Jan. 31, 1961 F. LEMBO 2,969,578

EXPANDER FOR STRETCHING A FABRIC AND THE LIKE

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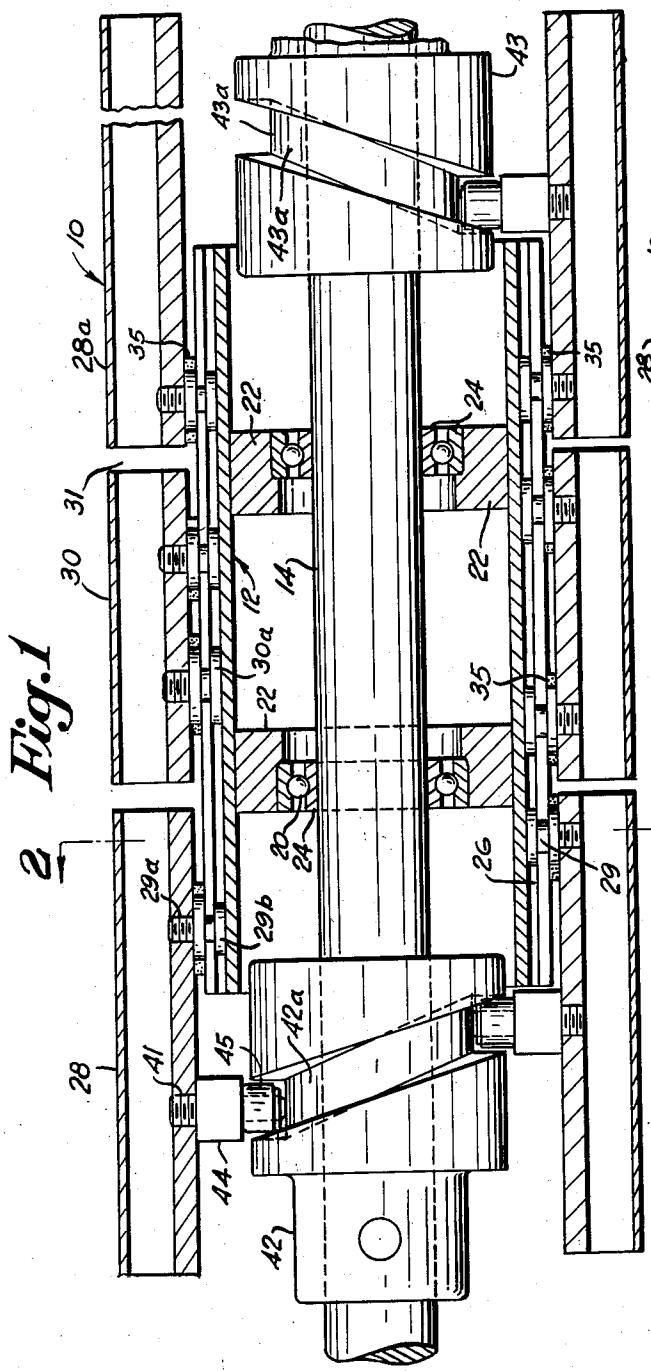

Fig. 1

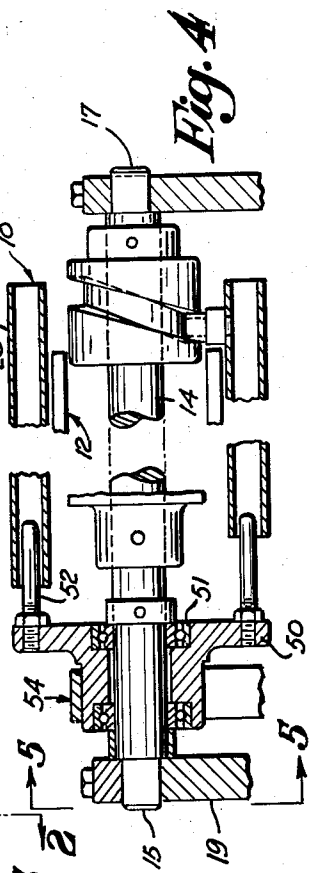

Fig. 4

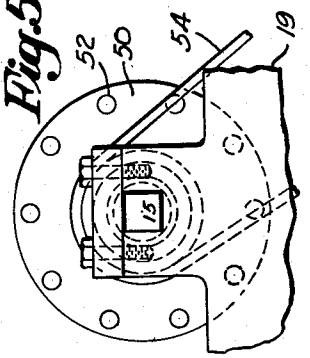

Fig. 5

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Fig. 2

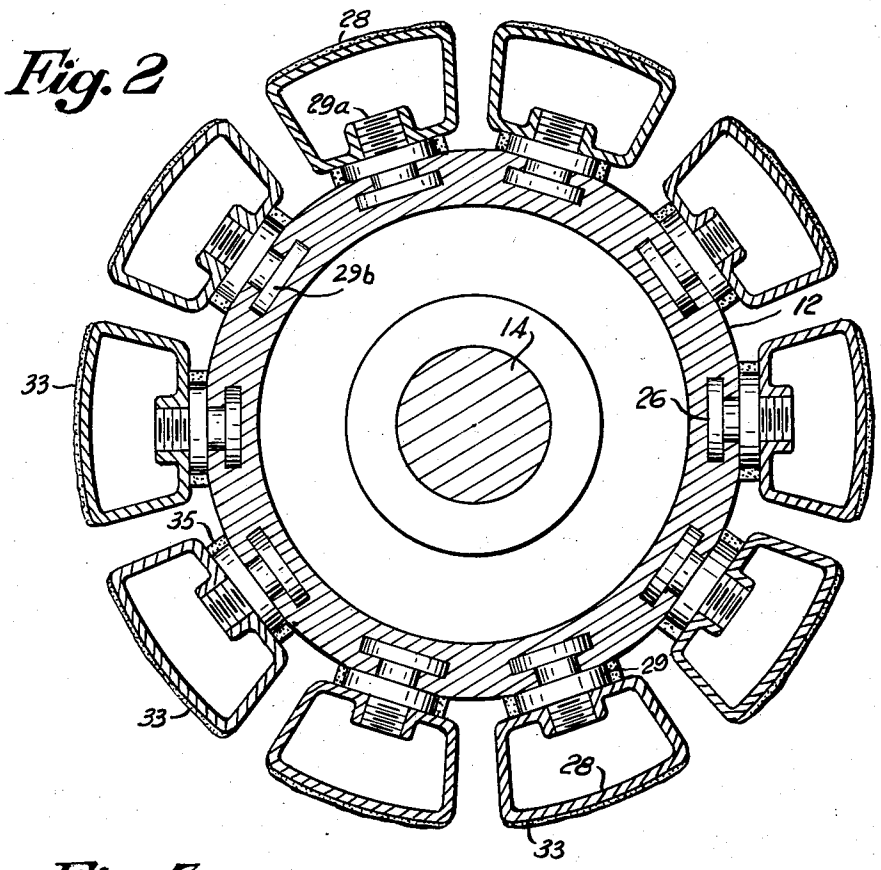
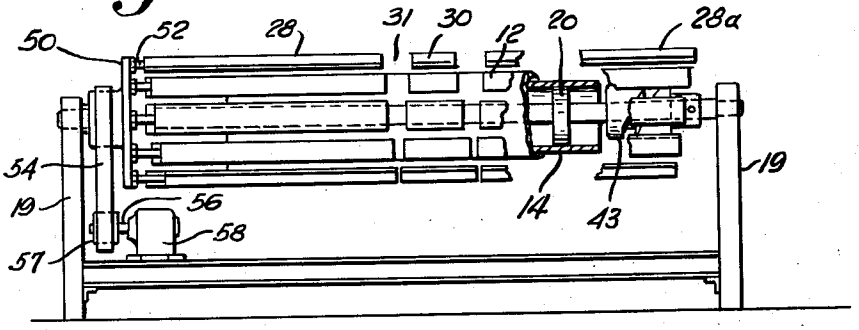


Fig. 3



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AN EXPANDER FOR STRETCHING A FABRIC AND THE LIKE

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1 Claim. (Cl. 26—64)

This invention relates to machinery for expanding and stretching various materials, such as textiles, to free them of wrinkles prior to lamination or other similar process. The invention is particularly concerned with the machinery known as the slat type of expander. Expanders known in prior art are provided with wooden slats bolted to a single layer of a centrally disposed steel tube and practical experience has shown that they are not able to withstand pressure to any considerable degree. The slats, and portions of the steel tube were forced by the pressure of the passing fabric bearing thereon, to bend inwardly toward the central stationary shaft, thereby causing repeated breakage. The replacement and maintenance costs of such expanders as well as their extremely heavy weight construction considerably decreased the overall efficiency of the unit operation, while the processes of expanding and stretching the material for which the apparatus is intended, were considerably delayed.

An object of the present invention is to provide an improved slat type of expander.

Another object of the present invention is to eliminate the disadvantages of prior art constructions hereinabove described.

Still another object of the present invention is to provide a greater degree of utility in an expander having a plurality of extruded aluminum slats disposed as integral units movably secured to a rotatable central tube.

A further object is to equalize the pressure more uniformly throughout the entire expander as the fabric or other material is applied to the revolving and sliding slat for expansion and wrinkle removal.

Still another object is to provide a greater degree of durability and flexibility in slats for an expander, so as to make it capable of withstanding greater pressures than was possible heretofore, thereby enhancing its usefulness through longer life.

Yet a further object is to provide a greater degree of expansion or stretching of the material before undergoing a particular process or operation, such as lamination and the like.

Still another object is to increase the overall operating efficiency and to widen the use of expanders.

Other objects will become apparent during the course of the following specification.

In the attainment of the aforesaid and other objectives the inventive concept of the present invention may be realized through the provision of an improved expander which is provided with a rotatable, centrally disposed, slotted cylindrical steel tube adapted to hold a plurality of slidable, equidistantly spaced, integrally formed slats made preferably of extruded aluminum. The steel tube may be mounted on bearings upon a stationary central shaft and driven by a drive plate provided with a plurality of finger-like bolt extensions which project into the terminal ends of the slidable slats. The drive plate may be mounted on bearings at one end of the stationary central shaft and may be driven by an endless belt or

other similar means which are connected to a motor shaft. The bearings and bearing housings of the stationary central shaft may be coaxially disposed at appropriate locations along its longitudinal axis. An eccentric cam unit provided with a diagonally disposed channel is firmly mounted at each end of the stationary central shaft. The steel tube is provided with a plurality of equidistantly spaced slots along the outer periphery thereof which extend the entire length of the tube in parallel relationship with each other. The revolving and slidable slats provided with threaded studs having slotted head portions are slidably disposed within the extruded slots of the steel tube and are similarly spaced equidistantly from each in parallel relationship with each other along the circumference of the tube. Each of the slats may be provided with a bolt having a solid head portion which is movably guided along the channel of the eccentric cam unit.

Several short stationary slats are mounted in the central portion of the steel tube intermediate its ends and are firmly positioned in the extruded slots of the tube. Due to this arrangement, it is apparent that as the material first comes into contact with a short stationary slat and passes over the rotating, slidable slats, it is stretched and expanded outwardly from its center toward its outer edges. Thus the fabric or other material passes toward the next roller or laminating point free of wrinkles and devoid of crimpy areas.

A fuller understanding of the present invention may be had by referring to the following description taken in conjunction with the accompanying drawings, showing by way of example, a preferred embodiment of the inventive idea.

In the drawings:

Figure 1 is a longitudinal section showing the central portion of the expander in the present invention.

Figure 2 is a transverse section taken along the line 2—2 of Figure 1, on a somewhat larger scale.

Figure 3 is a front elevational view of the expander on a reduced scale, some parts being shown in section, and illustrates the expander mounted upon a frame and driven by an endless belt from a motor shaft disposed on a platform below the expander.

Figure 4 is a fragmentary longitudinal section of the expander, some parts being shown in side elevation.

Figure 5 is an end view of the expander, along the line 5—5 of Figure 4.

Several expanders **10** constituting the subject of the present invention may be mounted in several strategic locations on a laminating or other similar apparatus. Each expander comprises a central steel tube **12** coaxially and rotatably mounted on a central stationary shaft **14**.

The stationary shaft **14** is firmly held in place by means of its squared ends **15** and **17** which are disposed within similarly shaped openings of a frame support **19**. Any other suitable stationary fastening means for shaft **14** may also be used.

The steel tube **12** is rotatably positioned by means of bearings **20** disposed in bearing housings **22** coaxially mounted on the stationary shaft **14** near the terminal ends of the tube **12**. The inner collars **24** of the bearings **20** are rigidly secured on the shaft **14**, while the bearings and bearing housings **22** rotate freely about the stationary shaft **14**.

The tube **12** has a plurality of slots **26** (Figure 2) extending from one end to the opposite end along its longitudinal axis on the outer periphery thereof, the slots **26** being equidistantly spaced in parallel relationship with each other.

A plurality of slats **28**, **28***a* made preferably of extruded aluminum are carried by studs **29**, each of which

has a threaded end 29*a* firmly secured to one side of a slat 28 or 28*a* and an opposite head portion 29*b* slidably disposed in a separate slot 26 of the steel tube 12. Thus the slats 28 or 28*a* are slidable and are equidistantly spaced around the circumference of the tube 12 in parallel relationship with each other. The slidable slats 28, 28*a* are disposed on each side of a plurality of short stationary slats 30 which are firmly carried on the outer periphery of the tube 12 by bolts 30*a* having heads which are firmly held by friction in the slots 26. A space 31 between the ends of the short stationary slats 30 and the inner ends of the slidable slats 28, 28*a* is constantly maintained to permit free unobstructed movement of the slats 28, 28*a* simultaneously with the rotary movement of the tube 12.

The steel tube 12 is substantially shorter in length than the overall length of the slidable slats 28, 28*a* and the stationary slats 30, as illustrated in Figure 1.

The outermost surfaces of the slats 28, 28*a* are more or less concave so as to expand the material more effectively as it comes into contact with the expander and to stretch the material more efficiently for subsequent steps of the particular process. The surfaces of the slidable slats 28, 28*a* may be provided with strips of sandpaper 33 if desired, to impart a more frictional engagement with the material as it is stretched and expanded thereover. Other means, such as etched surfaces, if desired, may also be satisfactorily used to obtain the same results. Fibre guide discs 35 mounted upon the studs 29 are located between the outer surfaces of the tube 12 and the underlying surfaces of the slats 28, 28*a* and 30. The fibre guide discs 35 serve as reinforcing means to prevent the slats from wobbling and to stabilize their position on the tube during longitudinal and oscillatory movements.

It is apparent, of course, that any number of slidable slats 28, 28*a* stationary slats 30, as well as bearings 20, bearing housings 22, and studs 29 may be used in the expander of the present invention, depending upon the specific requirements of the manufacturer and user.

A driving unit 42 provided with inclined channel 42*a* is firmly mounted at one end of the stationary shaft 14 and a similar cam unit 43 having a channel 43*a* is located upon the other end of the shaft 14, the channel 42*a* being directly opposed to channel 43*a*.

The terminal ends of slats 28, 28*a* are provided with firmly mounted bolts 44 which have head portions 45 guided through the channels 42*a* and 43*a*, respectively. Due to this construction, the slidable slats 28 and 28*a* move away from each other at one point in the rotation of the expander and toward each other at another point of rotation. These movements are predetermined and the position of the cam units 42 and 43 as well as of the shaft 14, are so adjusted that the last point of contact by the material is at the widest expansion movement of the slidable slats 28 and 28*a*.

It is apparent that the extent of the slidable movement of the slats 28 and 28*a* is primarily due to the extent of inclination of the channels 42*a* and 43*a*. The tube 12 will rotate jointly with the slats 28 and 28*a*.

A drive plate 50 carrying a plurality of finger-like bolt extensions 52 is mounted on bearings 51 upon one end of the stationary shaft 14 and is driven by an endless belt 54 which is operatively connected to a pulley 57 keyed upon the shaft 56 of a motor 58.

The extensions 52 project into the open ends of the slidable slats 28. The rotation of the tube 12 and movement of slats 28 are so adjusted that each of the members 52 serves as a driving force for rotating the expander. The length of each member 52 is sufficient to maintain constant engagement with its slat 28 during rotation of the expander.

In operation, the material to be stretched, such as a textile fabric, is moved in tight engagement over the outer surfaces of the slats 28, 28*a* and 30. The motor

58 will rotate the drive plate 50 by means of the driving belt 54. The rotation of the plate 50 is transmitted by the pins 52 to the slats 28 and 28*a* as well as to the tube 12 connected therewith. Since the bolts 44 follow the channels 42*a* and 43*a* of the cam units 42 and 43, the slats 28 and 28*a* will also move in their longitudinal direction. This causes the material to expand and to stretch while in contact with the slidable slats. Thus the expansion of the material is effected by the continuous lateral movement of the slats 28 and 28*a* which move away from the centrally disposed stationary slats 30. The material consequently is gradually stretched outwardly from its center toward its corresponding edges as it passes over one-half the circumference of the expander in such manner that its initial expansion is at the first point of contact and its widest expansion is at the last point of contact with the slats 28 and 28*a*. Looking in the direction of Figure 1, the material to be stretched first comes into contact with the bottom slat and leaves the expander at the top slat. Thus the material is stretched outwardly from its center only through one-half revolution of the expander while the material passes over the slats disposed between the bottom and top slats shown in Figure 1. As the expander begins to complete its full revolution, the top slat of Figure 1 is freed of the material and begins to move laterally inwardly to converge to the position shown by the bottom slat of Figure 1 as it passes through the channels of the cam units 42 and 43, respectively. During the last one-half revolution of the expander, one-half of the slats are free of the material to be stretched but begin their expansion cycle again as soon as they reach their narrowest converging point as shown by the position of the bottom slat in Figure 1. Thus, during a complete revolution of the expander, one-half of the slats are expanding the material outwardly while the remaining slats are returning free to resume their expansion cycle. Due to this arrangement it is apparent that the fabric or other material is applied on subsequent rollers void of crimpy surfaces or wrinkles.

It is understood, of course, that the expander of the present invention may be operated by frictional engagement of the material as it passes over the surface of the slats in which event a motor and an endless belt are not needed, since the pressure and pull of the material bearing on the expander will then cause rotation of the tube 12 and longitudinal movement of the slats 28 and 28*a*.

It is also apparent that this construction attains an equal distribution of pressure in the expander more satisfactorily and that bending at the extruded slotted portions of the tube 12 is eliminated. The material undergoing a particular process is expanded, stretched, guided, and freed of wrinkles much more effectively than was heretofore possible with prior art constructions. Furthermore, the improved construction of the present expander enables it to be used more rigorously, since it is made to withstand increased amounts of pressure and continuous use.

Other advantages of the present expander are its economy of manufacture and negligible replacement and maintenance costs.

It will be understood that the present invention is not restricted to the specific embodiment hereinabove disclosed but includes all such variation, modification, and equivalents as fall within the scope of the appended claim.

What is claimed is:

In a fabric-stretching expander roll, in combination, a tubular support with longitudinal circumferentially spaced slots, a plurality of movable slats located at opposite ends of said support, guiding devices located at opposite ends of said support and having inclined channels formed therein and extending in opposite directions, each of said slats consisting of a hollow body having an outer

curved uninterrupted portion, an inner portion, and side walls interconnecting said portions, means firmly engaging the inner portion of each slat and slidably mounted in one of said slots, means firmly engaging the inner portion of each slat and slidably mounted in one of said channels, a separate finger extending into the interior of each of said slats, a drive plate carrying said fingers, and a motor drive for said drive plate.

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