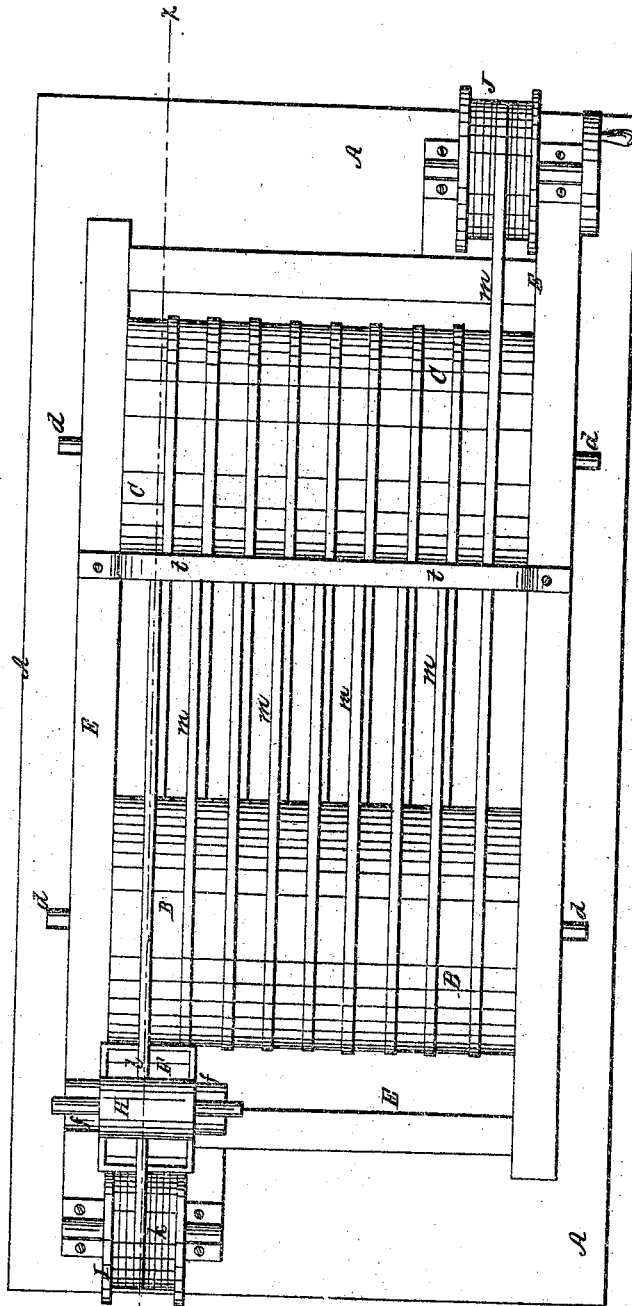


W. E. Frost.  
Hoop Skirt Machine.  
N<sup>o</sup> 48764  
Patented Jul. 11, 1865.

Fig. 1.



Witnesses.

Charles Speer  
A. Smith

Inventor.

W. E. Frost.  
By his attorney  
J. H. McIntire

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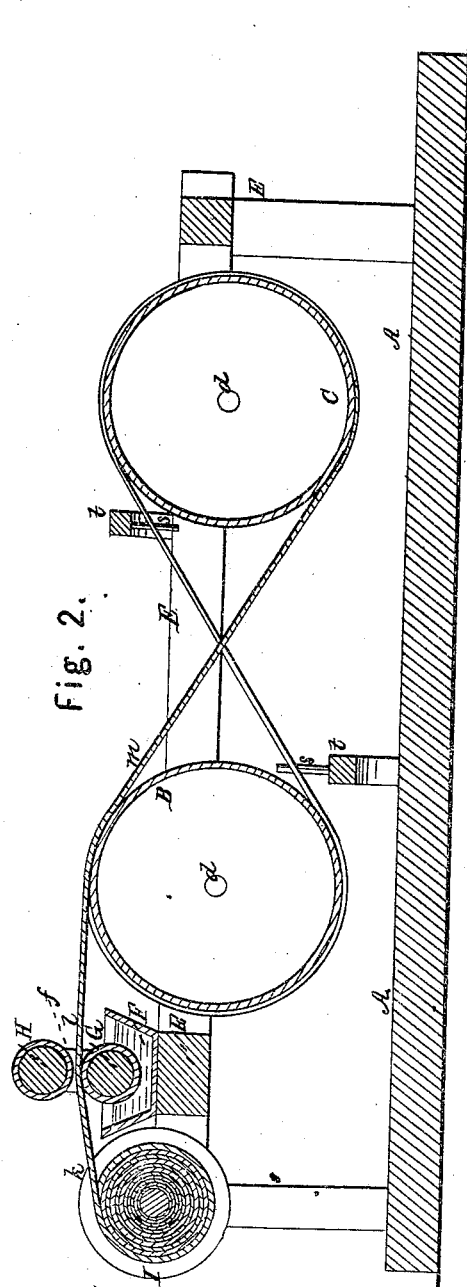


Fig. 2.

Witnesses.

Charles Speer  
A. Smith

Inventor.

W. E. Frost  
By his attorney  
J. N. McIntire

# UNITED STATES PATENT OFFICE.

W. E. FROST, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO I. WASHBURN AND P. L. MOEN, OF SAME PLACE.

## IMPROVEMENT IN SIZING AND FINISHING COVERED SKIRT-WIRE.

Specification forming part of Letters Patent No. 48,764, dated July 11, 1865.

*To all whom it may concern:*

Be it known that I, W. E. FROST, of Worcester, county of Worcester, in the State of Massachusetts, have invented a new and useful Improvement in Sizing and Finishing Covered Hoop-Skirt Wire; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this application—

Previous to my invention the employment of what is known as "braided" or "covered" hoop-skirt wire—that is, wire having a textile covering of cotton braided over it by machines, in long strips or lengths, which are wound on reels and afterward cut up into short pieces to form the springs in hoops of skeleton-skirts—was extensively employed in the manufacture of ladies' skirts, with many and great advantages over the old-fashioned method of making hoop-skirts—such, for instance, as the skirts having reeds or wires passed round them through continuous pockets; but in the employment of such covered wire some objections arose, the leading one being the slipping of the covering upon the wire, so that when the latter was cut into lengths for the hoops of a skirt it was necessary for the operative to cut the ends of said lengths or hoops a second time and double the covering over the end of the wire to prevent such slipping, and in this condition secure the said covered wire to the tapes of the skirt. To overcome this principal objection to the covered wire as made, I conceived the idea of sticking or cementing the braided covering to the wire by passing it through or coating it over with a "size" or starch mixture, which, when dry, cemented the textile covering to the wire sufficiently to prevent it from slipping on the latter, and also caused the article to present a more desirable surface, the nap being laid with the starch, and the interstices of the covering being partially filled up, so that the surface would not catch the dirt so much. This operation (at first performed by hand) and the result of coating or covering the braided wire with a size are made the subject of another patent by me for a new article of manufacture, in which it will be found fully described.

My present invention has for its object to produce this new article of manufacture by

means of machinery in which the covered wire is passed continuously from the reel or coil, in which it comes from the braiding-machine, through the sizing and finishing operations, and thence onto another reel in a finished condition; and to these ends my present invention consists in causing the covered wire to pass continuously through a sizing bath, or mechanism for applying the size or starch to the textile covering and interstices between the threads thereof, and thence over and under rolls for pressing and finishing the sized surfaces, at the same time submitting the article to a proper degree of heat to dry the size, and thence off onto another reel in a finished state.

To enable those skilled in the art to which my invention appertains to fully comprehend it, I will proceed to describe the construction and operation of the same, referring by letters to the accompanying drawings, in which—

Figure 1 is a top view of the machinery or apparatus for carrying out my said invention. Fig. 2 is a vertical section of the same at the line *x x* of Fig. 1.

In the different figures the same parts are designated by the same letters of reference.

A represents the floor or base upon which the several parts of machinery are supported.

B and C are two metallic cylinders, which I have represented as being made hollow, and supplied with steam through their journals from a suitable source by conduit-pipes *d*.

These cylinders B C are mounted to turn freely upon a supporting frame-work, E, at a distance apart suitable to the work and the room for the accommodation of the machinery.

Near one end of the frame-work E is arranged a small reservoir, F, which contains the starch or size, and within which is mounted, in suitable bearing-stands, *f*, a roll, G, which operates in conjunction with another roll, H, as will be presently described. The rolls G H may be made of any suitable material, but I prefer to have their peripheries covered with cloth.

I is a reel, which is mounted to turn freely in its bearings at one end of the frame of the machine, and J is another similar reel, mounted in the same manner, at the other end of the said frame. The latter reel is intended to receive the motive power applied to keep the machine in operation.

*k l m* represent the covered or braided wire which is being sized and finished. I have represented the size in red at the size-vat F. The wire to be sized and finished is placed (in a coil as it comes from the braiding-machine) upon a reel at I. One end of the wire is passed thence between the sizing-rolls G H, thence back and forth around the drums or cylinders B C (after the fashion of a crossed pulley-band) several times, and thence onto the reel J, the wire being guided between pins *s s* on bars *t t*, as clearly shown. The vat F being supplied with the sizing compound and power being now applied to the reel J to rotate it the wire will be drawn through the machine, passing from the reel I, as seen at *k*, between the rolls G H, which coat both sides or surfaces of the wire with the size in the vat. One of the said rolls, G, turns in the mixture and feeds it onto the periphery of the other roll, H, and the two deposit it onto the wire. Thence the wire passes over the heated cylinder B and down under the other heated cylinder, C, back over the first-named cylinder, crossing, as shown, and so on back and forth, as clearly seen in the drawings and illustrated by the arrows, a sufficient number of times to insure the drying of the sized surface.

I have run the tape or wire different numbers of times over the heated rolls; but as the rapidity of the drying depends on the temperature of the heating medium of the drums B C, and on the distance between the said drums, and also on whether or not other or additional means of drying are employed, the operator must determine how many times it is best to pass the wire in contact with the rolls from the surrounding circumstances. After being thoroughly dried by its passage around the drums or cylinders, as explained, the wire passes thence off at *m* onto the drawing-reel J in a finished condition. The shaft of the reel J may be adapted to receive spools of a given capacity, which as fast as filled are removed and replaced by empty ones; and the operator, by expertly securing the end of a fresh reel of wire each time to the latter end of the wire just unwound from reel I, may keep the machine in constant operation for any length of time. The size which I have employed has been made of corn or potato starch, and has served well as a mixture for coating and finishing the surface of the wire; but any other mixture found suitable may be used without departing from the spirit of my invention.

I have shown the drums B C as made of copper and heated with steam; but it is obvious that the same effects may be produced by the use of any other heating medium, or by passing the wire over cold cylinders, when a series of steam-heated tubes or other hot surfaces are

arranged adjacent to the wire where it passes back and forth to dry the size upon the wire before it is rereeled at J.

It will be understood that by thus passing the braided wire between the rolls G H (which deposit on and press into the covering of the wire the sizing) and thence back and forth over the heated rolls B C, as explained, the textile covering or braiding will be thoroughly coated with the sizing and filling mixture and smoothly finished.

It will be seen that by crossing the wire as it passes from one roll or cylinder to the other both sides of the coated wire are alternately presented to the drying-surfaces of the drums.

Where the heat is applied to the cylinders over which the wire passes I deem this method of stringing up or running the wire the best, though it is evident that the wire may be differently strung up without losing the main advantages derived from my invention.

If the drums B C are sufficiently long, in lieu of one supply-reel, I, and one take-up reel, J, several supply-reels and as many drawing or take-up reels may be employed, and a corresponding number of strands may be simultaneously passed through the machine to undergo the sizing operation.

It may be found expedient, in lieu of employing the cloth-covered rolls G H, to pass the wire under a roll or bar so located as to hold the wire down in the size, and thence between rolls to press in the size and remove the surplus coating supplied to the covering of the wire; or the wire may be passed from the reel I through a bath of starch or size, and thence between two pieces of cloth or other material so arranged as to squeeze out all surplus sizing before the wire passes to the rolls, over which it passes while being dried.

It is obvious that my invention is subject to numerous modifications and may be carried out in a variety of forms.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, in sizing and finishing covered wire, (or covered strips of metal of considerable length,) is—

Causing it to pass continuously through a sizing mixture, and over rolls, or their equivalents, while subjected to heat, and thence onto a reel or other receiver, substantially as described.

In witness whereof I have hereunto set my hand and seal this 13th day of May, 1865.

W. E. FROST. [L. S.]

In presence of—

J. N. MCINTIRE,  
ANDREW I. TODD.