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M. E. K. WELSH, ADMINISTRATRIX.
WIRE STRAIGHTENING MACHINE.
APPLICATION FILED JAN. 13, 1915.

1,206,184. Patented Nov. 28, 1916.

FIG. 1

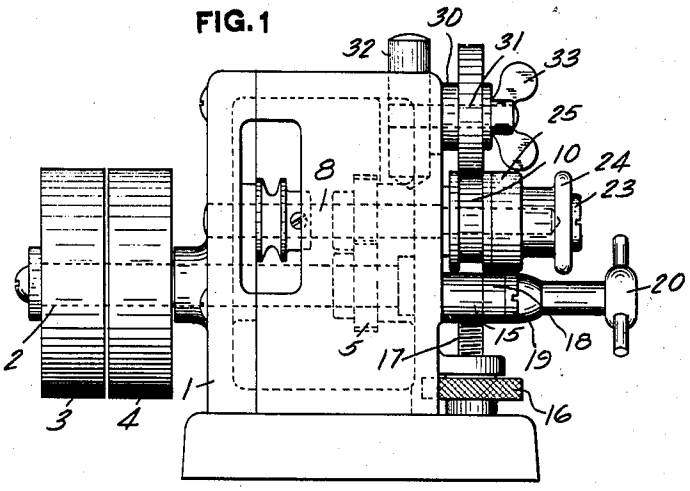


FIG. 4

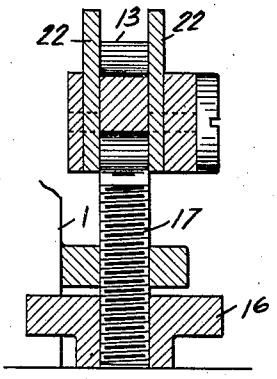


FIG. 7

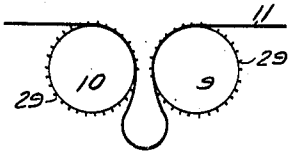


FIG. 3

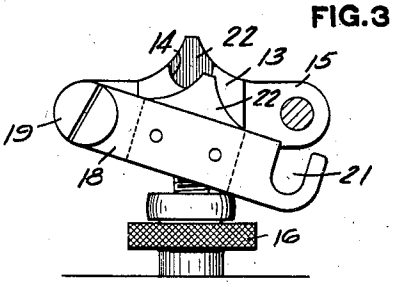


FIG. 2

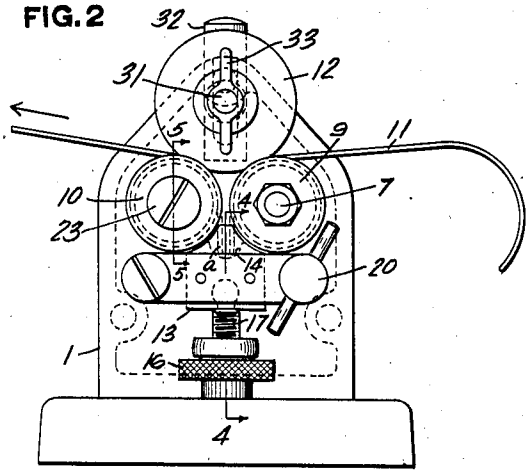


FIG. 5

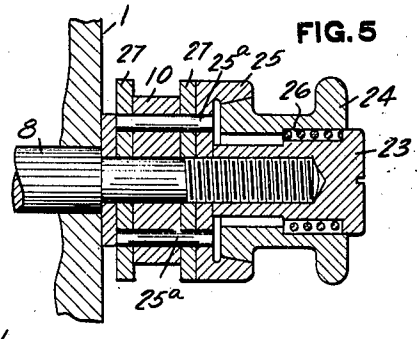
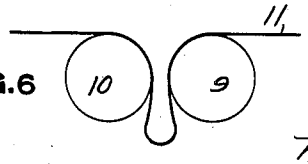


FIG. 6



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES M. WELSH, DECEASED, LATE OF MEADVILLE, PENNSYLVANIA, BY MARY ETTA K. WELSH, ADMINISTRATRIX, OF MEADVILLE, PENNSYLVANIA, ASSIGNOR TO THE SPIRELLA COMPANY, OF MEADVILLE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

WIRE-STRAIGHTENING MACHINE.

1,206,184. Specification of Letters Patent. Patented Nov. 28, 1916.

Application filed January 13, 1915. Serial No. 2,059.

To all whom it may concern:

Be it known that JAMES M. WELSH, deceased, late a resident of Meadville, in the county of Crawford and State of Pennsylvania, did invent a new and useful Improvement in Wire-Straightening Machines, of which the following is a specification.

This invention relates to wire straightening machines, and particularly to machines for straightening or taking the curl or bend out of bent wire structures, such as wire garment stays.

The object of the invention is to provide an improved machine of the character described, wherein the stay is straightened by compression instead of tension, which avoids stretching the same, and one which has various adjustments to enable the degree of reverse curvature imparted to the bent stay to be varied, to enable the operating parts to be readily inspected, to enable the stay to be readily inserted and removed from the machine, to vary the position of the idler or guide roll relative to the feed rolls, to change the angular periphery of one of the feed rolls for regulating the straightening effect and the position and size of the return bend or loop in the fabric, and also to adjust the position of the curved abutment relative to the loop in the fabric so as to assist in directing and shaping the latter and producing the straightening effect.

Further objects of the invention are in part obvious and in part will appear more in detail hereinafter.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the drawings, which represent one embodiment of the invention, Figure 1 is a side elevation; Fig. 2 is an end elevation; Fig. 3 is a detail view of the curved abutment and the clamping bar therefor; Fig. 4 is a detail sectional elevation on the line 4—4, Fig. 2; Fig. 5 is a cross section on the line 5—5, Fig. 2; and Figs. 6 and 7 are detail views, showing different shapes of return loop produced by different adjustments of the apparatus.

Referring to the drawings, the machine shown comprises a suitable frame 1 in which is journaled a main operating shaft 2 having the loose and fast pulleys 3, 4, thereon and also provided within the frame with a gear 5 meshing with two gears of the same size mounted respectively on shafts 7 and 8, which are parallel to and above the main operating shaft 2. These two parallel shafts carry stay feeding rollers 9 and 10, both of which lie on the same side of the path of movement of the stay 11 through the machine, and which rollers coöperate with an idle roller 12 located on the other side of the stay and above the rollers 9, 10.

The devices for straightening or taking the curl out of the bent wire structure comprise the three rollers 9, 10 and 12 and a suitable abutment 13, which abutment lies on the same side of the path of movement of the machine as the rollers 9 and 10 and slightly below said rollers. The stay is fed to the machine either directly from the stay forming machine (not shown) or from a suitable reel and with its convex side uppermost. In other words, the curl of the bent stay to be straightened is downwardly, as shown in Fig. 2. The stay passes between the rollers 9 and 12 and thence downwardly and upwardly between the rollers 9 and 10, forming a loop *a* which contacts with and slides over the abutment 13 below a point between the rollers 9 and 10. It passes out from the machine between the rollers 10 and 12 and thence is led to a suitable reel on which it is coiled.

The abutment 13 comprises a hardened steel block having a curved depression 14 in its upper edge to receive the loop or bend in the wire structure being straightened, as clearly shown in Figs. 2 and 3. Said abutment is preferably adjustable toward and from the stay so that it can be easily located at any desired point to assist in guiding the loop and in imparting any desired degree of reverse curvature to the stay at or near that point. For this purpose it is slidable vertically in a guide 15 carried by the frame, its movement being effected by a nut 16 threaded on a screw 17 non-rotatably connected at its upper end to the abutment, the nut 16 being rotatable on the screw but held against longitudinal movement thereon by fixed portions of the frame.

Preferably, suitable means is provided for clamping the abutment in adjusted position, such as the bar 18 hinged at 19 to a fixed

portion of the frame and arranged to be clamped against the abutment by a nut 20 threaded onto a threaded stud carried by the frame. Preferably, one end of the clamping bar 18 has a side slot, indicated at 21, which enables it to be detached from the stud by unscrewing the nut 20, whereupon the clamping bar 18 drops down, as shown in Fig. 3, to enable the operator to have access to the abutment where the stay contacts therewith. Also, side wear plates are preferably located on each side of the abutment, as indicated at 22. The inner wear plate is doweled directly to the member 15 in which the abutment slides, while the outer wear plate is doweled to the clamping bar 18. The upper ends of said wear plates project above the depression in the abutment and form with said abutment a pocket or depression to receive the loop or bend of the stay between the rollers 9 and 10.

The principal straightening effect with this machine is due to forcing the fabric between the two rolls 9 and 10 in the form of a flattened reverse bend or loop with the stay bent to a small radius at the end of the loop, as shown in the diagram, Fig. 6. This requires a firm grip of the stay at both of the feeding rolls 9 and 10, and said rolls, and the roll 12, when it is employed, may be roughened, notched, grooved or provided with teeth or the pins shown at 29, for this purpose. By using pins which engage in the openings between loops of the fabric the idle roller 12 may be omitted, if desired, as the pins themselves will positively feed the wire through the machine and maintain the reverse bend or loop which produces the straightening effect. The straightening effect may be varied to meet any conditions of curvature in the stay being straightened by modifying the form of the return bend or loop *a*, to change either its shape or size. For example, with a small short loop as in Fig. 6, the radius of curvature at the end of the loop is small and a greater bending or straightening effect is produced, while if the loop is longer and larger, as in Fig. 7, the radius of curvature is greater and the straightening effect is decreased.

The shape and size of the return bend may be varied by rotatably adjusting the rolls 9 and 10 relatively to each other. For this purpose one of the rolls, such as the roll 10, has a friction connection with its driving shaft and is rotatably adjustable thereon, while the other roll 9 is fixed to its shaft 7 so as to have no turning movement thereon. As shown, said roll 10 is loosely rotatable on a portion of the shaft 8 which carries at its outer end a nut 23 which is screwed tightly thereon until the shaft reaches the end of the threaded bore in said nut, but which nut does not clamp the roll 10 to the shaft. Surrounding the nut 23 and keyed to move longitudinally thereon and rotate therewith is a flanged member 24 whose inner end has a conical clutch face held against a similar face on a clutch member 25 by a compression spring 26 located between the nut 23 and member 24. The clutch member 25 is connected to rotate with the roll 10, as by one or a plurality of dowel pins 25^a, the latter passing not only through the clutch member and roll but also through side wear plates 27 whose edges project beyond the periphery of the roll 10 and form guides for holding the stay on the roller.

If the proper straightening effect is not being produced the member 24 is pulled out by its flange and turned in the proper direction to rotate the companion roll 9 to increase or diminish the size of the loop, and is then released and the clutch faces are allowed to again engage. The friction between said clutch faces is sufficient so that there is no slip therebetween in operation of the machine, but both rollers are positively driven by the same operating shaft to pass the stay through the machine and bend it into a return loop.

The upper idle roller 12 may also be adjusted toward and from the driven rollers 9 and 10 to vary the pressure of the rollers upon the stay and also to enable the stay to be threaded into or removed from the machine. As shown, the idle roller 12 is free to rotate on a collar 30 carried by a stud 31 whose inner end is riveted to a post 32 slidably adjustable vertically in a socket in the main frame. The outer end of the stud 31 is threaded to receive a winged clamping nut 33. When the stay has been placed in the machine the post 32 is pushed downwardly in its socket until the roller 12 has sufficient bearing contact with the stay, and the winged nut 33 is screwed up tight to clamp the collar 30 against the side of the frame, which rigidly holds the roller 12 in adjusted position.

The abutment 13 is not essential for the production of the return bend or loop or to produce the straightening effect. Its principal function is to steady the loop and produce a more uniform result, although to some extent it may be also resorted to for modifying the straightening effect by varying the shape of the loop and the radius of curvature thereof. The abutment is usually so adjusted that the bend or loop *a* has a firm pressure thereon, but by adjusting the abutment toward or from the loop the radius of curvature of the end portion thereof may be increased or diminished, which decreases or increases the straightening effect.

The straightened stay, as it emerges from the machine, may be led to a reel on which it is wound and in the machine shown one of the shafts, such as the shaft 8, is provided with a small sheave or pulley 34 to receive a

belt or band for driving the reel. Said reel may be of any suitable construction but preferably embodies a slip connection to compensate for the increased size of the coil as the wire fabric is wound thereon.

The machine described is simple and its various adjustments enable any degree of reverse curvature to be imparted to a bent stay. All of the parts are accessible for inspection, replacement or repair and enable the stay to be straightened to be readily inserted into the machine from the side. The machine is also not liable to easily get out of order and will straighten stays or other bent wire structures of any size within limits.

What is claimed is:—

1. A wire fabric straightening machine, comprising two rollers lying on the same side of the fabric, and means for rotatably adjusting one of said rollers around its axis to produce a reverse bend in the fabric between said rollers.

2. A wire fabric straightening machine, comprising two rollers lying on the same side of the fabric, means for rotatably adjusting one of said rollers around its axis to produce a reverse bend in the fabric between said rollers, and means for feeding the fabric through the machine for straightening the same.

3. A wire fabric straightening machine, comprising two driven rollers located on the same side of the fabric, means for rotatably adjusting one of said rollers around its axis to produce a reverse bend in the fabric between said rollers, and a roller on the other side of the fabric arranged to cooperate with both of said rollers for feeding the fabric through the machine.

4. A wire fabric straightening machine, comprising two rollers lying on the same side of the fabric, means for feeding the stay past said rollers and between the same to form a reverse bend in the fabric for straightening the same, and means for varying the form of said reverse bend.

5. A wire fabric straightening machine, comprising feeding rollers lying on the same side of the fabric, means coöperating with said rollers for feeding the fabric through the machine and producing a reverse bend thereof between said rollers, and means for varying the form of said reverse bend.

6. A wire fabric straightening machine, comprising two driven rollers located on the same side of the fabric, a coöperating roller on the other side of the fabric, said rollers being arranged to feed the fabric through the machine and produce a reverse bend thereof between said driven rollers, and means for varying the form of said reverse bend.

7. A wire fabric straightening machine, comprising two rollers lying on the same side of the fabric, means for feeding the stay past said rollers and between the same to form a reverse bend in the fabric for straightening the same, and means for rotatably adjusting said driven rollers relatively to each other.

8. A wire fabric straightening machine, comprising feeding rollers lying on the same side of the fabric, means coöperating with said rollers for feeding the fabric through the machine and producing a reverse bend thereof between said rollers, and means for rotatably adjusting said driven rollers relatively to each other.

9. A wire fabric straightening machine, comprising two driven rollers located on the same side of the fabric, a coöperating roller on the other side of the fabric, said rollers being arranged to feed the fabric through the machine and produce a reverse bend thereof between said driven rollers, and means for rotatably adjusting said driven rollers relatively to each other.

10. A wire fabric straightening machine, comprising feeding rollers lying on opposite sides of the fabric and arranged to form a reverse bend thereof, and an abutment on the convex side of said bend against which the fabric is bent.

11. A wire fabric straightening machine, comprising feeding rollers on opposite sides of the fabric, and a stationary abutment having a curved surface to receive the convex side of the reverse bend of the fabric.

12. A wire fabric straightening machine, comprising feeding rollers lying on opposite sides of the fabric and arranged to form a reverse bend thereof, an abutment on the convex side of said bend for steadying the fabric, and means for adjusting said abutment toward and from the fabric.

13. A wire fabric straightening machine, comprising feeding rollers lying on opposite sides of the fabric and arranged to form a reverse bend thereof, a stationary abutment having a curved surface on the convex side of said bend against which the fabric is bent, and means for adjusting said abutment toward and from the fabric.

14. A wire fabric straightening machine, comprising two feeding rollers lying on the same side of the fabric and adapted to receive a loop of the fabric being straightened therebetween, and a stationary abutment having a curved surface arranged to contact with the convex side of said loop.

15. A wire fabric straightening machine, comprising two feeding rollers lying on the same side of the fabric and adapted to receive a loop of the fabric being straightened therebetween, an abutment arranged to contact with the convex side of said loop, and an idle pressure roller lying on the other side of the fabric.

16. A wire fabric straightening machine, comprising two feeding rollers lying on the same side of the fabric and adapted to receive a loop of the fabric being straightened therebetween, a stationary abutment having a curved surface arranged to contact with the convex side of said loop, and an idle pressure roller lying on the other side of the fabric.

17. A wire fabric straightening machine, comprising two driven rollers lying on the same side of the fabric, an idle roller cooperating with said driven rollers and lying on the other side of the fabric, and a stationary abutment adapted to contact with the convex side of a loop of the fabric.

18. A wire fabric straightening machine, comprising two driven rollers lying on the same side of the fabric, an idle roller cooperating with said driven rollers and lying on the other side of the fabric, a stationary abutment adapted to contact with the convex side of a loop of the fabric, and means for rotatably adjusting said driven rollers relatively to each other.

19. A wire fabric straightening machine, comprising two rollers lying on one side of the fabric and adapted to receive a loop of the fabric therebetween, means for simultaneously rotating said rollers, and an abutment lying on the same side of the fabric and adapted to contact with the convex side of said loop.

20. A wire fabric straightening machine, comprising two rollers lying on one side of the fabric and adapted to receive a loop of the fabric therebetween, means for simultaneously rotating said rollers, an abutment lying on the same side of the fabric and adapted to contact with the convex side of said loop, and means for rotatably adjusting said rollers relatively to each other.

21. A wire fabric straightening machine, comprising two rollers lying on one side of the fabric and adapted to receive a loop of the fabric therebetween, means for simultaneously rotating said rollers, an abutment lying on the same side of the fabric and adapted to contact with the convex side of said loop, and a pressure roller lying on the other side of the fabric and coöperating with said driven rollers.

22. A wire fabric straightening machine, comprising two rollers lying on one side of the fabric and adapted to receive a loop of the fabric therebetween, means for simultaneously rotating said rollers, an abutment lying on the same side of the fabric and adapted to contact with the convex side of said loop, means for rotatably adjusting said rollers relatively to each other, and a pressure roller lying on the other side of the fabric and coöperating with said driven rollers.

23. A wire fabric straightening machine, comprising two rollers lying on one side of the fabric and adapted to receive a loop of the fabric therebetween, means for simultaneously rotating said rollers, an abutment lying on the same side of the fabric and adapted to contact with the convex side of said loop, and a pressure roller adjustable toward and from the fabric and lying on the opposite side thereof and coöperating with said driven rollers.

24. A wire straightening machine, comprising two rollers lying on one side of the fabric and adapted to receive a loop of the fabric therebetween, means for simultaneously rotating said rollers, an abutment lying on the same side of the fabric and adapted to contact with the convex side of said loop, means for rotatably adjusting said rollers relatively to each other, and a pressure roller adjustable toward and from the fabric and lying on the opposite side thereof and coöperating with said driven rollers.

In testimony whereof, I, MARY ETTA K. WELSH, administratrix of the estate of the said JAMES M. WELSH, deceased, have hereunto set my hand.

MARY ETTA K. WELSH,

Administratrix of James M. Welsh, deceased.

Witnesses:
T. F. CHARLTON,
M. HEIL.