Nov. 18, 1924. 1,516,413

A. I. SNOW

HIDE STRETCHING APPARATUS

Filed Nov. 4, 1922 4 Sheets-Sheet 1

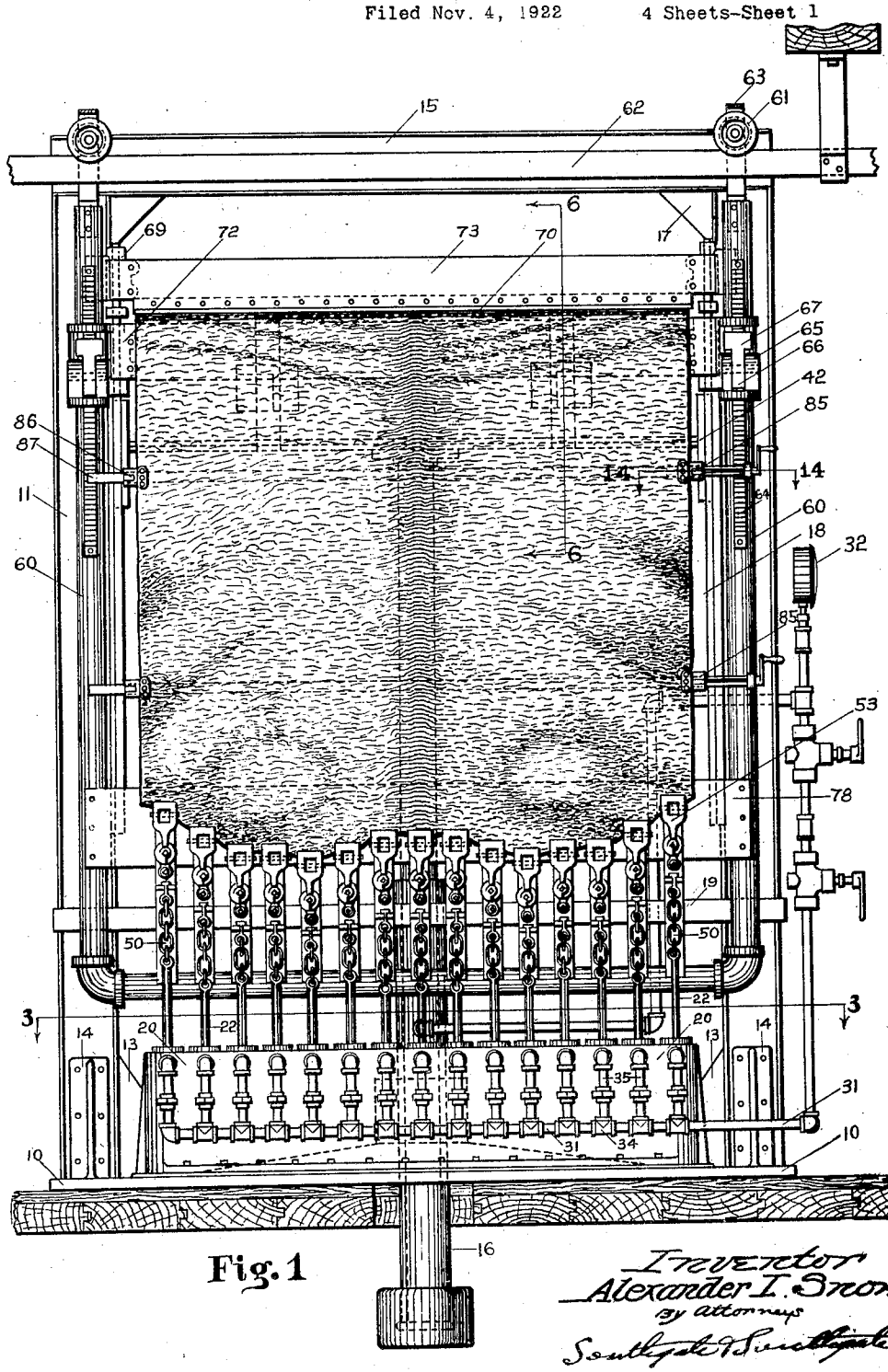

Fig. 1

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HIDE STRETCHING APPARATUS

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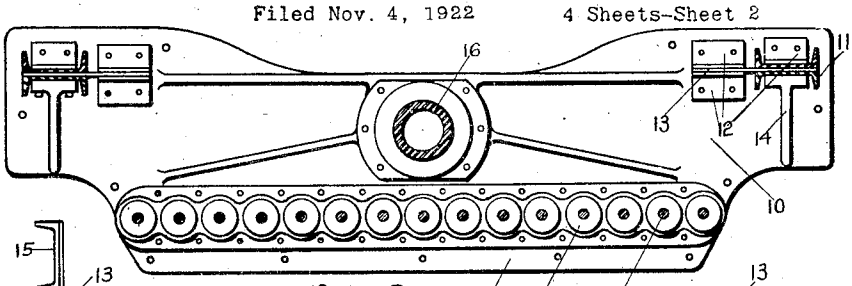

Fig. 3

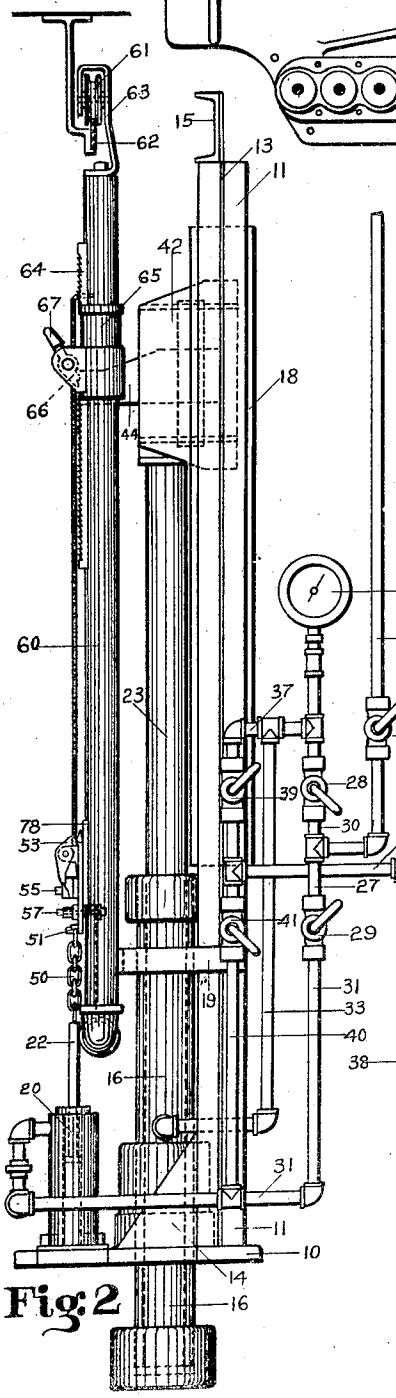

Fig. 2

Fig. 14

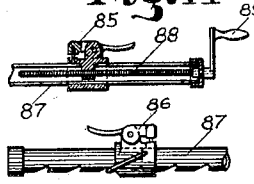

Fig. 15

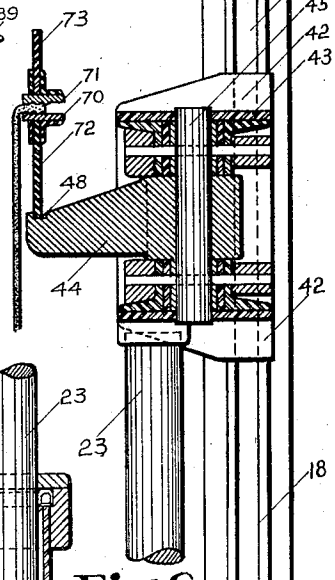

Fig. 6

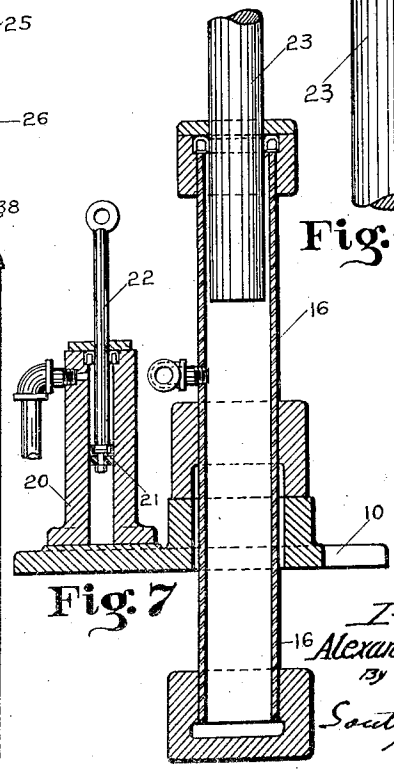

Fig. 7

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HIDE STRETCHING APPARATUS

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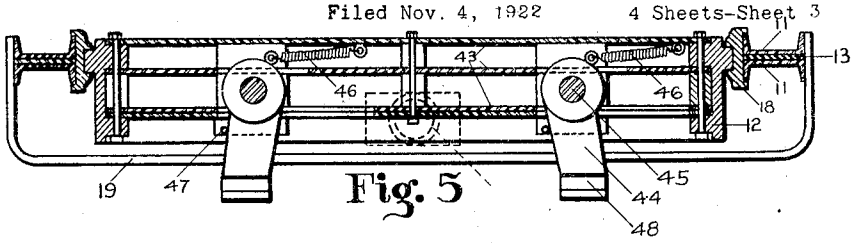

Fig. 5

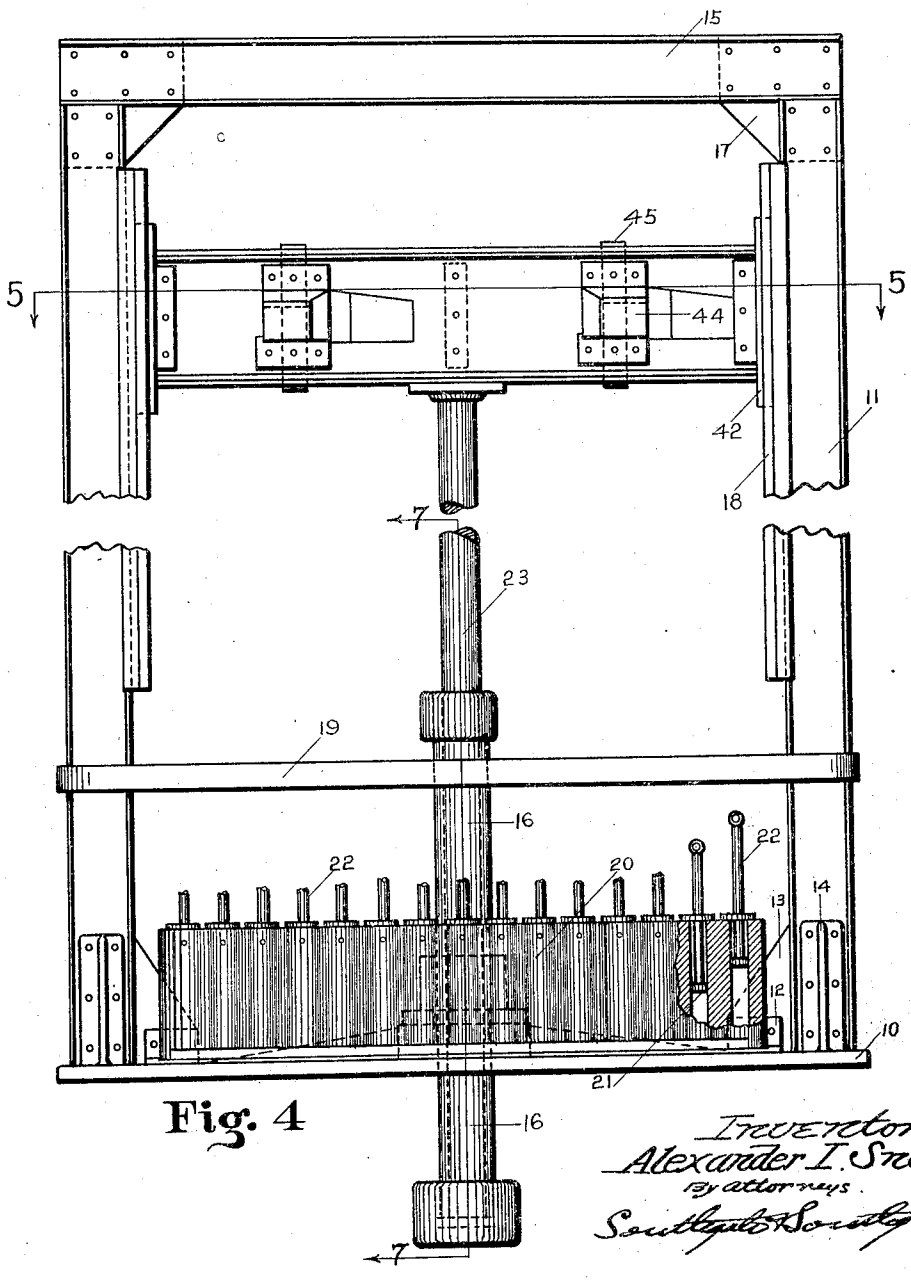

Fig. 4

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Nov. 18, 1924. 1,516,413

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HIDE STRETCHING APPARATUS

Filed Nov. 4, 1922 4 Sheets-Sheet 4

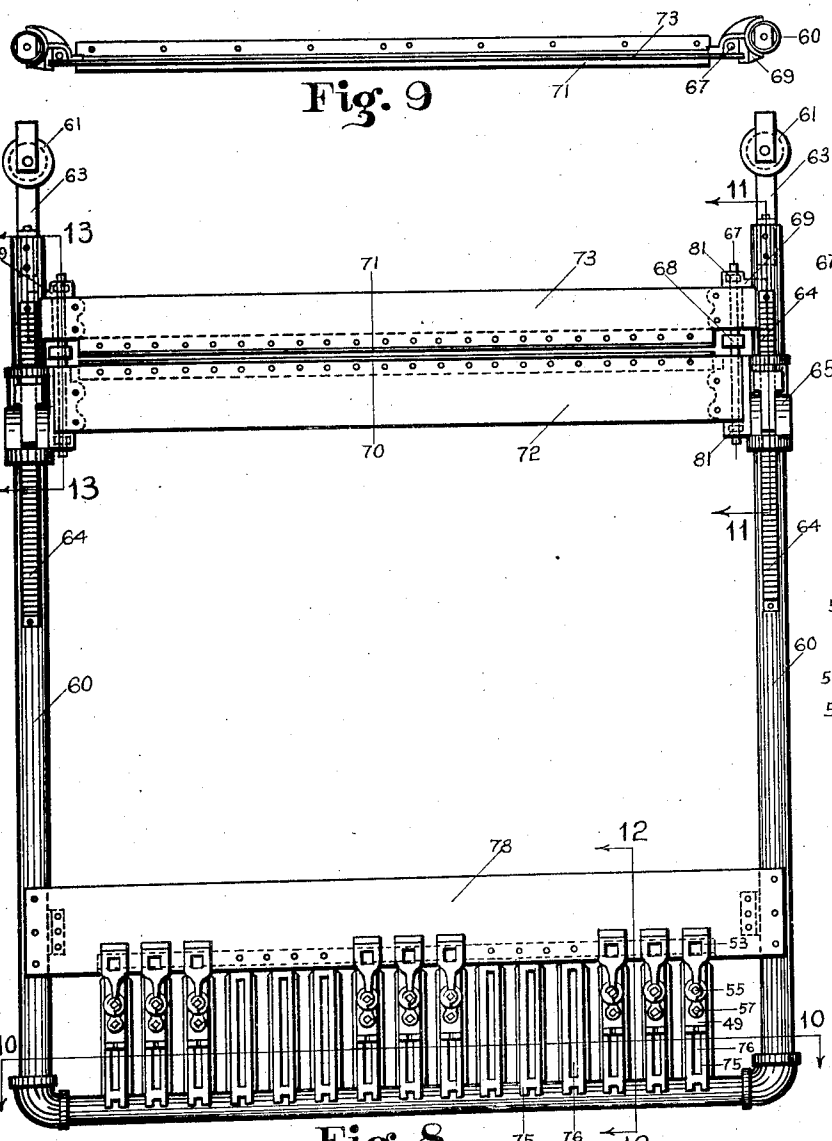

Fig. 9

Fig. 8

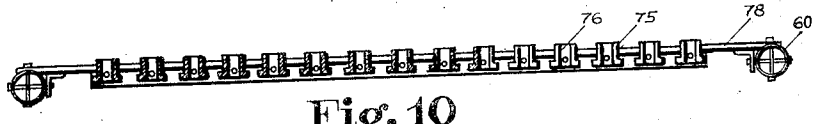

Fig. 10

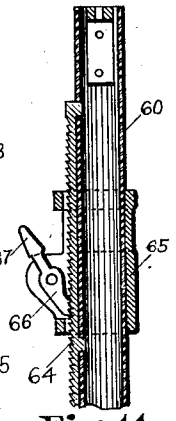

Fig. 11

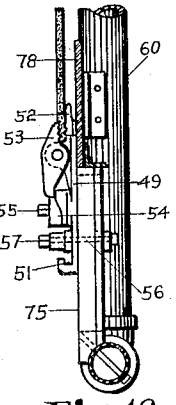

Fig. 12

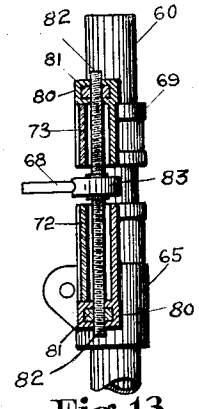

Fig. 13

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Patented Nov. 18, 1924. 1,516,413

UNITED STATES PATENT OFFICE.

ALEXANDER I. SNOW, OF WORCESTER, MASSACHUSETTS.

HIDE-STRETCHING APPARATUS.

Application filed November 4, 1922. Serial No. 599,044.

To all whom it may concern:

Be it known that I, ALEXANDER I. SNOW, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Hide-Stretching Apparatus, of which the following is a specification.

This invention relates to a device for stretching hides for general use, but is particularly adapted for putting them into the best condition for the production of leather belting.

The principal object of the invention is to provide for stretching whole hides in such a manner that, as near as possible, all the looseness or "stretch" will be taken up at all points within the stretched portion. The invention also has for an object to provide an improved method of and apparatus for stretching hides by which it will be practically impossible to apply too much tension at one point and too little at another; in other words, in which the tension employed in stretching will be performed entirely by mechanical means and the human element will be substantially eliminated, in which the action of getting the hide into its stretched condition will be comparatively simple and capable of being performed by relatively unskilled help, and which will be of such a nature that an unskilled operator will not be able to unduly stretch certain portions of the hide and leave other portions in a partially unstretched condition.

The invention also involves improvements in many features of construction comprising a hydraulic or other elastic system by which the uniformity above mentioned is secured, an improved stretching frame to which the hide can be applied in a convenient and simple manner and left in a stretched condition to go through the subsequent drying process without danger of releasing the tension at any point of interfering with its uniformity in the resultant hide, and a plant which will involve important economies in floor space and time. The invention also involves improvements in mechanism by which the stretching frame is connected with and disconnected from the stationary part of the plant, improvements in the means for gripping and holding the hide, and other features of construction as will appear.

Reference is to be had to the accompanying drawings, in which—

Fig. 1 is a front elevation of an apparatus constructed in accordance with this invention showing the hide in position and in the act of being stretched;

Fig. 2 is a side elevation of the same;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1 showing the lower part in plan;

Fig. 4 is a front elevation of the stationary part of the apparatus with the stretching frame removed;

Fig. 5 is a horizontal sectional view of the same on the line 5—5 of Fig. 4;

Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 1;

Fig. 7 is a central transverse sectional view on the line 7—7 of Fig. 4;

Fig. 8 is a front elevation of the stretching frame removed from the main part of the apparatus;

Fig. 9 is a plan of the same;

Fig. 10 is a sectional view on the line 10—10 of Fig. 8;

Figs. 11, 12 and 13 are sectional views respectively on the lines 11—11, 12—12 and 13—13 of Fig. 8;

Fig. 14 is a sectional view of the side gripping mechanism on the line 14—14 of Fig. 1, and

Fig. 15 is a front elevation of the same.

Ordinarily it has been the practice to cut a hide off square at the shoulder, cut off the belly sides parallel to the back bone, and leave the butts at the rump end in an irregular shape, thus avoiding unnecessary waste. This makes it convenient to clamp the fore end of the hide in a single clamp as is well understood in this art, but has made it necessary to provide for clamping the rump end in some other way. Several ways have been proposed, including the use of a plurality of small clamps following the contour of the rear end of the hide. That involved the necessity of a skilled operator to place these clamps in proper relationship to each other and to adjust them. Of course, as the human element entered into this method, it was never possible to secure even tension all the way across. The perfection of the result lay in the skill of the operator. The back center resisted stretching force so that the softer parts were

insufficiently stretched. Therefore it has been the custom to divide the hide into three parts and stretch each one separately.

The present invention is based on the idea of automatically and mechanically equalizing the strain all over the whole hide without attempting to depend upon the skill of the operator to any great extent. It is not claimed that this skill is entirely eliminated, but that it is so subordinated to the mechanical apparatus as not be responsible for the result. An experienced operator can, by the nature of a hide, predetermine the approximate length of stretch necessary, but any error that the operator is likely to make is compensated for by the apparatus itself on account of its elastic nature.

The apparatus as set forth herein involves two elements. There is a stationary stretching machine located in a convenient position and a movable frame for holding the hide while it is being stretched. On this frame the hide is removed from the machine and is left on it until it has dried and is otherwise treated in the usual way. It is to be understood that there is one stationary machine to take care of a large number of removable stretcher frames which are run around the plant on trolleys or other convenient supports to and from the same.

This stationary machine, as shown, involves a base 10 located on a solid flooring or the like. It is provided with a pair of uprights 11, shown here in the form of channel irons riveted together and secured to the base so as to form a rigid frame structure. At each end of the base I have shown two of these channel irons arranged back to back and secured to the base by angle irons 12. Between these two channel irons is located a steel sheet 13 at the bottom which is of a triangular shape and is secured to the base by additional angle irons 12 to constitute a strut for holding the upright frame in position. Several of these can be used and I have also shown a forward strut, 14 of special design. The two uprights at the top are connected by a transverse channel iron 15. This constitutes the supporting frame for the stationary machine in the form in which I have shown it. It is braced at the corners in any desired way as by braces 17 and is provided with a pair of opposite ways 18 on the inner surfaces of its uprights. It has a guide or rear rest 19.

Rigidly mounted at the center of the base is a vertical cylinder 16. This is shown as extending down below the floor and is properly anchored in position. On the front of the base 10 there is shown an extension which supports a plurality of rigid vertical cylinders 20. In each of the cylinders 20 there is a piston 21 having a piston rod 22 extending up from it. In the cylinder 16 there is a plunger 23 which projects up to the top of the apparatus. The combined effective areas of the pistons 21 is substantially equal to the effective area of the plunger 23. On account of the additional friction a little surplus should be allowed for the former.

I have shown these pistons as being supplied with water or other fluid under pressure through a supply pipe 25 controlled by a main supply and regulating valve 26. This delivers the pressure fluid into a pipe 27 which is connected by two supply valves 28 and 29 with two pipes 30 and 31. The pipe 30, in addition to being connected with a pressure gauge 32, is shown as connected through a pipe 33 with the cylinder 16. The pipe 31 is connected with a series of T's 34, each of which is connected by a pipe 35 with one of the several cylinders 20 above their respective pistons. There are no valves in these T's or in the pipe 31, but when the valve 29 is open pressure is communicated equally to all the cylinders 20. It will be seen therefore that the pressure in these cylinders is always equal. Furthermore, the pipe 33 and therefore the plunger in the cylinder 16 is under the same pressure per square inch. These pistons are all single acting and the pressure exerted in the cylinder 16 acts to force its plunger up, while the pressure exerted in the cylinders 20 acts to force their pistons down. Double acting pistons can be used.

It may be stated at this point that the cylinder 16 exhausts through a pipe 37 to a main exhaust pipe 38, the same being controlled by an exhaust valve 39. The several cylinders 20 exhaust in like manner through a pipe 40 controlled by an exhaust valve 41 and into the main exhaust 38.

Adjustable up and down the ways 18 on the uprights is a head. This is formed of a pair of end pieces 42 and a plurality of spaced plates 43 extending between them. This head is provided with a pair of arms 44 pivoted on vertical pivots 45 and normally forced apart by yielding means, as for example a spring 46. These springs move the arms about their pivots into contact with stops 47 so as to project out at right angles from the head. They are then located in such position that a groove 48 in each is adapted to receive and support the movable frame as will appear. This head is supported on top of the plunger 23 and is adapted to be forced upwardly thereby in the operation of the device.

The stationary machine is also provided with a series of chains or other flexible connections 50, one for each piston rod 22 adapted to extend upwardly therefrom. Each of these chains engages a hook 51. This hook constitutes the bottom of a slide 49 ex-

tending upwardly and provided with a relatively fixed jaw 52 having corrugations on its front face.

Pivotally mounted on this slide below its top is a swinging jaw 53 having complementary corrugations whereby the two jaws are adapted to grip the edge of a hide between them. Located under the lower end of the jaw 53, but on the opposite side of its pivot is a cam 54. This is provided with a square head 55 or the like by which a wrench can be applied to turn it. This cam has a cam surface for engaging the extreme end of the jaw 53 when turned to the position shown in Figs. 2 and 12, forcing the lower end of the jaw forward and the operative end inward to grip the leather. The parts just described, located above the chain 50, are adapted to be removed from the stationary machine, as they constitute part of the stretching frame 60. This is brought about by means of a series of bolts 56 each having a head 57 for operating it. Each passes through one of the slides 49 and is adapted to secure it firmly to the removable frame 60. Then, as will appear hereinafter, the chain can be cast off and the jaws will continue to hold the leather. It will be seen that there is one of these jaws for each one of the pistons 22.

The hide stretching frame 60 is shown as made up largely of piping and in rectangular form. At the top it is provided with a pair of trolley wheels 61 which run on an overhead track 62 going around the plant to any desired points. The frame 60 is supported from the wheels by the aid of straps 53 connected with the shafts of the trolley wheels and depending therefrom. On this frame 60 near the top there are two vertical racks 64 having teeth sloping upwardly. These racks are fixed to the pipe frame.

Adapted to move up and down in the side pieces of the frame are a pair of hollow heads 65, each one provided with a pawl 66 having teeth for engaging the teeth of its rack 64 and provided with a handle 67. It will be obvious that the raising of these heads, no matter by what means, will normally result in holding the heads in their elevated positions. The handles 67 constitute counter-weights, in the form shown, for holding the pawls in engagement with the teeth and preventing downward motion but permitting upward motion. Also when carried over the center of gravity they will hold the teeth out of engagement and permit downward motion. Above the heads are slides 69 of similar construction movable on the side pieces. These heads 65 and slides 69 are provided with a pair of brackets 80, one above and one below, having inserted nuts 81 in their opposite ends. Into these openings extend the ends of a right and left screw 82 which is provided with a permanently located ratchet wrench 83 having a handle 68 for turning it and adjusting the relative distance between the respective heads 65, and slides 69. This mechanism is duplicated on the other side.

The two lower brackets 80 carry a jaw plate 72, and the upper brackets on the slides 69 carry a jaw plate 73 above it. Jaws 70 and 71 are mounted on these vertical plates. The lower one rests in the notches 48 referred to above and constitutes a support for the whole frame 60.

By operating the screws 82 the jaws 70 and 71 can be caused to approach each other or recede from each other. They are designed to clamp the straight free end of the skin as indicated in Figs. 1 and 6.

On the front of the frame 60 at the bottom are located a series of guides 75 located vertically and in number equal to the number of cylinders 20. Each of these guides has a longitudinal slot 76 for the reception of the bolt 56 so that, in the operation described above, the slides 49 can be secured in the position along this guide in which it may be left when the operator has located it.

The frame 60 is strengthened in the form shown by a cross plate 78 riveted or otherwise conveniently secured to it. The upper ends of these guides 75 are fixed to it while the lower ends are fixed to the bottom pipe or other cross piece which constitutes the bottom of the frame.

I have shown a separate side stretching frame 85 holding opposite edges of the hide and keeping them straight. These jaws grip the hide and thus hold this frame thereon.

It will be understood of course that the particular constructions shown and described, particularly the structural iron shapes indicated, are selected for the purpose of convenience strength and inexpensiveness and that other mechanical devices can be substituted withir wide limits in accordance with the appended claims. It will be also understood that by some change in design and an apparatus for hoisting the frames to overhead track, the outfit will perform equally well in a reclining or horizontal position.

Operation.

In the use of the device one of the frames 60 shown in Figs. 1, 2 and 3, with a skin stretched upon it and dried preferably for a period of twenty-four hours more or less, is brought around on the track into registration with the stationary machine. It rests back against the rest 19. The operator sees that the plate 72 is supported in the notches 48 and that each of the jaws 53 registers with the rod of the proper piston 22 below it. Then he goes over the bottom of the frame

with a wrench, loosening the jaws 53 by turning the cams 54. Now he turns the valve 39 to let water out of the cylinder 16, having first moved both of the pawls 66 out of engagement with their racks. The latter operation does not have any result until the plunger 23 begins to descend. Now when the jaws 70—71 are lowered to about the level of the top of a stack of wet hides upon a truck, immediately behind the operator, the valve 39 is closed again and the heads on the frame 60 thus left in stationary position. The operator then manipulates the handles 68 to separate the jaws 70—71 and removes the top of the stretched hide from the apparatus.

Now a new hide is dragged flatwise part way off the stack on the truck and its front straight edge carried directly in horizontally between the jaws 70—71 and clamped in position by the reverse manipulation of the wrench handles 68 and screws 82. This constitutes a very simple way of manipulating and gripping the fore end of the new hide.

Now the operator opens the valve 28, it being assumed that the valve 26 has been open all the time and the valves 28 and 29 closed. The admission of water through the pipes 30 and 33 into the cylinder 16 raises the heads 65 and the jaws 70—71 dragging the hide off the truck and suspending it vertically. The pawls 66 now operate automatically to hold these parts in any position to which they are thus elevated. Before the hide gets to the top of the frame the valve 28 is closed again and the operator goes across the bottom of the hide applying the chains 50 to the hooks 51, which, it will be remembered are fixed in position on the frame 60 by the bolts 56.

Having connected the chains with the hooks as stated, he loosens the bolts 56 one at a time, individually manipulates the slides 49 up and down until they come into position for their respective jaws 52 to engage the rear of the hide near its edge. In that position the cams 54 are turned and the jaws 53 forced inwardly to grip the hide. This operation is carried on all the way across the hide until all these jaws 52 and 53 are gripping the irregular rump end thereof.

The operator now cautiously opens the valve 29 and lets water into the upper ends of the cylinders 20 to force down the several pistons 21. The operator at this point uses the ordinary gauges employed in this art to determine whether the hide is being stretched adequately throughout its area. During this operation he also applies the side stretching clamps 85. The stretching operation is accomplished by opening both of the valves 28 and 29 to their full extent, and controlling the pressure by means of the main valve 26. The pressure is the same per square inch in all the cylinders and the area on which it acts is substantially the same at both ends. Therefore, a uniform stretching action is secured and the hide is left in a floating condition because the pressures are balanced.

It will be remembered that the bolts 56 are loosened and slid along the slots 76 in accordance with the stretching operation. As soon as this has proceeded as far as is thought necessary the two valves 28 and 29 are closed simultaneously or the valve 26 is closed. Then the operator goes across the bottom of the machine tightening up the bolts 56. The effect of this is to hold firmly all the slides 49 in the position which they naturally assume on account of the relative elasticity of the portion of the hide on which their respective jaws are operated. Therefore the tightening of these bolts at this time leaves the hide in a natural condition in which the stretch has been uniform all over.

It will be seen that on account of the equality in the combined piston areas above indicated, any desired degree of tension can be exerted over the whole area of the hide. This is controlled by the valve 26 and shown by the indicator 32.

The operator can now go across the machine, cast off all the chains 50 after first closing the valves 28 and 29 and opening the exhaust valves 39 and 41. This will leave the hide in its natural stretched condition on the removable frame 60 and there is no way in which the pressure can be released at any point along the hide. The stretching operation so far as this machine is concerned is now complete. The operator pushes the frame 60 out of the machine along the trolley track 62 and it is taken on that track to the drying room or any other station in which it is to be treated in the ordinary way. Another frame is ready to be moved into the machine from the opposite side with a completely stretched hide upon it and the operation above described is repeated.

It will be understood that the hide on the frame which has just been taken from the machine is ordinarily dried in a drying chamber for about twenty-four hours and then brought around to this machine to be detached.

I call attention to the fact that by the process above described I have equalized the tension all over the hide, prevented the occurrence of unstretched points which usually appear over the hip bones of the animal, and produced a skin that is in a uniformly and fully stretched condition all over. Thus belting or other leather commodities made from it will be of uniform character and can be depended upon for accurate and uniform service. This invention provides for taking all the "stretch" out of the hide all the

way across. The leather in a new belt will be in same condition as that in a belt which has been run over pulleys a long time.

In this way I have accomplished a result not heretofore attained because in all other hide stretching processes of which I am aware the operator has no means of securing absolute uniformity in the product because he cannot secure uniform tension all over the skin. He is restricted to the necessity of adjusting his tension by hand to secure the best results he can attain. The result is that with the old processes the uniformity of the skin depends fully upon the skill of the operator, and perfection is not to be expected. In other words, the old processes are hand processes, every part of the skin having tension placed upon it controlled by the judgment of the operator and he is not able to understand or to measure the exact results of the pressure which is applied. But in my process the judgment of the operator, except for the preliminary adjustments as above described, is eliminated and mechanical flexible means is employed for making uniform the tension on the skin throughout its surface so that all the stretch is taken out. Therefore, a mechanically accurate result is obtained not dependent upon the individual adjustments made by the operator.

By providing yielding but equal tension at all points along the irregular edge of the hide, danger of stretching some parts of the hide too much and not stretching other parts enough is avoided, and yet those parts which yield more readily and consequently must be stretched more in order to bring them to uniform condition will be stretched automatically in proportion to their stretchability. I can get much more stretch or gain in area because of equally uniformly applied tension, since the weak parts cannot be strained beyond their breaking point, as happens in any other machine. Thus the action on the leather is dependent on the condition of the leather itself at every point across it. In practice it has been known of course that it was necessary to stretch the leather along the soft sides more than along the back where it is thick and strong, and attempts have been made to do that by the old hand operations. By this invention, however, that is accomplished automatically without any guess work on the part of the operator.

It will be understood, of course, that although I have shown a whole hide and preferred to use the machine for stretching of a whole hide, the same principle can be carried out for the stretching of leather in narrower strips. No claim is made herein to the product of this machine, namely the hide, as that is reserved for a divisional application.

Although I have illustrated and described only a single form of the machine and shown details of construction which are practical and efficient, I am aware of the fact that modifications in all these details can be made without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited to the details of construction herein shown and described, but what I do claim is:—

1. In a hide stretching device, the combination with a pair of jaws for engaging and holding one end of a hide, and a plurality of independently mounted jaws for engaging and holding the other end of the hide, of elastic means for forcing the two sets of jaws apart, adapted to yield at all points to compensate for differences in the quality of the hide.

2. In a hide stretching device, the combination with a pair of jaws for gripping one end of a hide all the way across it, and a series of pairs of jaws independently adjustable toward and from the first named jaws for gripping an irregular edge at the other end of the hide, of hydraulic means for forcing the two sets of jaws apart.

3. In a hide stretching device, the combination with a pair of jaws for gripping one end of a hide, and a series of pairs of jaws independently adjustable toward and from the first named jaws for gripping the irregular edge at the other end of the hide, of hydraulic means for forcing the two sets of jaws apart, said hydraulic means comprising open connections by which the water can flow in either direction to keep equal the intensity of the pressure at both ends of the hide.

4. In a hide stretching device, the combination with a pair of jaws for gripping one end of a hide, and a series of pairs of jaws independently movable toward and from the first named jaws for gripping an irregular edge at the other end of the hide, of means for forcing the two sets of jaws apart, comprising a cylinder and corresponding piston for each respective pair of jaws, the movable elements of said pistons and cylinders being connected with their respective jaws, and piping connecting all of said cylinders freely with each other, whereby fluid can flow in both directions between the cylinders.

5. In a hide stretching device, the combination with a pair of jaws for gripping one end of a hide, and a series of pairs of jaws for gripping the other end of the hide, of means for forcing the two sets of jaws apart, comprising two sets of cylinders and pistons individually connected with the respective pairs of jaws of the series, the combined areas of the several pistons connected with the series of jaws for engaging one end of the hide being substantially equal to the

effective area of the corresponding piston connected with the jaws at the other end of the hide, whereby the total pressure is equal on the two ends and the tension on the hide will be uniform throughout its width.

6. In a hide stretching device, the combination of a pair of straight jaws for gripping the straight free end of a hide, a series of pairs of jaws adapted to be adjusted toward and from the straight jaws for gripping the other irregular rear end of the same hide, a plunger and cylinder for forcing the first named jaws in one direction, and a series of pistons and cylinders, one individually connected with each of the other pairs of jaws for forcing them in the opposite direction, means whereby fluid under pressure can be admitted to all of said cylinders under the same pressure, the combined effective areas of the plurality of pistons being substantially the same as the effective area of the single plunger, whereby the pressure at all points across the hide will remain equal.

7. In a hide stretching device, the combination of a pair of jaws for gripping the end of a hide, a series of pairs of jaws for gripping the other end of the same hide, a plunger and cylinder for forcing the first named jaws in one direction, and a series of pistons and cylinders, one individually connected with each of the other pairs of jaws for forcing them in the opposite direction, means whereby fluid under pressure can be admitted to all of said cylinders under the same pressure, whereby the pressure at all points across the hide will remain equal, and each part of the hide will be stretched in accordance with its condition.

8. In a hide stretching machine, the combination with a pair of jaws for gripping one end of the hide and a series of pairs of jaws for gripping the other end of the hide at short intervals across it, means for forcing the first pair of jaws away from the others, and a series of cylinders and pistons individually connected with the other jaws and all under the same pressure for forcing the series of jaws in the opposite direction.

9. In a machine for stretching hides, the combination with a base, of a pressure exerting element, means adapted to be moved upwardly thereby for supporting a hide, a series of cylinders located adjacent thereto, each having a piston movable downwardly therein under pressure, and means connected with each of said cylinders for exerting downward pressure on a hide carried by said supporting means.

10. In a machine for stretching hides, the combination with a stationary base, of a vertical cylinder located thereon, a plunger extending down into said cylinder from above, means supported by the top of said plunger and adapted to be moved upwardly thereby for supporting a hide, a series of cylinders located in front of the single plunger, each having a piston movable downwardly therein under pressure, and means connected with each of said pistons for exerting downward pressure on a hide carried by said supporting means.

11. In a hide stretching machine, the combination of a stationary frame, a head movable up and down thereon, arms carried by said head and projecting outwardly, a hide carrying frame depending therefrom, a cylinder, a plunger movable in said cylinder and engaging said head to lift it, and means located adjacent to said cylinder for pulling downwardly on the lower edge of a hide carried by said frame.

12. In a hide stretching machine, the combination of a base, a frame extending upwardly therefrom and having ways thereon, a head movable up and down on the ways and having supports thereon, means on the head for holding the end of a hide, a cylinder on said base, a plunger in the cylinder arranged to force said head upwardly, and a series of devices located on said base near the bottom of said frame, each capable of exerting pressure downwardly on the other end of the hide.

13. In a hide stretching machine, the combination of a base, a frame extending upwardly therefrom and having ways thereon, a head movable up and down on the ways and having means thereon for carrying a hide depending vertically therefrom, means on said base for forcing said head upwardly, and a series of devices located on said base near the bottom of said frame, each capable of exerting a pressure downwardly on a part of the bottom of said hide, and means whereby the pressure exerted by all of said devices will be the same.

14. In a hide stretching machine, the combination of a frame having ways thereon, a head movable along the ways and having supports thereon for a hide, a cylinder opposite said head, a plunger in the cylinder arranged to force said head in one direction, a series of devices located near the other end of said frame, each capable of exerting a pressure in the opposite direction, and means whereby the pressure exerted by all of said devices will be the same and whereby the total pressure exerted by said plunger and cylinder will be substantially equal to the total exerted by all of said devices.

15. In a hide stretching apparatus, the combination of a stationary frame, a supporting head movable along the frame for carrying a hide stretching frame, a plunger and cylinder for positively moving said head and hide carrying frame, a plurality of pistons and cylinders each provided with a separate pair of gripping jaws for engag-

ing the other end of the hide and exerting a pull upon the same in the opposite direction, and means whereby fluid pressure from the same source and of the same intensity will be introduced in all of the cylinders, the combined piston areas of said series of cylinders and pistons being substantially equal to the effective area of the plunger.

16. In a hide stretching machine, the combination of a base, a frame extending upwardly therefrom and having ways thereon, a head movable up and down on the ways and having arms pivoted freely on vertical axes, yielding means for holding said arms in a position substantially perpendicular to the frame, a cylinder on said base, a plunger in the cylinder arranged to force said head upwardly, a series of devices located on said base near the bottom of said frame, each capable of exerting pressure downwardly, and means parallel with said frame for supporting a hide stretching frame and directing it into a position to engage said arms and rest upon them.

17. In a hide stretching apparatus, the combination of an overhead track, a hide carrying frame depending therefrom and movable along said track, a stationary machine frame located in position parallel with a portion of said track having a head thereon, arms movably mounted on said head, and yielding means for forcing said arms outwardly under said track, whereby when the hide frame is moved along the track it will engage said arms swinging them out of the way as its edge passes them and they will automatically swing back into position to support the frame at its center.

18. In a hide stretching apparatus, the combination of an overhead track, a hide carrying frame depending therefrom and movable along said track, a machine frame located in position parallel with a portion of said track, a head movable up and down thereon, arms movably mounted on said head, yielding means for forcing said arms outwardly under said track, whereby when the hide frame is moved along the track it will engage said arms to swing them out of the way as its edge passes them and they will automatically swing back into position to support the frame, said arms having grooves in position for engaging a definite portion of said hide carrying frame and supporting it in a depending position, and a rest on said stationary frame for engaging the lower end of the hide carrying frame and keeping it in vertical position.

19. In a hide stretching apparatus, the combination of an overhead track, a hide carrying frame depending therefrom and movable along said track, a stationary machine frame located in position parallel with a portion of said track, a head movable up and down thereon, arms movably mounted on said head, yielding means for forcing said arms outwardly under said track, whereby when the hide frame is moved along the track it will automatically be supported by said arms, means connected with said stationary frame for forcing said head, and consequently the hide carrying frame, upwardly, and means located at the lower part of the apparatus for individually gripping different portions of the bottom of a hide depending from the top of the hide carrying frame and exerting downward pressure on the same.

20. In a hide stretching apparatus, the combination of an overhead track, a hide carrying frame depending therefrom and movable along said track, a machine frame located in position parallel with a portion of said track, a head movable up and down thereon, arms movably mounted on said head, yielding means for forcing said arms outwardly under said track to support the hide frame when it is moved along the track into registration with said machine, a rest on said stationary frame for engaging the lower end of the hide carrying frame and keeping it in vertical position, means connected with said stationary frame for forcing said head, and consequently the hide carrying frame, upwardly, and means located at the lower part of the apparatus for individually gripping different portions of the bottom of a hide depending from the top of the hide carrying frame and exerting downward pressure on the same equal at all points all the way across the hide.

21. In a hide stretching apparatus, the combination with an overhead track, of a hide carrying frame depending therefrom and adapted to move along the track, comprising vertical side members spaced apart and a pair of jaws extending across its upper end from one of said members to the other for gripping the square end of the hide, whereby the hide will depend from this pair of jaws on the front of the hide carrying frame, and a stationary frame adjacent to the track having vertically movable arms having provisions for receiving and supporting the lower of said jaws directly and therefore supporting the hide carrying frame.

22. In a hide stretching apparatus, the combination with an overhead track, of a hide carrying frame depending therefrom and adapted to move along the track, comprising vertical side members spaced apart and a pair of jaws extending across its upper end from one of said members to the other for gripping the square end of the hide, whereby the hide will depend from this pair of jaws on the front of the hide carrying frame, a stationary frame adjacent to the track having vertically movable arms having provisions for receiving and supporting the lower of said jaws directly and therefore

supporting the hide carrying frame, means near the bottom of the stationary frame for engaging the rear of the hide carrying frame and guiding it, power-operated means for raising the said vertically movable means and said jaws, and power-operated means for engaging the hide at different points along its bottom and exerting a downward pull thereon.

23. In a hide stretching apparatus, the combination with an overhead track, of a hide carrying frame depending therefrom and adapted to be moved along the track, a pair of jaws extending across the upper end of said frame for gripping the square end of the hide, whereby the hide will depend from this pair of jaws on the front of the hide carrying frame, a stationary frame adjacent to the track having vertically movable means for supporting the lower of said jaws directly and therefore supporting the hide carrying frame, power-operated means for raising the said vertically movable means and said jaws, and power-operated means for engaging the hide at different points along its bottom and exerting a downward pull thereon of equal intensity at all points along the bottom of the hide.

24. In a hide stretching apparatus, the combination with an overhead track, of a hide carrying frame depending therefrom and adapted to move along the track, a pair of jaws extending across its upper end for gripping the square end of the hide, whereby the hide will depend from this pair of jaws on the front of the hide carrying frame, means for supporting the lower of said jaws and the hide carrying frame, power-operated means for raising the said supporting means and said jaws, and power-operated means for engaging the hide at different points along its bottom and exerting a downward pull thereon of equal intensity at all points along the bottom of the hide and of a total amount substantially equal to the pressure exerted to raise the upper jaws, whereby the hide will be held in a floating condition with substantially equal pressure applied to both ends and will be stretched uniformly in that condition.

25. In a hide stretching device, the combination of a hide carrying frame comprising a pair of side pieces, supporting wheels at the top of said side pieces, a track on which said wheels run, a pair of jaws adjustable on the side pieces, and located near the top of said frame for gripping the square end of a hide between them, means for adjusting said jaws to grip the hide, a support for the lower of said jaws, means for exerting an upward pressure on said support, means whereby the said jaws are capable of moving upwardly along said frame, means for holding them in their upper position and preventing them from slipping backwardly down the frame, and means at the bottom of said frame for exerting a downward pressure comprising a plurality of pressure exerting elements.

26. In a hide stretching device, the combination of a hide carrying frame, supporting wheels at the top, a track on which said wheels run, a pair of jaws adjustably located near the top of said frame for gripping the square end of a hide between them, means for adjusting said jaws to grip the hide, a support for the lower of said jaws, means for exerting an upward pressure on said support, means whereby the said jaws are capable of moving upwardly along said frame, means for holding them in their upper position and preventing them from slipping backwardly down the frame, means at the bottom of said frame for exerting a downward pressure comprising a plurality of pressure exerting elements, a pair of jaws connected with each of said pressure exerting elements and adapted to engage the bottom of a hide depending from the first named jaws at varying heights, whereby the first pair of jaws can be attached to the top of a hide while located at the bottom of the frame, then raised with the frame the desired amount and the last named jaws connected with the hide and then all the jaws put under pressure to stretch the hide in that position.

27. In a hide carrying frame, the combination of a pair of side pieces located vertically, a rack along the upper end of each side piece, a jaw support mounted on each side piece and movable up and down the rack, means for holding said jaw supports in their uppermost position on the rack, a single jaw carried by said two jaw supports, a second jaw adjustably connected with the first jaw, said pair of jaws extending across the frame, and a plurality of jaws mounted adjacent to the bottom of the frame for gripping the opposite end of the hide and capable of independent longitudinal movement.

28. In a hide carrying frame, the combination of a pair of side pieces connected together at the bottom and located vertically, a rack along each side piece, a jaw support mounted on each side piece and movable up and down the rack, means for holding said jaw supports in their uppermost position along the rack, a jaw carried by said jaw supports and extending across from one to the other, a second jaw adjustably connected with the first jaw, a plurality of jaws mounted adjacent to the bottom of the frame for gripping the opposite end of the hide, the last named jaws being adjustable along the bottom of said frame in a vertical direction, individual means for clamping the last named jaws to the hide, and individual means for clamping said jaws to the frame.

29. In a hide stretching device, the combination of a frame, a pair of jaws at the one end of said frame adapted to grip the square end of a hide, said jaws being movable as a whole along the frame and being adjustable toward and from each other, a series of guides at the other end of the frame, a corresponding number of jaw supporting slides connected with said guides, a pair of jaws on each of said slides, individual means for operating said jaws to grip the other end of the hide carried by the first named jaws and extending therefrom, means for exerting a pressure to move the first pair of jaws and the jaws of the last named series in opposite directions, and means whereby after a hide is stretched in that way the series of jaws can be individually clamped to the frame in the positions they then assume to permit of the hide being dried on the frame in the condition in which it is stretched.

30. In a hide stretching device, the combination of a frame, a pair of jaws at the top of said frame adapted to grip the square end of a hide, said jaws being movable as a whole up and down the frame, a series of vertical guides at the bottom of the frame, a corresponding number of jaw supports connected with said guides, a pair of jaws on each of said supports, individual means for operating said jaws to grip the bottom of the hide carried by the first named jaws and depending therefrom, means for exerting pressure to raise the first pair of jaws and to lower the jaws of the last named series, means whereby after a hide is stretched in that way the series of jaws can be individually clamped to the frame in the positions they then assume to permit of the hide being dried on the frame in the condition in which it is stretched, and means whereby the pressure exerting means at the bottom can be disconnected from the several jaws to permit of the removal of the frame.

31. In an apparatus for stretching hides, the combination of a hide supporting frame located in vertical position, means at the top of said frame for gripping the square end of a hide to permit the hide to depend therefrom along the frame, a series of jaws for gripping the bottom of the frame at variable elevations, a jaw support for each of said jaws separately mounted, guides on the frame for said guide supports, means detachably connected with said jaw supports and independent of said frame for exerting a downward pull on each of said jaws, and means whereby each of said jaw supports can be clamped to the frame after the hide is stretched, whereby the pressure exerting means can be cast off and the hide left on the frame in a stretched condition.

32. In a hide stretching apparatus, the combination of a frame for supporting a hide having means at one end for clamping the square end of the hide, and a plurality of jaws at the other end for clamping the irregular end of the hide at varying distances therefrom, the last named jaws each comprising a jaw support having a gripping surface and a pivoted jaw cooperating therewith, means for engaging each pivoted jaw to force it into clamping position, means for individually moving the last named jaws to stretch the hide, and means for clamping the jaw supports to the frame, said moving means being detachably connected with the jaw supports.

33. In a hide stretching device, the combination of a frame, a pair of jaws at the top of said frame adapted to grip the square end of a hide, said jaws being movable as a whole up and down the frame, a series of vertical guides at the bottom of the frame, a corresponding number of jaw supports connected with said guides, a pair of jaws on each of said supports, individual means for operating said jaws to grip the bottom of the hide carried by the first named jaws and depending therefrom, means for exerting pressure to raise the first pair of jaws and to lower the jaws of the last named series at the bottom, means whereby after a hide is stretched the series of jaws can be individually clamped to the frame in the position they then assume, a track above the frame on which it can move edgewise, the pressure exerting means for forcing the first pair of jaws upwardly comprising horizontal supports from which said frame is adapted to slide automatically when moved along the track in one direction, and the jaws at the bottom being readily detachable from the pressure exerting means at the bottom to permit the frame to be moved out of position with the stretched hide thereon.

34. The method of stretching a hide which consists in gripping the end of the hide at a plurality of points and applying the same tension at each point.

35. The method of stretching a hide which consists in gripping one end of the hide along a straight line across it, gripping the opposite end of the hide at a plurality of points arranged irregularly across the other end of the hide and applying fluid pressure of the same intensity to all the points at which the hide is gripped to pull the two ends in opposite directions.

36. The method of stretching a hide which consists in gripping one end of it along a straight line across it, gripping the opposite end of the hide at a plurality of points arranged irregularly across that end and applying fluid pressure to all the points at which the hide is gripped to pull the two ends in opposite directions, the whole amount of pressure exerted on the two ends of the hide being equal and the amounts

exerted at each point on the irregular end also being equal, whereby the tension exerted on the hide is the same and the amount of stretch will vary exactly in accordance with the stretchability of the hide at each point, thus resulting in an increase in the stretch and a gain in the area of the hide.

37. The method of stretching a hide which consists in applying fluid pressure to pull the ends of the hide in opposite directions to stretch it at all points, pressure being applied at one end at a plurality of different points, the whole amount of pressure exerted on the two ends being equal, for the purposes described.

In testimony whereof I have hereunto affixed my signature.

ALEXANDER I. SNOW.