To all whom it may concern:

Be it known that I, STEPHEN J. MILLER, a citizen of the United States, residing at the city of Danbury, county of Fairfield, State of Connecticut, have invented certain new and useful Improvements in Hat-Curling Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the art of curling hat brims, but is more particularly intended as an improvement on the machine shown and described in Letters Patent No. 1,100,599, issued to me June 23, 1914.

My present invention relates particularly to a new form of curling tool, to means for constantly holding the hat in proper position so that the proper depth of curl will be automatically effected, to certain means provided for opening the curled portion of the hat when the latter is passed through the machine more than once, to instrumentality provided for making a "welt" curl when necessary, and to the provision of a heating pocket at the rear of the shackle so that the latter may be more effectually heated.

In the accompanying drawings Figure 1 is a plan view of my improved machine—Fig. 2 an elevation partly in section—Fig. 3 a detail plan view of the curling tool—Fig. 4 a detail broken sectional elevation of the curling tool and the parts immediately associated therewith—Fig. 5 a detail rear elevation of the curling shackles with the welt tool in position therein—Fig. 6 a detail sectional elevation of the curling shackle and welt tool, and Fig. 7 a detail front elevation of the welt tool.

Similar numerals of reference denote like parts in the several figures of the drawing.

While I have illustrated the various constructions and mechanisms for revolving the feed rolls and the curling tool, I will not describe the same herein because they are identical with the corresponding means shown and described in said Letters Patent, but I will confine the present description to the novel features that are identified with the present invention.

The curling tool in my patented structure referred to was made up of segments operated by centrifugal force, and while this tool performed its function in a highly satisfactory manner, the centrifugally operated portions thereof were apt to become broken or badly worn owing to the high speed at which the tool must be run. It therefore became advisable to provide a rigid curling tool which would beat against the brim with great rapidity and would also perform an ironing and smoothing operation.

A vertical shaft journaled within a rigid sleeve, which shaft and sleeve are identical with the corresponding parts shown and described in said Letters Patent. Rigidly secured to the bottom of this shaft immediately below the sleeve is my improved curling tool 1, which tool is made up of a plurality of radially extending combined beater and ironing elements. This tool extends within the curling shackle 2 and has a resilient play just as in the patented structure. In the formation of the curling tool each radially projecting element has a comparatively broad circumferential ironing surface 3 and a comparatively narrow round hammer portion 4 which hammer portions extend in the direction of the revolution of the curling tool. As the heated brim passes between the curling tool and the heated shackle, the hammer portions 4 will beat with great rapidity against the inside of the curled portion thereby hardening the same to cause the fur fibers to knit exceedingly close so that the curled portion will be very stiff and will thereafter hold its shape. Immediately following the action of a hammer portion 4 the ironing surface 3 will operate against the hat brim and smooth and iron the same firmly so that every portion of the curled brim is not only subjected to the hammering process but also to a comparatively prolonged ironing operation.

The results effected by my present curling tool are about the same as those that are brought about by the centrifugally operated curling device set forth in my patent aforesaid, but my present device is far more durable and will stand a high rate of speed, and therefore is greatly to be preferred.

While I have shown three of these radially extending portions in the construction of my curling tool, it will be obvious that I can utilize any number of such portions, and I therefore do not wish to be limited in this respect.
In some styles of hats it becomes necessary to form what is known as a "welt" curl, that is to say, the edge of the brim is curled over and doubled upon itself and then ironed flat against the body portion of the brim, and I have therefore provided means for effecting this which I will now describe.

5 is a plate which extends within the shackle and is curved and shaped at the rear edge so as to conform closely to the contour of the rear inner wall of the shackle. The rear edge of this plate thus shaped is always in close contact with the rear inner wall of the shackle.

6 is an arm rising from the forward edge of the plate and extending rearwardly above the top of the shackle and spaced therefrom, and driven through the horizontally extending portion of this arm is a thumb screw 7 whose lower end abuts against the top wall of the shackle, so that it will be clear that when this thumb screw is driven down it will raise the plate 5 against the roof of the shackle. For convenience in guiding the plate 5 I can provide a suitable channel 8 within the top surface of the shackle within which channel the lower end of the screw 7 extends. On the upper face of this plate 5 is an incline 9 which slopes downwardly toward the curling tool so that when the plate 5 is moved outwardly to its full extent, or, to the position shown at Figs. 1 and 5 the driving of the screw 7 against the shackle will cause the plate 5 to be elevated snugly against the roof of the shackle, and this is the position of this Welt tool during the ordinary curling operation.

When it is desired to make a Welt curl, the screw 7 is relaxed and the plate 5 moved inwardly so that the incline 9 will operate against the roof of the shackle and thereby effect the lowering of such plate. The plate 5 is moved inwardly so that more or less of the inclined portion may be effective, according to the nature of the Welt desired, it being clear that if this plate be moved inwardly so that the highest part of the incline will have engaged the roof of the shackle then the bottom surface of the plate 5 will be comparatively close to the floor of the shackle for the purpose of effecting a very firm and tight Welt curl.

In order to retain as much of the heat as possible and to get full benefit of the same I provide at the rear of the shackle a heating pocket 10 within which the heating agent extends, and I find that by the use of such pocket the heat is better diffused and a quicker and more uniform heating of the shackle effected.

As above explained, there is nothing new in the feeding rolls 13, 19, between which the hat is delivered to the curling instrumentalities, but, in connection with the devices for guiding the hat to the feed rolls, I have provided a curl opener which operates to open the curled portion of the brim of the hat when the latter is passed several times through the machine.

29 is a plate, secured to the bed of the machine designated by A, having formed integral therewith a vertically disposed guide plate 30, and 31 is a lever pivoted to the outer end of this plate 30. The free end of this lever 31 terminates in the downwardly extending open hook portion 32 and said lever is normally elevated by means of a spring 33 which bears against the bottom edge of the forward or free end of said lever.

34 is a lug which extends from the upper edge of the inner portion of the guide plate 30 and overhangs a little toe 35 that extends laterally from the lever 31 and through this lug 34 a thumb screw 36 is driven downwardly against the toe 35, so as to force the lever 31 downwardly against the resiliency of the spring 33, the construction and operation of all these parts being precisely the same as illustrated in my patent above referred to. But I provide the outer depending portion of the open hook 32 with an outwardly flaring curl opener 29, this curl opener extending immediately in front of the face of the plate 30, so that when a hat brim is placed against the plate 30 and moved toward the open hook portion 32 it will primarily be engaged by the outwardly flaring curl opener and will be positively guided within the hook portion 32. After a hat has been curled and it is desired to pass the same once or twice more through the machine this curl opener will open the curled portions as fast as they come in contact therewith so that they may be properly delivered between the feed rolls and thence to the curling instrumentalities.

The heating pocket 10 is opposite the curling tool 1 so that it will be clearly understood at the point where the curling tool cooperates with the shackle in performing the curling operations.

In utilizing my prior patented construction it was necessary that the operator present by hand the brim to the action of the curling devices, but I have made provision whereby the brim may be presented to these devices automatically and uniformly so that part of the brim subjected to the curling operation is uniform at all times with the same adjustment of this gage, and this makes the machine automatic so that one operator can attend to several machines.

In carrying out the provisions of my improvement last mentioned I provide a lever 50 which is pivoted to the bottom of the bed of the machine at 37 and midway the length of this lever extends an arm 38 which...
carries at its end a pin 39 that projects up through an arcuate slot 40 in the bed of the machines and carries on its upper extremity above the bed a curved member 41 which has a smooth convex surface presented toward the curling devices. A coil spring 42 connects this lever with any stationary part of the machine below the bed, so that when the member 41 is moved outwardly through the slot 40 it will be returned by means of this spring, and therefore it will be clear that the movement of this lever and member 41 is resilient. I provide a series of holes 43 through the bed plate, through which holes a pin 44 may be inserted to act as an abutment for the lever 36 to limit the inward movement thereof and consequently the inward movement of the member 41.

In curling a hat brim the member 41 is inserted within the crown of the hat so as to lie snugly against the side thereof, and the pin 44 is inserted within the proper hole 43 so that the member 41 will be stationary as far as any movement toward the curling devices is concerned. In a hat having a very wide brim the member 41 will of course be normally separated a greater distance from the curling devices, and the pin 44 will be placed in one of the outer holes 43—possibly the outermost hole, and in curling a narrow brim the reverse of these adjustments will be made. Also, it is sometimes necessary to put quite a deep curl on a brim, and in such instance the member 41 would be adjusted closer to the curling devices so as to present a greater portion of the brim for curling. In all instances, when the member 41 is within the hat crown it lies snugly against the side of the same and only a predetermined depth of the brim can be presented to the curling devices, and therefore my improved machine is automatic in this respect, and for this reason one operator may attend to several machines, since, after a curling operation on one machine is really completed, it is immaterial how many times the hat brim runs through the curling devices. Of course the pin 39 could be surmounted above the bed plate with an ordinary roller, if desired, and I do not therefore wish to be limited to the arcuate member 41.

In my patented improvement aforesaid I provide a pivoted lever 22 which engages the heel end of a slide 15 in the forward end of which is journaled the idle feed roll 19, and I connect this lever with a treadle rod 25, so that when the treadle is depressed the slide would be operated to separate the feed rolls, and I employ this identical construction in the present instance, and I have identified the parts by the same numerals of reference. Journaled within a hanger 45 below the bed plate is a pulley 46, and the lever 36 has a slight extension 47 beyond its pivotal point, and to this extension is connected a chain 49 which is led over the pulley 46 and secured at its other end to the lever 22, so that it will be clear that when the treadle rod 25 is depressed the member 41 will be moved outwardly through the slot 40 and simultaneously the feed rolls will be separated.

In removing a hat or in placing a hat on the machine in position for curling, the operator simply depresses the treadle (not shown) in order to space apart the feed rolls and to withdraw the gage member 41, and when the treadle is released the parts are restored to normal positions and the gage lever 36 will be arrested by the pin 39 which had been placed in the proper hole 43 according to the width of brim or depth of curl desired.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A hat brim curler, comprising a curling shackle and a curling tool, a welding member within said shackle, and means for adjusting said member to operative or inoperative positions.

2. A hat brim curler, comprising a curling shackle, a revoluble curling tool within said shackle, a welding plate having its rear edge snugly conformed against the rear inner wall of said shackle, and means for adjusting said plate at different distances from the floor of said shackle.

3. A hat brim curler, comprising a curling shackle, and a revoluble curling tool consisting of a plurality of spaced radially extending members.

4. A hat brim curler, comprising a curling shackle, and a revoluble curling tool consisting of a plurality of spaced radially extending arms having hammer portions and elongated circumferential ironing portions.

5. In a hat brim curler, the combination with the feeding and guiding means of a curl opener preceding said guiding means and consisting of an outwardly flaring portion integral with said means.

6. In a hat brim curler, the combination of the feeding means, the device for regulating the depth of curl, outwardly flaring means integral with said device for opening the curl.

7. In a hat brim curler, the combination of the feeding means and the guide plate, with the vertically adjustable downwardly extending open hook portion for regulating the depth of curl, the outer wall of said portion extending rearwardly and flared to form a curl opener.

8. A hat brim curler, comprising curling instrumentalities, and means engageable with the inside of the hat crown for auto-
matically presenting the brim to said instrumentalities whereby uniform curling is effected.

9. In a hat brim curler, the combination of the curling instrumentalities, with adjustable means engaging the inside of the hat crown for automatically limiting the circumferential area of the brim subjected to the curling operation.

10. In a hat brim curler, the combination of the feed rolls, the curling instrumentalities, a gage for properly presenting the brim to the curling instrumentalities, and means controlled by the operator for simultaneously separating said rolls and retracting said gage.

11. In a hat brim curler, the combination of the curling instrumentalities, with a resilient adjustable gage for automatically presenting the brims to the curling instrumentalities.

In testimony whereof I affix my signature in presence of two witnesses.

STEPHEN J. MILLER.

Witnesses:
E. ROLAND CROFUT,
ELLIS R. ROGERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."