**. Adjustment of the position of stop **308** in wall **287** limits the distance that the wall can travel toward wall **11** under the bias exerted by spring **305**. The adjusted position is locked by tightening locknut **309**.

The ratio of diameters of pulleys **282** and **291** is selected to provide somewhat faster operation of belt **297** than that of belt **198**. This differential in speed causes tightening of the freshly ironed fabric drawn between the belts. Since roller **188***r* is in contact with belt **297** through the fabric, the roller travels at the same speed as the belt which tends to prevent distortion of the fabric as it emerges from the apparatus.

Horizontal pulling members

Referring to FIGS. 3 and 15, the extension of shaft **41** carries cogged pulley **442** at its free end and also supports a pair of joined together, spaced plates **443***a* and **443***b* which have journals which permit free rotation of shaft **41**. Near the outlet of the apparatus, the plates support horizontal shaft **444**. Pulley **445** is retained on shaft **444** between the plates and cogged pulley **446** is fixed on the free end. A second pair of spaced and joined plates **447***a* and **447***b* are disposed on either side of pulley **445** on shaft **444** and have journals which permit shaft **444** to rotate freely. Approximately opposite roller **301** of the vertical pulling assembly, plates **447***a* and **447***b* support between them horizontal shaft **448** on which pulley **449** is rotatably mounted. Belt **450** engages pulleys **445** and **449** and cogged belt **451** engages pulleys **442** and **446** to drive belt **450**. The ratio between the

diameters of pulley **442** and pulley **445** has been selected to provide slightly faster operation for belt **450**.

As in the parent case drive pulley **23** is a wide member fast on shaft **21** (see FIG. 36) with its outer end journalled in plate **27**. Conveying belts **24**, **25** and **26** are driven as in the parent case by pulley **23**. In the present version, the lower horizontal drive belts **24***a* and **25***a* of the post puller which carry the freshly ironed garment section after it leaves the first set of conveying belts, are driven by pulley **23** at a somewhat faster rate for the purpose previously mentioned. Pulley **23** therefore differs from that of the parent case in that in addition to having grooves for driving belts **24**, **25** and **26**, it also has somewhat larger diameter steps for belts **24***a* and **25***a* which cause the latter belts to operate at a somewhat higher speed.

Large idler roller **23***a* is rotatably supported between the main frame and the rearward portion of plate **27** at the end of the apparatus with belts **24***a* and **25***a* engaging suitable portions of the roller. Belt **450** is driven in substantial synchronism with belt **25***a* on which it rests through the fabric of the garment section which passes between the belts.

Roller **23***a* has a portion designated **23***b* which is in line with the outlet of the buck and the vertical pulling members to assist in carrying the garment section from the apparatus (see FIGS. 15 and 16).

The air blast

Air nozzle **310** supported in one suitable position as shown in FIG. 15, is connected by tubing to a source of air under pressure through a regulating and cutoff valve (not shown). The taut freshly ironed fabric passing this position is subjected to a blast of air just prior to entering the vertical and horizontal members of the post puller. The cold air lowers the temperature of the freshly ironed fabric and sets it in taut condition. The amount of air to be applied can be fixed by setting the valve. The air blast also blows away any lint or loose threads clinging to the freshly ironed garment section.

Another location for the air nozzle could be just beyond rear heat pod **220**, with the nozzle arranged to blow air through holes **175***b* of the metal belt which would also assist in stripping the fabric from the metal belt.

An alternate arrangement for setting the freshly pressed fabric involves the use of a vacuum arrangement to pull air through the fabric as it passes one of these positions.

Apparatus drive mechanism

Referring to FIG. 34, transmitter **149***a* has an output shaft **149***b* which carries pulley **149***c* which receives the usual sewing machine drive belt, and pulley **149***d*. Idler pulleys **149***e* and **149***f* are rotatably supported on jackshaft **149***g* and the belt **149***h* connects pulleys **149***d* and **149***e* to drive pulley **149***f*. A second jackshaft **149***i* carries pulley **149***j* at one end and one half of a disconnectible coupling **149***k* at the other. Belt **149***m* connects pulleys **149***f* and **149***j* to drive shaft **149***i* and coupling **149***k*. The other half of the coupling is attached to input shaft **165** of the variable speed transmission unit **162** (see FIG. 33 herein and FIG. 5 of the parent case).

Unit **162** which is also shown in FIG. 32 removed from the ironing mechanism and indicated in installed position in FIG. 1, has an output shaft which carries sprocket **163**, which is connected by chain **164** with the sprocket (designated **161** in the parent case) which drives the ironing mechanism whenever the sewing machine operates. This unit is typically a "ZERO-MAX" speed changer unit of approriate capacity which is commercially available and is so well known as to require no further description of its construction and operation other than to point out that shifting the output speed adjusting lever **166** in the direction of the arrow in FIG. 32 reduces the output speed, and shifting it in the opposite direction, increases the output speed. Shifting is normally effected by movement of screw **167** which may be manipulated by handwheel **168**. In the unmodified device, positioning screw **167** engages a nut-like, internally threaded member which is pivotally connected with lever **166** so that appropriate rotation of the handwheel will cause lever **166** to move in the desired direction.

The optimum feed rate for the garment section through the ironing mechanism is approximately the same as that of the sewing machine but this rate differs from fabric to fabric depending upon nature and stretchiness and the relative effectiveness of the feed mechanisms of the sewing machine and the ironing mechanism for the same fabric. It is therefore desirable to be able to adjust the feed rate of the ironing mechanism to meet the requirements of the particular fabric being ironed and this can be optimumly set by manipulation of handwheel **168**.

In the commercial version of the combined sewing and ironing apparatus, the handwheel is made conveniently accessible to the operator by extending the end of screw **167** by a flexible shaft as indicated in broken line so that the handwheel may be mounted on the sewing machine table in a position at which it is readily manipulatable.

Necessity for slack fabric

One problem encountered in using ironing mechanism positioned immediately rearward of the sewing machine arises because the portion of the garment section being ironed is clamped between the ironing members, and because of the limited amount of give or elasticity of the fabric of the garment section, it has not been possible previously to sew successfully the type of seam which has a relatively long straight section followed by a curve inwardly inclined to the length of the buck. Such seams are typically found in trousers, slacks and skirts at the hip portion of the garment, which for certain valid production reasons, must be sewn in the sequential direction mentioned. In negotiating such curves, the operator must maintain a constant distance between the needle and the edge of the garment section. To achieve this, some slack must be available in front of the needle. When the previously sewn portion of the garment is clamped behind the needle, no slack is available in front of the needle to allow pivoting the unsewn portion about the needle to maintain this constant distance.

The arrangement about to be described makes it possible to sew such seams by use of mechanism which allows the operator to obtain slack in the portion of the garment section restrained between the ironing members and the needle whenever desired. Slack in this portion permits the operator to pivot the unsewn portion about the needle as required.

One way to provide this slack would be to operate the ironing mechanism at a slower rate than that of the sewing machine. However, on a continuous basis, this differential would quickly build up a surplus of fabric between the sewing machine and the inlet of the pressing mechanism and would quickly choke the inlet or else so bunch the fabric that wrinkling would occur in the ironed garment section.

The mechanism provided can be operated for any desired length of time to either substantially reduce or suspend feeding of the garment section through the ironing mechanism without discontinuing operation of the sewing machine and without disturbing the initial optimum feed rate set for the particular fabric being ironed as mentioned above.

The slack fabric producing mechanism

For the present purpose, the arrangement for shifting speed control lever **166** is modified as shown in FIGS. 32 and 33. Transmission unit **162** is supported on the ironing mechanism by U-shaped member **169** to which the unit is secured. A pair of spaced brackets **167***a* and **167***b* attached to the body of unit **162**, provide journalled

supports for the ends of screw **167**. Lever **166** is pierced as indicated in FIG. 32 to provide a passageway for screw **167**.

Platform **169***a* is slidably mounted, as by a dovetail connection, on the top edge of bracket **167***b* so that the platform may move parallel to the length of screw **167**. Lug **169***b* depending from platform **169***a*, is internally threaded and is engaged by screw **167**. Bracket **167***b* is provided with elongated guide slot **167***c* in which pin **169***c* secured to a lug depending from platform **169***a*, fits so that when platform **169***a* travels along the top edge of bracket **167***b* as screw **167** is rotated, the platform is stabilized. Limits of movement are fixed by the ends of the slot.

Air cylinder **169***d* secured to platform **169***a*, has a diaphragm actuated piston **169***e* whose free end is linked to the top of lever **166**. Normally, because of the air circuit arrangement used, piston **169***e* is fully retracted within cylinder **169***d*, and hence the position of lever **166** with respect to shifting the internal speed changing members of the transmission unit is fixed by this retracted position of the piston. Accordingly, if the position of platform **169***a* is shifted by rotation of the handwheel, the position of lever **166** will move to effect the desired speed change. Thus the initial position of lever **166** to set the desired output speed suitable for the particular fabric being processed in the apparatus is arrived at by the same manipulation of handwheel **168** as in the prior arrangement.

Cylinder **169***d* connected to a source of compressed air through a four way valve, is of the type which has air input ports on either side of the piston actuating diaphragm so that movement in either direction is positively controlled by admission of air to the proper port.

The valve is preferably of the solenoid actuated type operated through a switch connecting the solenoid to a source of electricity. In the present arrangement, the switch is part of a knee operated lever assembly similar to the usual presser bar knee lift arrangement.

The power stroke of the piston is adjusted to effect the proper amount of shifting of lever **166** to provide the desired reduction of output speed. Thus whenever in the judgment of the operator it is desirable to obtain slack in the garment section being sewn and ironed, pressure on the knee operated lever will close the switch to actuate the air cylinder to shift lever **166** to reduce the output speed of the transmission unit and accordingly, that of the conveying members of the ioning mechanism. Since the stroke of the piston is capable of being adjusted, it is possible to shift lever **166** sufficiently to effect discontinuance of operation of the conveying members.

The operator is thus able whenever desirable, to suspend the ironing operation completely, while continuing the sewing operation for pivoting around curves or for back tacking.

Danger of damage to the garment section by overheating when operation of the conveying members is reduced or suspended, is avoided because the speed sensitive switch normally disengages the ironing pods from the fabric whenever the speed of the conveying members falls below the lowest critical speed for which the speed sensitive switch is set when the switch is driven from one of the operating members of the ironing mechanism as in the parent case.

Speed sensitive switch defeat mechanism

Because the presently available commercial speed sensitive switch operates more effectively with large differentials between operating speeds, a variation of the circuit shown in FIG. 21 of the parent case is provided for the present version of the combined sewing and ironing apparatus. Referring to FIG. 37, switch **225** is driven from the sewing machine transmitter which operates in synchronism with the ironing mechanism, but at a higher rate of speed. With this arrangement, while the sewing machine continues operation when operation of the conveying members of the ironing mechanism is reduced or suspended, the heat pods continue to be thrust toward the metal belt.

To prevent this, it is necessary to use an auxiliary switch **232** of the normally closed configuration, inserted in series with either of the power supply lines which feed the circuits to the solenoid valves operated by the speed sensitive switch. When the knee lever control is actuated to reduce speed or suspend operation of the ironing mechanism, the switch contacts are opened to defeat operation of the speed sensitive switch for as long as the knee lever is depressed. This prevents application of the heat pods regardless of the speed of the sewing machine.

Seam folding

The two types of folding of seams shown in FIGS. 21 and 21A can readily be produced with the bridging arrangement shown in FIG. 30. The folding of the seam shown in FIG. 21 is that which is normally produced when the top free ply edge passes over top layer **238***a* and the bottom free ply edge passes under layer **238***b*.

The folding shown in FIG. 21A can be produced by passing both free ply edges over layer **238***a*. After the seam is sewn, bridge **241** guides both free ply edges so that they pass over the top surface of separator portion **236** before being engaged between the buck belt and the metal belt. The showing of FIG. 21A is merely representative of the folding produced by such handling. In actuality, the free ply edges would be pressed closely to the fabric of the upper ply.

By directing both free ply edges under layer **238***b*, the downwardly folded free ply edges would be ironed so that they would be pressed closely to the fabric of the lower ply. Other variations in folding of the seam edges are obviously within the skill of the folder maker.

The words "prepuller" and "prefeeder" used in the foregoing specification and in the following claims are interchangeable, and are intended to designate auxiliary fabric plies feeding mechanism which functions to transport the sewn plies emerging from the sewing machine outlet to the region of the ironing mechanism at which the main conveying members are active and effective to apply traction to the fabric of the sewn plies. The main and auxiliary feed actions are not necessarily exclusive and may be applied concurrently to adjacent regions of the fabric.

What is claimed is:

1. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies, having: means for separating the margins; ironing elements; and means for engaging and transporting the fabric plies between the ironing elements; in which the ironing elements include a moving heat transfer belt which has means for engaging the fabric for assisting in transporting the plies; means for driving the heat transfer belt; at least one heated element; means for bringing the heated element into contact with the heat transfer belt when the belt moves at a minimum predetermined speed; an elongated buck; a belt mounted in the buck for movement with the fabric and against which the fabric is ironed in cooperation with the heat transfer belt; and means for applying pressure to the buck belt and for simultaneously driving it.

2. Apparatus according to claim **1** in which the means for separating the margins includes a plies separator and guide member supported in advance of the heat transfer belt; said member having a thin forward portion and a rearwardly tapering section extending toward the heat transfer belt; and a thin flexible plies separating member supported by the buck in advance of the buck belt; said separating members being disposed in substantially coextending relation; and a bridging member having a portion consisting of two separable, flexible, superposed layers between which the forward portion of the sepa-

rator and the buck supported separating member are movably interleaved.

3. Apparatus according to claim 1 in which the heat transfer belt has a high heat transmissibility characteristic, and a first series of reinforced openings by means of which the belt may be engaged to be driven, and a second series of openings which engage the fabric of the plies for assisting in transporting the plies, and which also reduce the area of contact with the heated element.

4. Apparatus according to claim 1 including a connection to a source of steam; a nozzle supplied from the steam source, directed to apply a spray of steam to the fabric just prior to ironing; means for reducing condensation from the steam applied by the nozzle settling on the heat transfer belt from being carried by the belt to the fabric; said means comprising a chamber heated by introduction of steam from the source, disposed in proximity to the heat transfer belt at a location in advance of the position at which the belt engages the fabric, said chamber adapted to transfer heat to the belt to raise its temperature prior to engaging the fabric.

5. Apparatus according to claim 1 including a connection to a source of steam; a nozzle supplied from the steam source, directed to apply a spray of steam to the fabric just prior to ironing; and in which the means for separating the margins includes a separator member having a vertical wall located near the position at which the heat transfer and buck belts engage the fabric; said nozzle being arranged to direct the steam spray at said vertically wall to deflect any liquid carried by the steam spray from the fabric to be ironed.

6. Apparatus according to claim 1 having: an endless belt supported in the buck and mounted for longitudinal movement therein, said belt having a driven run and an ironing run; pressure transmitting members rotatably supported in the buck, disposed between the driven and ironing runs of the belt; and members rotatably supported in the buck and adapted to transmit to the driven run of the belt, pressure applied toward the belt and simultaneously, rotary motion for driving the belt.

7. Apparatus according to claim 6 in which the pressure transmitting rotatable members and the driving rotatable members are also supported for movement in the buck transversely to the longitudinal movement of the belt.

8. Apparatus according to claim 1 in which the buck consists of a body member and a mating cover plate, said body member and plate having matching, laterally extending projections which form transverse recesses when joined together; a pair of longitudinally spaced pulleys supported in the buck and on which the buck belt is rotatably mounted, said belt having longitudinal driven and ironing runs; a series of inserts movably retained within the recesses through each of which the driven run of the belt passes, a driven roller rotatably mounted in each of the inserts in contact with the driven run of the belt, a series of smaller pressure transmitting rollers disposed between the ironing and driven runs of the belt and rotatably mounted in each insert; and means for driving the driven roller of each insert to rotate the buck belt.

9. Apparatus according to claim 8 in which the apparatus includes two opposed series of large drive rollers, each of which is resiliently mounted to exert pressure; means for driving said rollers; in which the periphery of each of the driven rollers of the buck inserts consists of a straight central surface with bevelled surfaces disposed on each side of the central portion; in which the peripheries of each of the large pressure drive rollers is disposed in driving contact with one of the bevelled surfaces of said driven rollers, and in which the straight peripheral surface of each of said driven rollers is urged into driving contact with the driven run of the buck belt by pressure exerted by the large drive rollers.

10. Apparatus according to claim 8 in which the projections which form the recesses are of substantially rectilinear configuration; in which each insert has portions which come into contact with said projections to limit longitudinal movement; and in which said insert portions have a circular form which permits swivelling as well as transverse movement in its recess.

11. Apparatus according to claim 8 in which there is a longitudinally extending projection in the buck with which a portion of each insert can come into contact in moving transversely in one direction, to limit movement of each insert in that direction.

12. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies, having: means for separating the margins; ironing elements; and means for engaging and transporting the fabric plies between the ironing elements; in which the ironing elements include a moving heat transfer belt and an elongated floating buck against which the fabric is ironed in cooperation with the heat transfer belt; and in which the buck and cooperating belt are supported in inclined relation to partially offset drag exerted on the buck by the plies as they are moved by the transporting means.

13. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies, having: means for separating the margins; ironing elements; and means for engaging and transporting the fabric plies between the ironing elements; in which the ironing elements include an elongated floating buck, a pair of spaced rollers rotatably mounted in the buck, each of said rollers having a circular cross section at its periphery; and in which the plies transporting means includes an upper belt having a traction surface which contacts the upper fabric ply, said belt being driven by a first pulley; and a lower belt having a traction surface which contacts the lower fabric ply, said belt being driven by a second drive pulley; each of said pulleys having a circular cross section at its periphery which corresponds and mates with the periphery of one of the buck rollers through the belt driven by the pulley.

14. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies, having: means for separating the margins; ironing elements; main means for engaging and transporting the fabric plies between ironing elements; and prefeeding means for engaging the fabric plies in conjunction with the separating means, for conveying the plies to the main transporting means; said prefeeding means including a disc mounted for rotation in advance of the main transporting means; means for rotating the disc; means for frictionally coupling the disc to the means for rotating the disc; and means for permitting limited radial displacement of the coupled disc.

15. Apparatus according to claim 14 in which the coupling means applies magnetic attraction between the disc and a rotating member of sufficient magnitude and direction to frictionally engage the disc for rotation while permitting slippage radially in any direction; in which the displacement limiting means includes an axial extension on one of the members, and a central opening in the other member which surrounds the axial extension, said opening having a diameter larger than the diameter of the extension.

16. Apparatus according to claim 14 in which the disc contacts the upper fabric ply; in which a second disc contacts the lower fabric ply; and in which additional means are provided for rotating the second disc, for frictionally coupling the second disc to the rotating means, and for permitting limited radial displacement of the second coupled disc.

17. Apparatus according to claim 15 in which the main conveying members include an upper belt having a traction surface which also contacts the upper fabric ply; an idler pulley on which said belt is supported and which is driven thereby; and a lower belt having a traction surface

which also contacts the lower fabric ply; a second idler pulley on which the lower belt is supported and which is driven thereby; and in which the discs are each magnetically coupled to one of said idler pulleys for rotation therewith.

18. Apparatus according to claim **15** in which the disc has spaced, transverse recesses disposed parallel to the axis of rotation of the disc; and a magnetized slug retained in each of the recesses and arranged to exert magnetic attraction transversely parallel to the axis of rotation of the disc for coupling the disc to the rotating member.

19. Apparatus according to claim **18** in which the periphery of the disc has a straight portion and an adjoining tapered portion.

20. Apparatus according to claim **17** in which the discs have larger diameters than their companion pulleys so that the disc peripheries tend to travel faster than the traction surfaces of the belts which drive the pulleys; in which the pulleys have hubs, and the discs have central openings which fit about the hubs with substantial clearance; and in which the coupling arrangement permits the discs to slip radially in any direction until limited by said hubs and the fabric in contact with the separating means.

21. Apparatus according to claim **16** in which the peripheries of the discs have straight portions adjoining tapering portions so that points on the adjoining portions travel at different rates of speed to produce a skewing action in the direction of taper when the discs engage the fabric in contact with the separating means.

22. Apparatus according to claim **17** having adjustable means for elevating the pulley which supports the upper belt to reduce traction exerted on the upper fabric ply by the lower portion of the belt wrapped about the pulley and to transfer such traction to its coupled disc.

23. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies, having: means for separating the margins including a separator member having a thin, tapering leadon portion having a guide edge; and ironing members including a buck having a thin leadon portion having a guide edge; said guide edges being coextensive and positioned adjacent to each other to form a slot between them through which the stitching joining the sewn together plies may pass; and prefeeding means including a disc mounted for rotation about a horizontal axis but capable of radial displacement with respect to said axis, said disc having a periphery having a straight portion and an adjoining tapered portion with a line of junction between them; said disc being positioned so that the straight portion of the disc periphery can bear against the leadon portion of the buck, and the tapered portion of the disc periphery can bear against the leadon portions of the buck and separator, with the line of junction disposed in alignment with the slot formed between the guide edges.

24. Apparatus according to claim **23** in which means are provided for urging the guide edges toward each other and to oppose lateral displacement; and said separator and said buck are mounted for longitudinal movement independently of each other.

25. Apparatus according to claim **23** in which the leadon portions of the buck and separator have upper and lower surfaces, and in which the prefeeding means includes a pair of discs each having a periphery with a straight portion and an adjoining tapered portion, said discs being mounted for rotation about horizontal axes longitudinally and vertically displaced from each other; each of said discs being capable of radial displacement from its respective axis; one disc being positioned so that its straight and tapered portions bear against the upper surfaces of the leadon portions of the buck and separator, and the other disc being positioned so that its straight and tapered portions bear against the under surfaces of the leadon portions of the buck and separator.

26. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies having: means for separating the margins; ironing elements; means for engaging and transporting the fabric plies between the ironing elements, including main conveying members operating at one selected velocity; auxiliary conveying members for drawing the ironed fabric plies from the ironing elements, said auxiliary conveying members operating at a higher velocity to place the ironed fabric under tension; and means for driving the main and auxiliary conveying members.

27. Apparatus according to claim **26** having means for directing air at the tensed fabric to reduce its temperature and to set the fabric in tensed condition as it emerges from the apparatus.

28. Apparatus according to claim **26** in which the auxiliary conveying members include an endless belt operating to draw the fabric in a vertical plane and a cooperating roller supported in one of the ironing elements, said roller being driven by the belt through the fabric passing between them.

29. Apparatus according to claim **28** in which the means for driving the endless belt includes a shaft journalled for rotation about a vertical axis; a platform; journal means in the platform adapted to support the platform on the rotating shaft in relatively non-rotating position and to also permit opposite rotation of the platform; said belt being rotatably supported on the platform and driven from said shaft.

30. Apparatus according to claim **29** including means for resiliently urging the endless belt toward the roller and to oppose movement in the opposite direction.

31. Apparatus according to claim **26** having drive means for the auxiliary conveying members including a shaft journalled for rotation about a vertical axis; a shaft supporting member; journal means in said member for supporting it in relatively nonrotating position on the rotating shaft; a second shaft supported by the member and journalled for rotation about a vertical axis; drive means connecting said shafts for rotation; and resilient means urging said member to rotate about the first shaft in one direction and to oppose rotation in the opposite direction.

32. Apparatus according to claim **31** having an adjustable stop means for limiting rotation of the member caused by the resilient means.

33. Apparatus according to claim **28** having means for supporting the endless belt: said means including a first mounting journalled for rotation about a vertical axis; resilient means urging the mounting to rotate about said axis and opposing opposite rotation; a second mounting supported by the first mounting and journalled for rotation about a second vertical axis displaced from the first vertical axis; and additional resilient means urging the second mounting to rotate about the second axis and opposing opposite rotation; said second mounting being capable of opposed rotation independently of the first mounting.

34. Apparatus according to claim **26** in which the auxiliary conveying members include a set of conveying members operating to draw the fabric in a vertical plane and a set of endless belts operating to draw the fabric in a horizontal plane.

35. Apparatus according to claim **26** in which the auxiliary conveying members include a lower group of endless belts operating to draw the fabric in a horizontal plane, and one upper endless belt cooperating with one of the lower belts; and in which the means for supporting and driving the upper belt comprises a horizontally extending rotating drive shaft; a first idler shaft support mounting; journal means in said mounting for supporting it in relatively non-rotating position on the rotating drive shaft; a rotating first idler shaft supported in said mounting in spaced relation to said drive shaft; a second idler shaft support mounting; journal means in said second mounting for supporting it in relatively non-rotating position on the rotating first idler shaft; a second idler

shaft supported in the second mounting in spaced relation to the first idler shaft; pulleys mounted on each of said idler shafts and about which the upper belt is wrapped for rotation; and drive means connecting the drive shaft with the first idler shaft for rotating the pulleys.

36. A buck for use with ironing mechanism comprising; an elongated body member; a pair of longitudinally spaced pulleys supported in the buck; a continuous belt rotatably mounted on said pulleys and having longitudinal driven and ironing runs; pressure transmitting members rotatably supported in the buck, disposed between the driven and ironing runs of the belt; and members rotatably supported in the buck and adapted to transmit to the driven run of the belt, pressure applied toward the belt and simultaneously, rotary motion for driving the belt from external rotating members.

37. Apparatus according to claim 36 in which the pressure transmitting rotatable members and the driving rotatable members are also supported for movement in the buck transversely to the longitudinal movement of the belt.

38. A buck for use with ironing mechanism having a heated ironing element which presses fabric against the buck; comprising an elongated body member and a mating cover plate; said member and plate having matching laterally extending projections which form transverse recesses when joined together; a pair of longitudinally spaced pulleys supported in the buck; a continuous belt rotatably mounted on said pulleys and having longitudinal driven and ironing runs; a series of inserts movably retained within the recesses through each of which the driven run of the belt passes; a roller rotatably mounted in each of the inserts in contact with the driven run of the belt; and a series of rollers rotatably supported in each insert disposed between the ironing and driven runs of the belt.

39. A buck according to claim 38 having a projection extending longitudinally in the buck with which a portion of each insert can come into contact in moving transversely in one direction to limit movement of each insert in that direction.

40. A buck according to claim 38 in which the matching laterally extending projections form transverse walls in each recess with a substantially rectilinear configuration; in which each of the inserts has portions which come into contact with the walls to limit longitudinal movement; and in which such portions are circular in form to permit swivelling as well as transverse movements in the recesses.

41. A buck according to claim 36 having a pair of spaced rollers rotatably mounted on axes normal to that of the pair of spaced pulleys, said rollers having a circular cross section at their perimeters adapted to match mating peripheries of rotating members of the ironing mechanism.

42. An insert for a long buck for use in ironing mechanism, said insert having a pair of spaced support plates; elongated arms extending in opposite directions from each of said plates, said plates having arcuate shaped ends disposed transversely to the arms; a series of rollers rotatably supported between the arms and plates; and a larger roller rotatably supported between the plates and adapted to shift laterally to and from the series of rollers.

43. An insert according to claim 42 in which the periphery of the larger roller has a straight central portion and beveled surfaces disposed on each side of the straight portion, said beveled portions being adapted to coact with contacting drive rollers to rotate the roller, and said straight portion being adapted to drive a belt disposed between the larger roller and the series of rollers supported between the arms and plates.

44. Apparatus for separating and ironing the free margins of sewn together fabric plies having: ironing elements; conveying members for engaging the sewn together plies and drawing them between the ironing elements; and means for separating the margins prior to ironing including a separator member, means for supporting said separator member in advance of the ironing elements, said support means being adapted to permit movement of the member transversely to the direction of movement of the fabric plies through the ironing elements, and resilient means opposing such transverse movements.

45. Apparatus according to claim 44 in which the support means for the separator also permits simultaneous movement of the separator longitudinally in both directions parallel to the movement of the fabric plies through the ironing elements.

46. A fabric plies separator for use with ironing mechanism having a thin leadon portion and a longitudinally spaced, tapering section expanding in a plane normal to said longitudinal spacing, said portion and section being connected by contoured faces having increasing taper extending longitudinally from the leadon portion to the tapering section and simultaneously in a transverse direction; said expanded section being adapted to act as a deflector for water droplets condensing from a steam jet directed at the section.

47. Apparatus for separating and ironing portions of the free margins and adjacent fabric of sewn together fabric plies, having: means for separating the margins; ironing elements; and means for engaging and transporting the fabric plies between the ironing elements including an upper belt having a traction surface which contacts the upper fabric ply, said belt being driven by a first drive pulley; a lower belt having a traction surface which contacts the lower fabric ply, said belt being driven by a second drive pulley; each of said belts having a drive surface provided with longitudinally extending grooves in which lint and foreign matter can accumulate; said drive pulleys being provided with peripheral grooves which mate with the grooves on the drive surfaces of said belts, and separate members disposed in engagement with the drive grooves of each of said belts, said members being adapted to scrape and dislodge lint and foreign matter accumulating in said grooves and simultaneously to maintain the belt grooves in alignment with the peripheral grooves of said pulleys.

48. Apparatus according to claim 47 in which each of the scraping and aligning members is supported on the ironing apparatus by a swinging arrangement which includes a first link pivotally mounted thereon; a second link pivotally connected to the first link; an arm connected near its midpoint with the second link; a roller member rotatably supported at one end of the arm in engagement with the belt grooves; said scraping member being pivotally supported at the other end of the arm and engaged with the belt grooves; and resilient means urging said arm toward the belt.

References Cited

UNITED STATES PATENTS

1,683,412	9/1928	Rosenbaum et al.	38—2
1,988,241	1/1935	Gardner et al.	112—217
2,070,996	2/1937	Meyer	38—10
2,307,623	1/1943	Gardner	112—217
2,753,823	7/1956	Judelson	112—217

MERVIN STEIN, Primary Examiner

G. V. LARKIN, Assistant Examiner

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