(No Model.)

C. L. HART.

SHEET METAL PIPE.

No. 409,196. Patented Aug. 20, 1889.

Fig. 1.

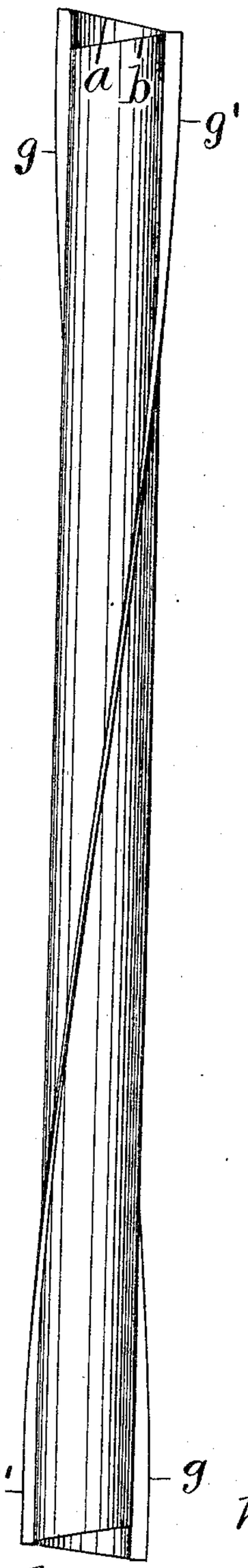

Fig. 2.

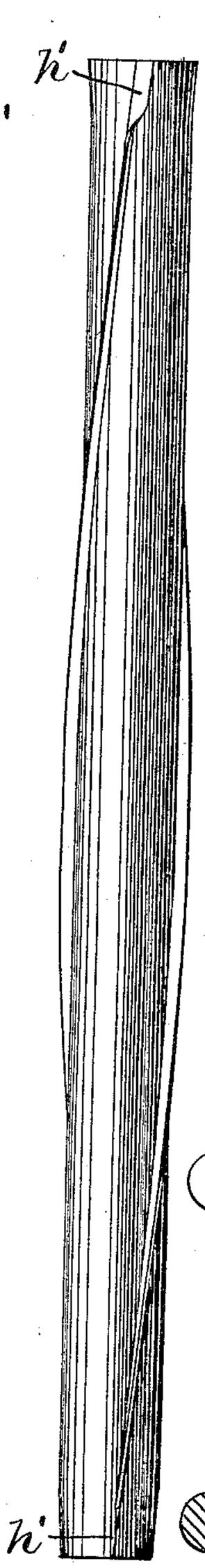

Fig. 3

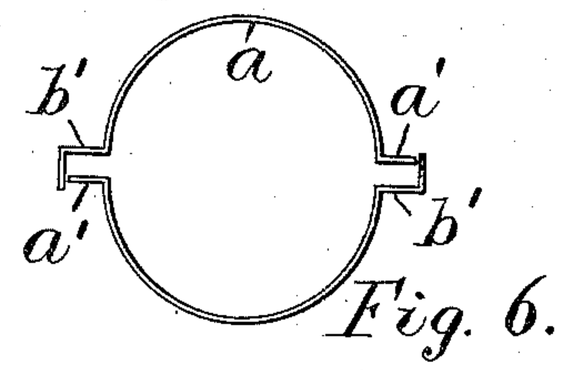

Fig. 6.

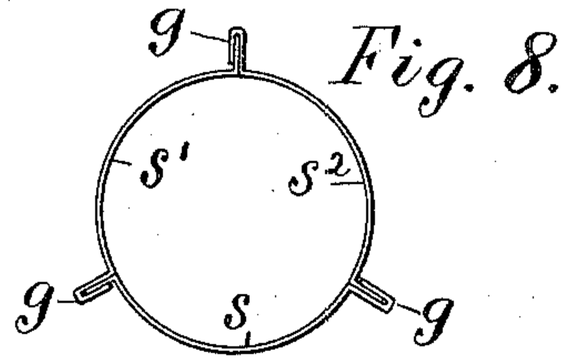

Fig. 8.

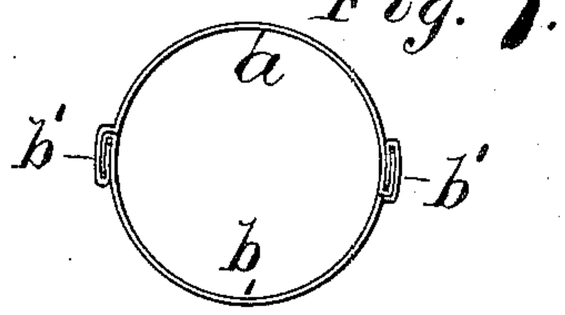

Fig. 7.

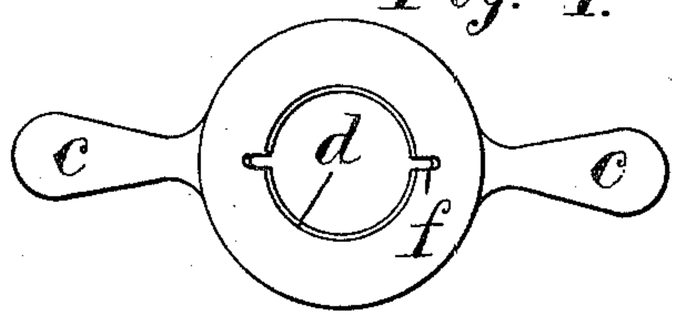

Fig. 4.

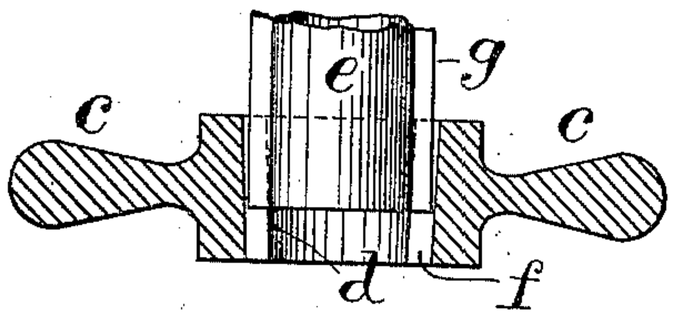

Fig. 5.

Attest:
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UNITED STATES PATENT OFFICE.

CHARLES L. HART, OF BROOKLYN, NEW YORK.

SHEET-METAL PIPE.

SPECIFICATION forming part of Letters Patent No. 409,196, dated August 20, 1889.

Application filed December 19, 1888. Serial No. 294,134. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. HART, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Sheet-Metal Pipes, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention consists in a sheet-metal pipe formed in two or more longitudinal sections united by longitudinal twisted seams.

It also consists in certain modifications hereinafter fully set forth. When formed with standing spiral seams, the appearance of the pipe is not only novel and ornamental, but the standing spiral seams operate to brace and stiffen the pipe in a very remarkable degree.

In all the pipes heretofore manufactured with spiral seams the pipe has been constructed with a single spiral seam and formed by wrapping a blank transversely to the axis of the pipe and securing one edge of the blank upon the opposite edge of the same blank when lapped spirally thereon. Such a process may be continued indefinitely to form an endless pipe; but to form a pipe in such manner requires special machinery adapted to wind the blank and secure its overlapped edges together, and the object of my present invention is to avoid the expense of such special machinery in forming a pipe with a spiral seam. I effect such object by first forming the pipe of straight longitudinal sections of convenient length united by longitudinal seams and then twisting the whole when seamed together.

The straight longitudinal sections which are required to form a pipe with straight longitudinal seams may be readily shaped without expensive dies in the ordinary cornice-brake found in the shops of all large workers in sheet metal, and they may also be formed in suitable stamping or shaping presses by providing dies of suitable profile and pressing the sheet-metal blanks between them. The pipe may thus be made and seamed longitudinally with very little expense, and may then be twisted bodily to form the twisted seam thereon by merely grasping the two ends of the pipe and turning them in opposite directions.

The invention will be fully understood by reference to the annexed drawings, in which—

Figure 1 is a view of a pipe provided with straight longitudinal seams prior to the twisting operation, the view showing the edge of the standing seam *g*. Fig. 2 is a side view of the same pipe with standing seam *g* spirally twisted one-half a revolution in the length of the pipe. Fig. 3 is an edge view of the same pipe with one end of the pipe tapered and a portion of the standing seam removed and the other end flared and the standing seam flattened down. Fig. 4 is an end view of a die adapted to twist such pipe. Fig. 5 is a longitudinal section across the center of the same with one end *e* of the pipe fitted therein. Fig. 6 is an end view of the two sections of a pipe shaped ready for seaming. Fig. 7 is an end view of the same pipe with the seam closed and bent down upon the pipe, and Fig. 8 is an end view of a pipe formed in three longitudinal sections with three standing seams. Figs. 6, 7, and 8 are drawn upon a larger scale than the other figures.

In Fig. 6 the sections of the pipe are shaped each to embrace one-half its circumference, the sections *a* and *b* being provided each with a longitudinal radial flange *a'* at one edge and with a bent flange *b'* at the opposite edge. The sections are thus similar, and any number of similar sections may thus be used in forming the pipe.

Fig. 7 shows the sections united together with the flange *b'* closed over the flange *a* and both bent down over the pipe, as in double seaming.

In Fig. 8 the pipe is shown formed in three longitudinal sections *s*, *s'*, and s^2, united by similar seams, but the seams *g* projecting radially from the pipe.

In Figs. 4 and 5 the die is shown provided with handles *c* and formed with a conical bore *d*, adapted to partially admit the end of the pipe *e*. Longitudinal grooves *f* are formed in the sides of the bore to admit the standing seams *g*. The pipe is made in the following manner:

Sheet-metal section-blanks of suitable length and width are prepared to form the required sections for one length of pipe, and each is shaped at its edges to form a seam in conjunction with the edges of the adjacent sections. The longitudinal seams are then

closed sufficiently to hold the sections together during the twisting operation, and the seams are, after the pipe is twisted, permanently closed to hold the sections in their twisted position.

It will be readily perceived by comparing Figs. 1 and 2 that the spiral seam in Fig. 2 is necessarily longer upon the same pipe than the straight seam in Fig. 1, and it will therefore be obvious that in the twisting operation one or more of the flanges a' must slide longitudinally upon certain of the flanges b' an amount corresponding to the difference in the length of the straight and spiral seams, and that the end of each section will assume an angle with the axis of the pipe, owing to the twisting of each section-blank around such axis. All the seams are not therefore rigidly closed prior to the twisting operation, as such closing would cause a great resistance to such sliding movement of the flanges, but part only of the seams, as the seam g' in Fig. 2, are closed rigidly before the pipe is twisted to hold the sections firmly in their twisted position.

It will be noticed in Fig. 2 that the ends of the blanks a and b coincide upon the closed seam g', thus forcing the sliding of the flanges to occur upon the seam g, at the ends of which the displacement is obvious. It will also be understood that the metal in the flanges a' and b' is materially changed in form during the twisting operation, and receives a permanent set to such form before and during the final closing of the seams. It is well known that longitudinal blanks bent in the form shown in Fig. 6 are in practice, when formed, more or less warped or buckled, so that the flanges a' and b' upon the opposite edges of the section a or b would not lie in the same flat plane. The seaming of the sections together brings the flanges a' and b' into contact without materially affecting the tendency of the sections to warp or buckle, and a perfectly straight pipe is not therefore produced by the mere joining of the seams. I have, however, discovered that the twisting operation serves to remove all the buckle from the pipe and to make it exceedingly straight, while the "set" imparted to the respective sections and the seams formed upon their edges serve to hold the pipe permanently in such straight condition. By retaining the seams in a radial position upon the finished pipe at the close of the final seaming operation, as shown in Figs. 2, 3, and 8, the standing seam greatly re-enforces the pipe in every direction and imparts to it an unusual degree of strength and rigidity.

It will be understood by reference to Fig. 1 that the edges of the sections a and b in the untwisted pipe are parallel with the axis of the cylinder or pipe which they form, the curvature of the metal being transverse at the edges to such axis, while an inspection of Fig. 3 will show that the twisting operation entirely changes the cylindrical curvature of the metal, so that the line of the curvature is not parallel with the edges of the sections, but at an angle thereto equal to the arc through which the pipe is twisted.

The spiral seam formed upon the pipe in my invention is a much longer and more gradual spiral than could be formed by spirally winding a single blank and securing its overlapped edges, and my construction is readily distinguished from any pipe having a single spiral seam instead of two or more, as in my invention.

The blanks for the sections may be formed with oblique ends, so that when the pipe is twisted its ends will be at right angles to its axis. When the standing seam is used, the pipe-lengths may be readily fitted together by flattening down or removing a portion of the seam at each end and fitting the ends to enter one into the other, as is common with sheet-metal pipes, and shown upon the pipe in Fig. 3 at h and h'.

It is immaterial how the pipes are twisted after seaming or how the seams are finally locked to hold the sections in their twisted position, and no means for locking the seams is therefore shown herein.

Having thus set forth my invention, what I claim is—

1. As a new article of manufacture, a sheet-metal pipe formed in two or more longitudinal sections and having twisted seams at the joints of the sections, substantially as herein set forth.

2. As a new article of manufacture, sheet-metal pipes in uniform lengths formed in two or more longitudinal sections and having twisted seams at the joints of the sections, substantially as herein set forth.

3. As a new article of manufacture, a sheet-metal pipe formed in two or more longitudinal sections and having twisted standing seams at the joints of the sections, substantially as herein set forth.

4. As a new article of manufacture, a sheet-metal pipe formed in two or more longitudinal sections and having twisted standing seams at the joints of the sections, with the projection of the seam removed at the ends of the pipe and the ends longitudinally flared and tapered to join the same in series, substantially as herein set forth.

5. As a new article of manufacture, a sheet-metal pipe formed in two or more longitudinal sections united by longitudinal standing seams and having the sections and seams twisted and held in a twisted condition by the locking of the seams, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES L. HART.

Witnesses:
ANSON O. KITTREDGE,
HENRY COLWELL.