

(No Model.)

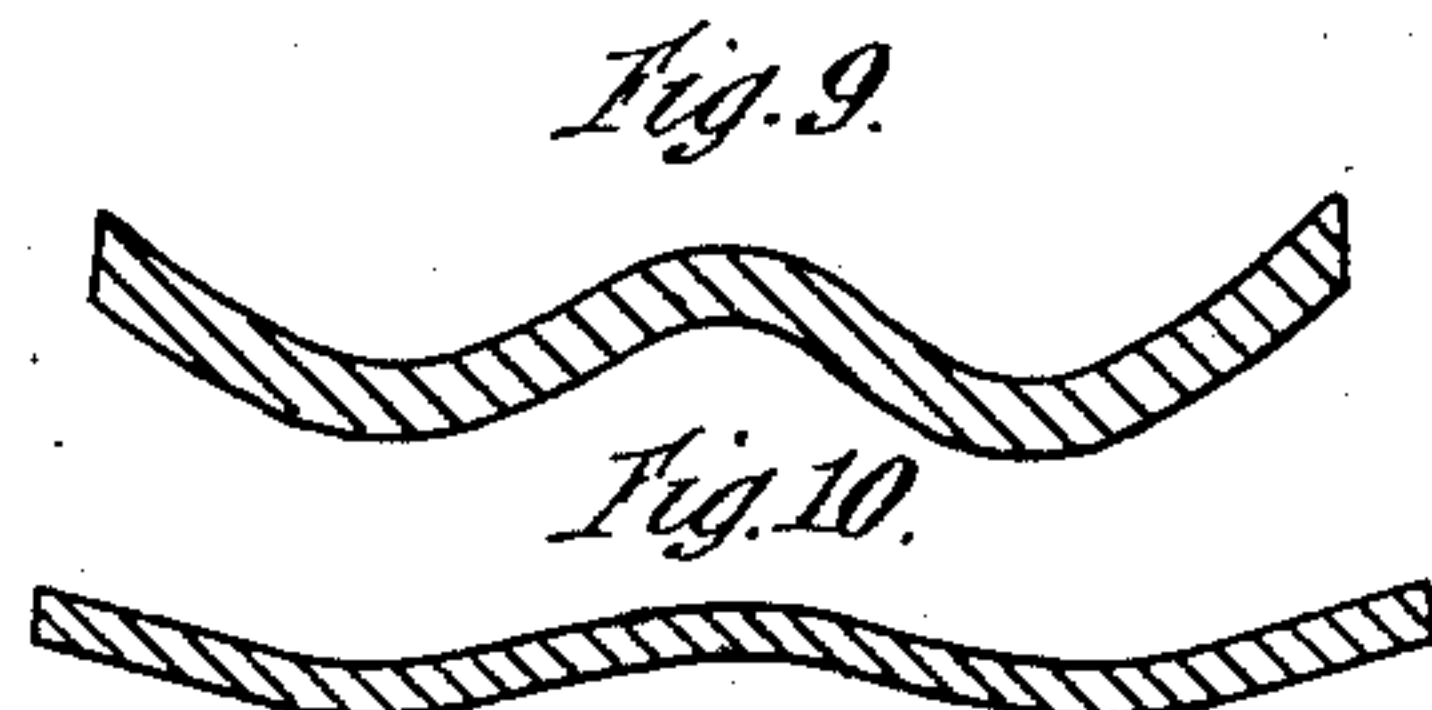
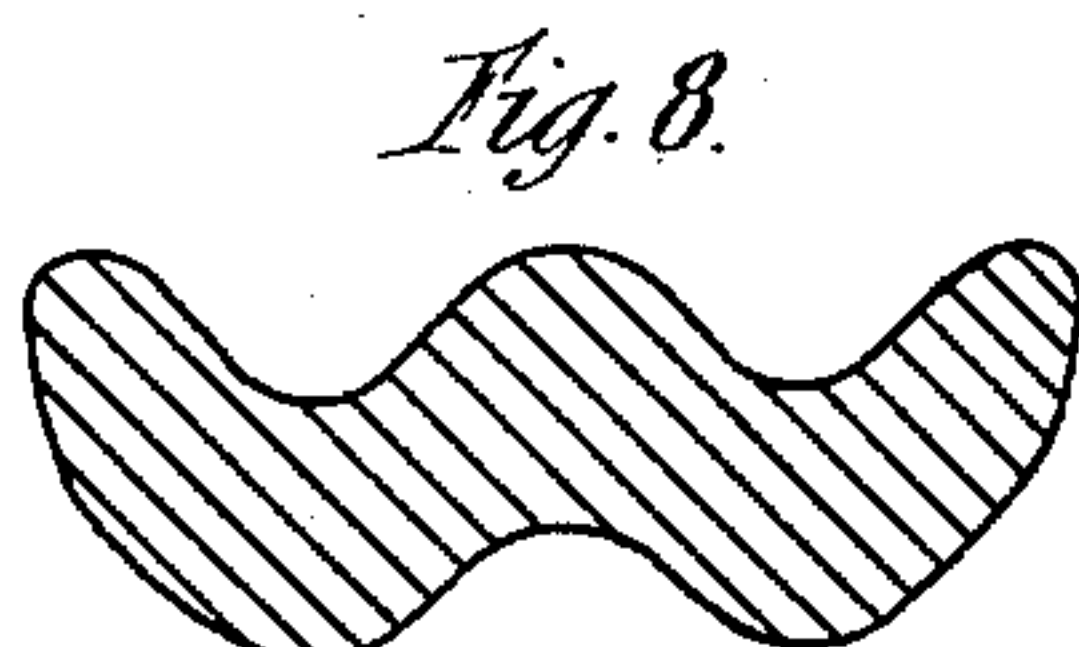
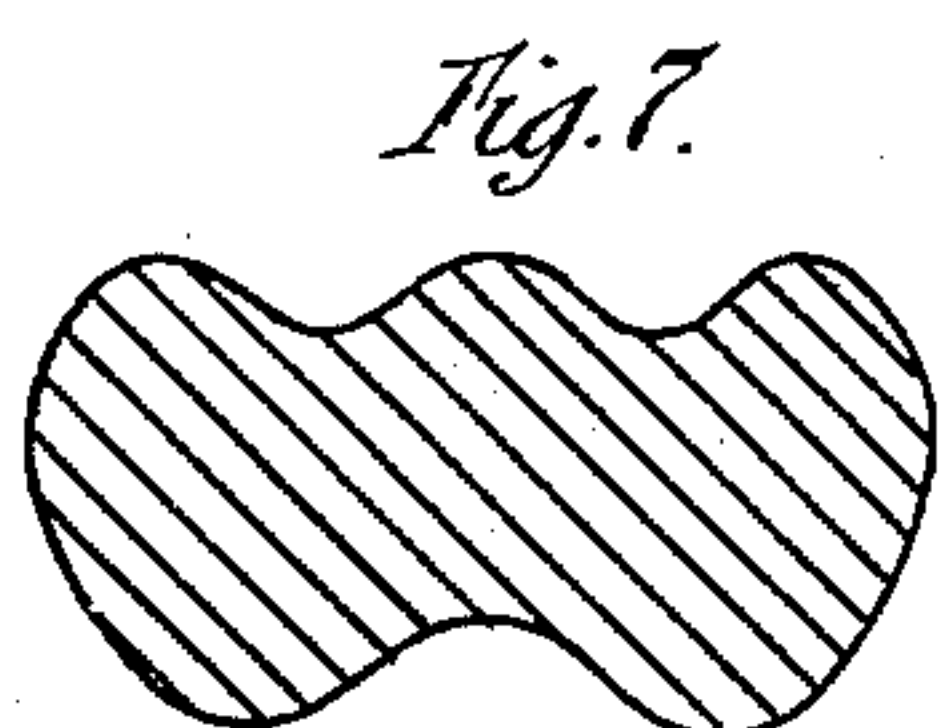
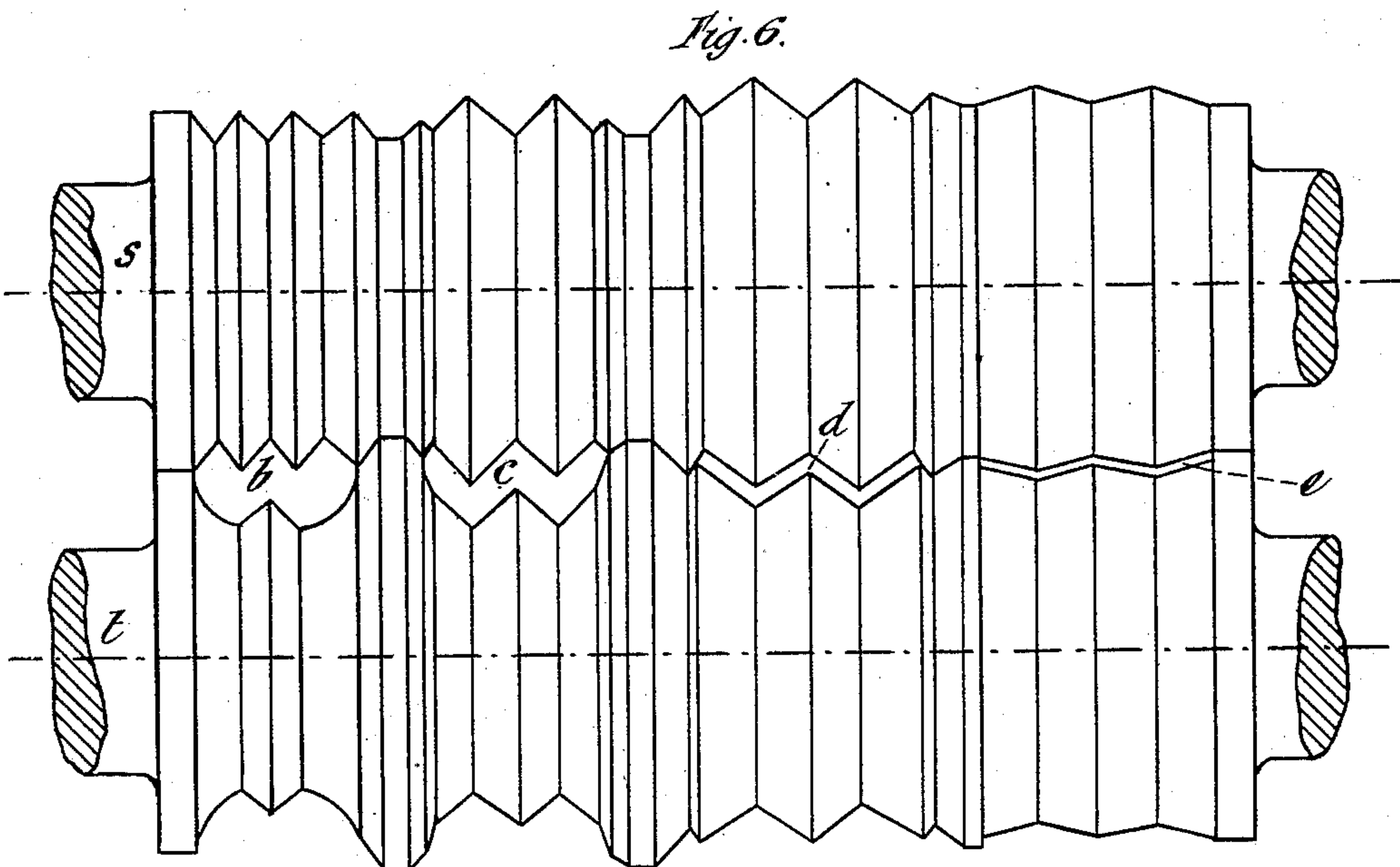
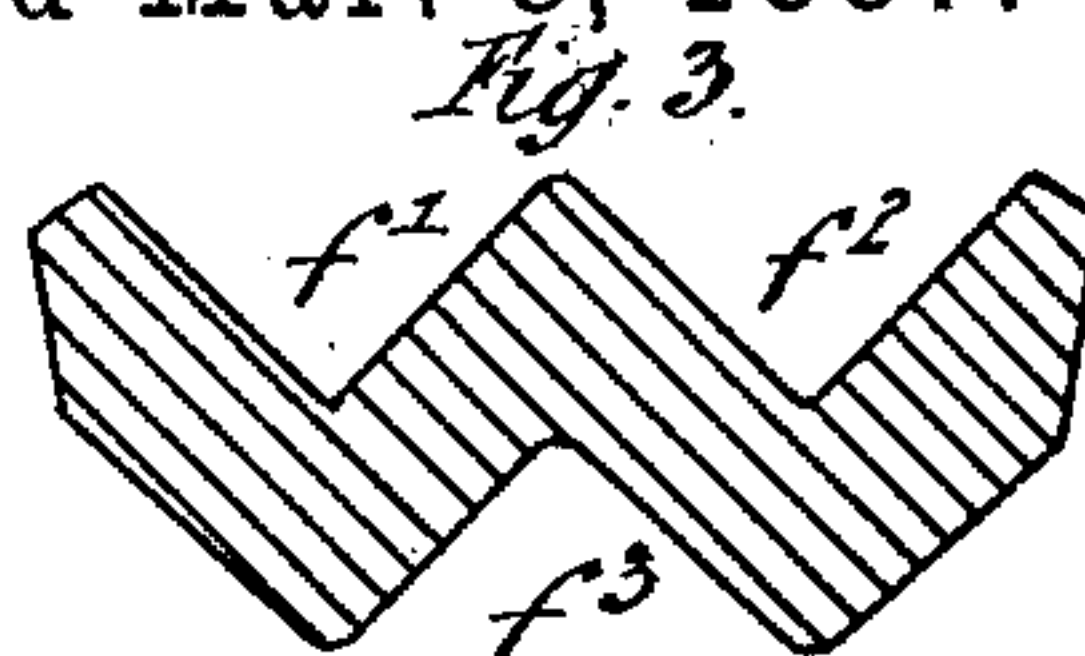
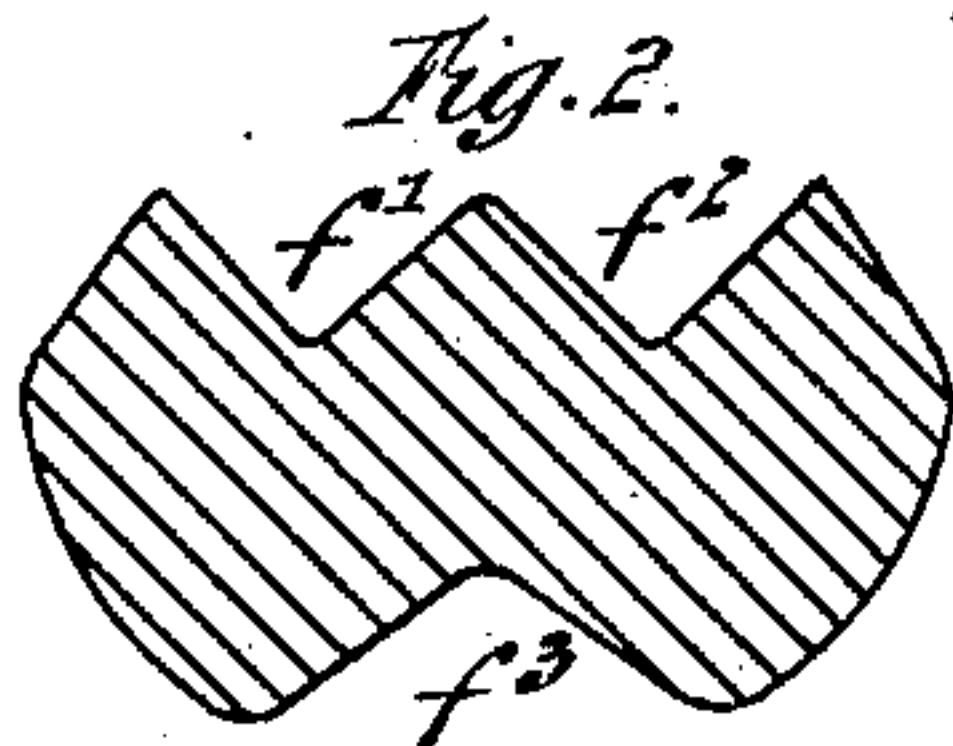
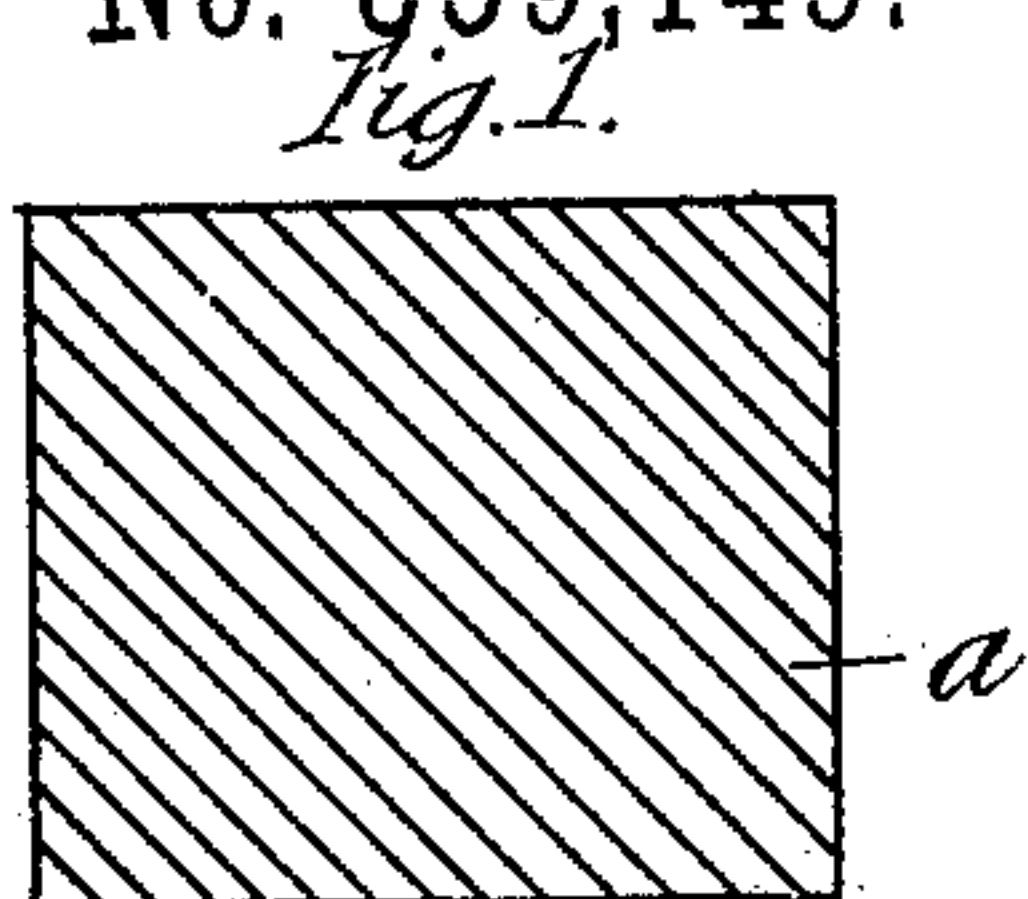
2 Sheets—Sheet 1.

J. GUEST.

ROLLING PLATES OR SHEETS.

No. 359,149.

Patented Mar. 8, 1887.



WITNESSES.

Charles Bosworth Kitley
William Charles Batten

INVENTOR.

Joseph Guest

(No Model.)

2 Sheets—Sheet 2.

J. GUEST.

ROLLING PLATES OR SHEETS.

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Fig. 11.

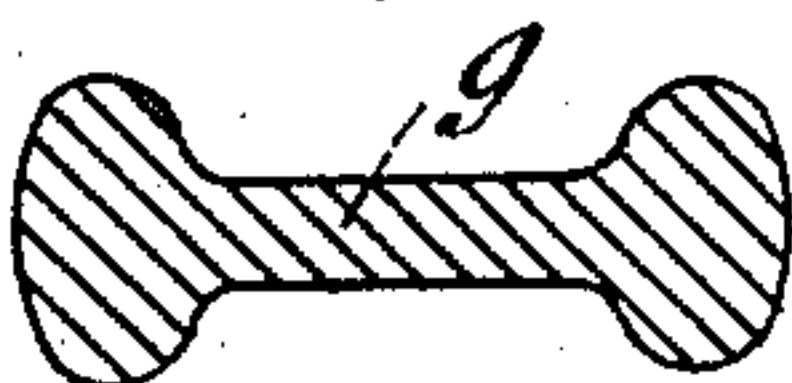


Fig. 12.



Fig. 13.

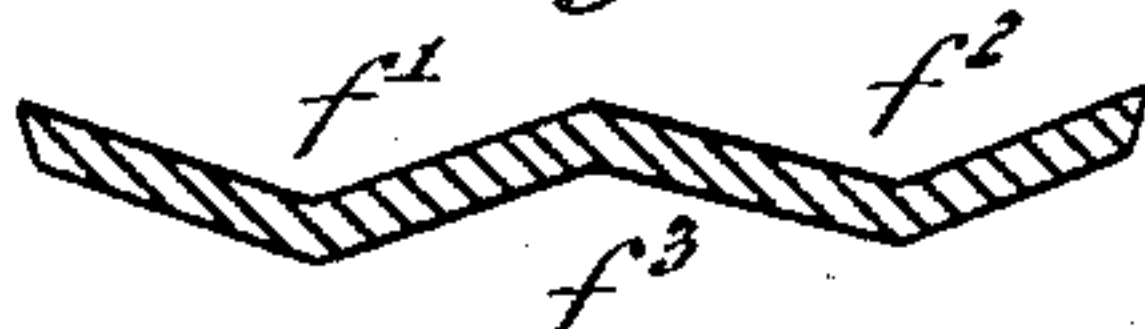
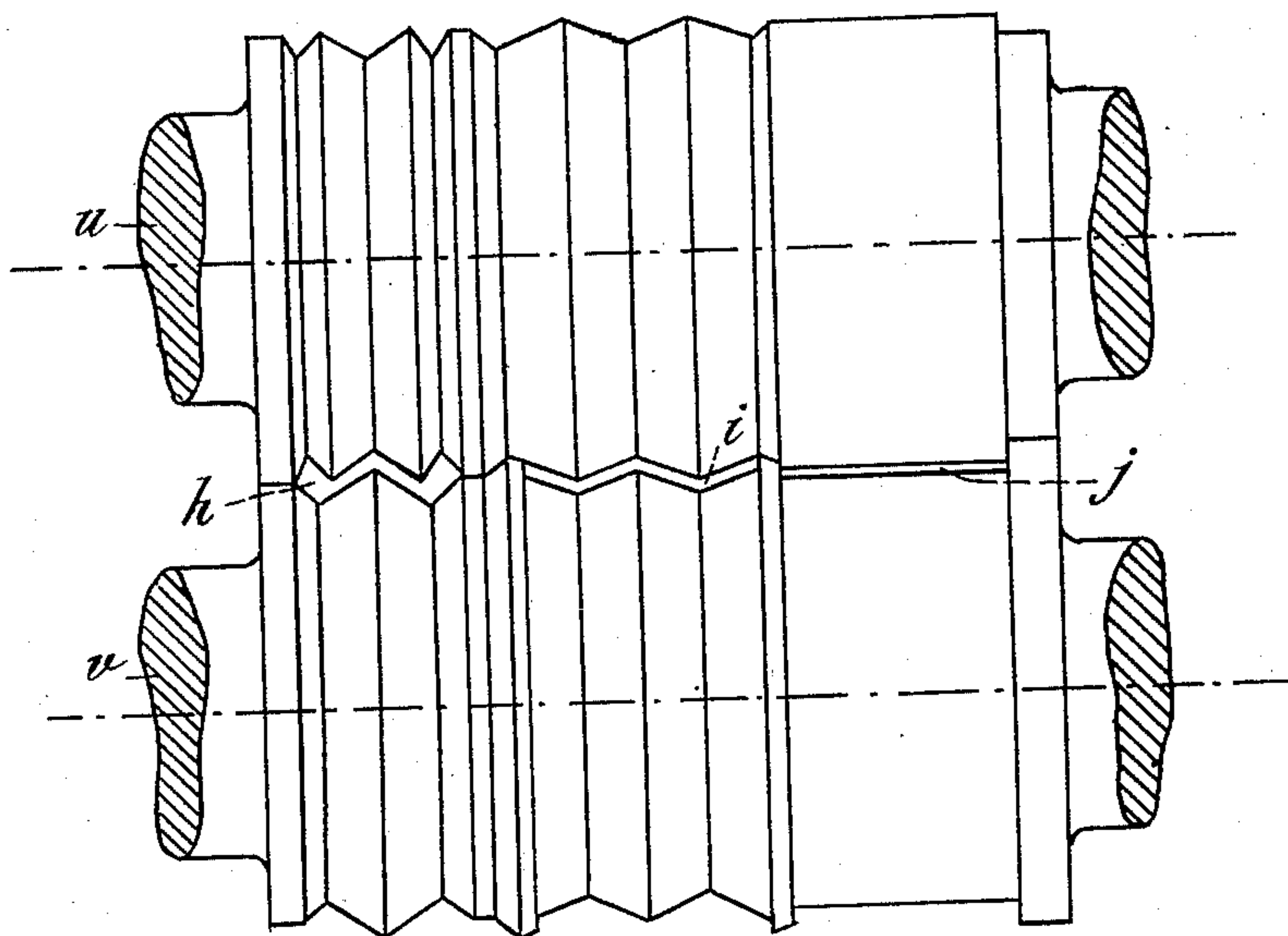


Fig. 14.



Fig. 15.



WITNESSES.

Charles B. Smith Ketley
William Charles Batten

INVENTOR.

Joseph Guest

UNITED STATES PATENT OFFICE.

JOSEPH GUEST, OF TIPTON, COUNTY OF STAFFORD, ENGLAND.

ROLLING PLATES OR SHEETS.

SPECIFICATION forming part of Letters Patent No. 359,149, dated March 8, 1887.

Application filed September 4, 1886. Serial No. 212,734. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH GUEST, a subject of the Queen of Great Britain, residing at Tipton, in the county of Stafford, England, have invented certain new and useful Improvements in Rolling Plates, Sheets, Merchant-Strips, Armor-Plates, and other Similar Sections of Iron and Steel, of which the following is a specification.

My invention relates to improvements in rolling plates, sheets, merchant-strips, armor-plates, and other similar sections from iron piles, steel ingots, or old railroad-rails, or from other similar sections of iron and steel; and the chief object of my invention is to reduce the thickness of an iron pile, steel ingot, old railroad-rail, or other similar section of iron or steel faster than heretofore, and further to spread the metal laterally as it is passing through the rolls.

In the accompanying drawings, Figure 1 represents in cross-section an ordinary iron pile or steel ingot; and Figs. 2, 3, 4, and 5 illustrate progressive stages in the manufacture of sheets, strips, or plates from the pile or ingot illustrated by Fig. 1. Fig. 6 represents in front elevation, on a smaller scale, part of a pair of rolls for rolling the same; and Figs. 7, 8, 9, and 10 illustrate modified forms of the progressive stages represented by Figs. 2, 3, 4, and 5, respectively. Fig. 11 is a cross-section of the double-headed roll previous to its being rolled. Figs. 12, 13, and 14 represent progressive stages in the rolling. Fig. 15 represents a pair of rolls for rolling the same.

I will first describe my invention as applied to the process of forming by hot-rolling the sheet, plate, or strip from an ordinary square or rectangular iron pile or steel ingot, and for this purpose will refer to Figs. 1 to 10, inclusive.

I take a square or rectangular iron pile or steel ingot, *a*, Fig. 1, (it having been previously heated in a suitable furnace,) and pass it through the gate or pass *b* of the rolls *s t*, which are so shaped as to make three deep angular longitudinal grooves, $f' f^2 f^3$, along the bar, and by slightly spreading its four sides to give it the cross-section shown by Fig. 2.

The said bar is then passed through the pass *c*, when it assumes the section shown by Fig. 3, which resembles the letter **W**, or the letter **M** upside down. The said bar is then passed through the gates *d* and *e*, which gradually flatten it and spread it laterally by making the angles $f' f^2 f^3$ more and more obtuse. (See Figs. 4 and 5.) The bar or strip thus formed, Fig. 5, after being cut up into suitable lengths, is then rolled flat and reduced to the thickness required by means of ordinary rolls, which (except in the case of very thin sheets) can generally be accomplished without reheating, thus effecting a considerable saving in fuel and heating-furnaces.

It will be evident that a pile or ingot can be reduced to strips so quickly by the process above described that when rolling sheets one strip-mill will produce enough strips to employ two or more sheet-mills.

The angular shape of the longitudinal grooves $f' f^2 f^3$ may be modified without departing from the spirit of my invention, as they may, for instance, be semicircular or semi-elliptical, as shown by Figs. 7, 8, 9, and 10, and their number may be increased as is required when rolling armor-plates and other wide plates and sheets.

When rolling plates, sheets, or strips from steel ingots, the ingots themselves may be similar in cross-section to the letter **M** or **W**, (see Figs. 2, 3, 7, and 8,) the longitudinal grooves being either angular or rounded, thus requiring less rolling than if the ingot were made square or rectangular, as above described with reference to Fig. 1.

Fig. 11 is a cross-section of an ordinary double-headed rail, which is required to be rolled into a flat strip or plate, and Figs. 12, 13, and 14 illustrate progressive stages in the manufacture of a flat strip or plate from the rail illustrated by Fig. 11. Fig. 15 represents in front elevation, on a smaller scale, part of a pair of rolls for rolling the rail illustrated by Fig. 11 into the flat strip or plate illustrated by Fig. 14.

In rolling the double-headed rail *g* represented in cross-section by Fig. 11 into the flat strip or plate illustrated by Fig. 14, a pair of

rolls, *u v*, are employed having grooves and notches, which form the passes *h i j*, as shown by Fig. 15. The rail *g* is successively passed through the passes *h i*, which flatten its heads 5 and make them uniform, or almost uniform, in thickness with the web of the rail, (see Figs. 12 and 13,) and the web is at the same time made convex or angular in shape, so that the cross-section resembles the letter **W**, or the 10 letter **M** upside down, the longitudinal grooves *f' f² f³* being angular, as shown by Fig. 13, or rounded off, as shown by Fig. 9. The strip or plate thus formed (see Fig. 14) is then flattened by being passed through the pass *j*, after 15 which it can be cut into lengths and finished, if required, by ordinary rolls.

I have found the number of passes through which the various bars have to pass, as represented on my drawings, to answer well in practice; but I do not limit myself to the numbers 20 shown, as greater or smaller numbers will have to be employed, according to the shape of the pile, ingot, or old rail and the section of finished iron or steel required to be produced.

What I claim as my invention, and desire 25 to secure by Letters Patent, is—

1. The improvements in rolling consisting in passing the metal to be rolled through rollers, which first form three or more longitudinal grooves therein, and then gradually flatten the said grooves, substantially as hereinbefore described. 30

2. The improvements in rolling consisting in passing the metal to be rolled through rollers, which first cause it to gradually spread 35 laterally and to assume the shape of the letter **M** or **W**, or approximately the shape of the letter **M** or **W**, and then roll out the bar thus formed into a flat plate or strip, substantially as hereinbefore described. 40

In testimony whereof I have signed in the presence of two subscribing witnesses.

JOSEPH GUEST.

Witnesses:

CHARLES BOSWORTH KETLEY,
WILLIAM CHARLES BATTEN.