

May 2, 1939.

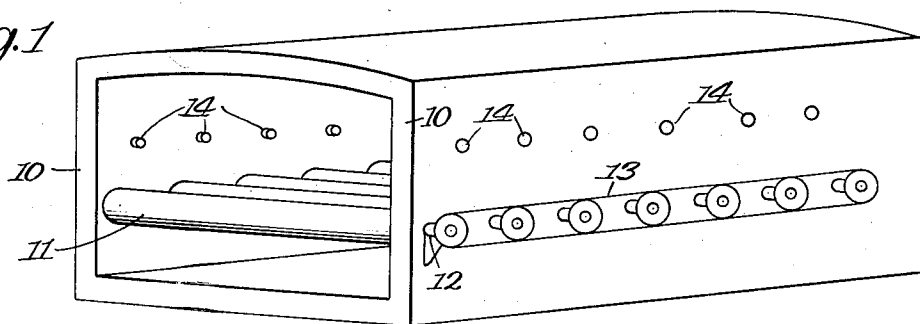
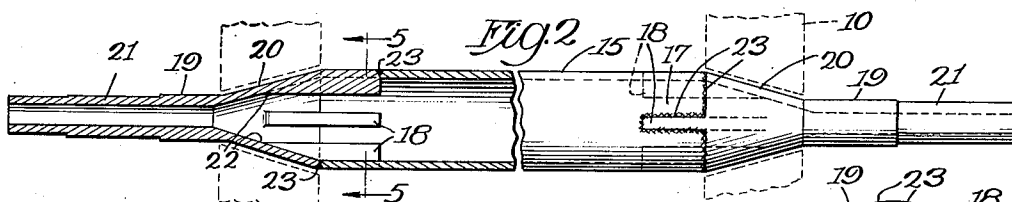
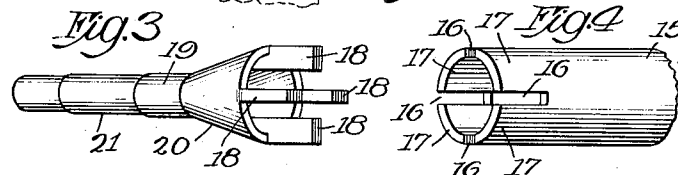
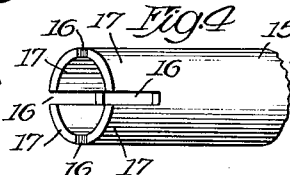
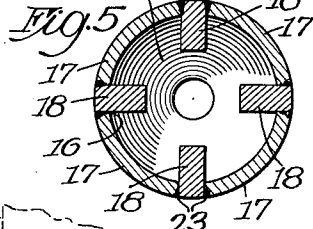
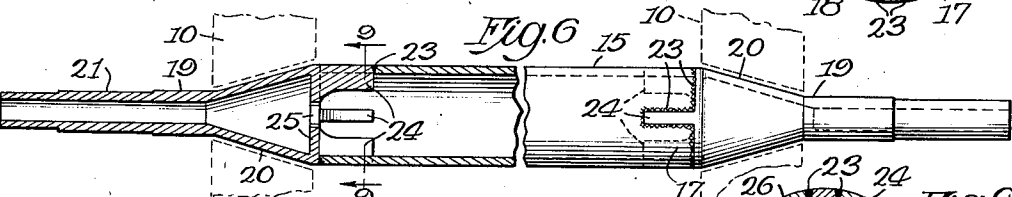
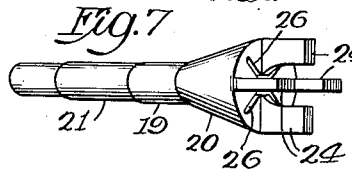
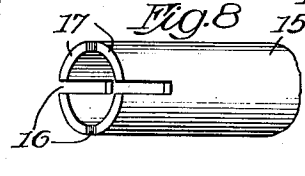
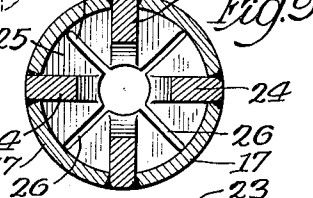
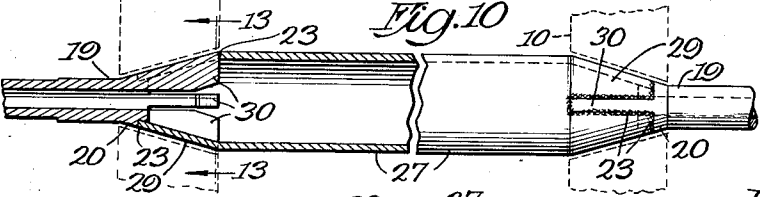
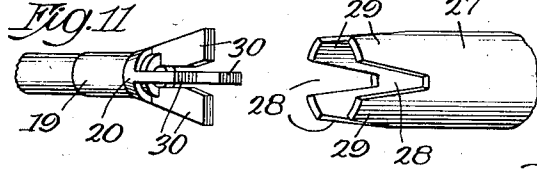
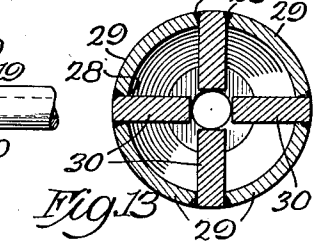
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2,156,395

ROLL FOR HEAT TREATING FURNACES

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Fig. 1



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UNITED STATES PATENT OFFICE

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ROLL FOR HEAT TREATING FURNACES

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3 Claims. (Cl. 263—6)

This invention relates to rolls for heat treating furnaces and has for its principal objects to form the body of the roll and the end portions thereof separately, each in a manner best suited to its production, and then unite the parts by joints of strength suited to the peculiarities of the work those rolls have to do. Further objects and advantages of the invention will appear as the description is read in connection with the accompanying drawing in which

Fig. 1 is a diagram of one form of heat treating furnace used for normalizing rolled sheets; Fig. 2 is a side elevation partly in section, of one of the rolls for such a furnace embodying this invention;

Fig. 3 is a perspective view of one of the end portions of the roll shown in Fig. 2;

Fig. 4 is a perspective view of one end of the body portion of the roll shown in Fig. 2;

Fig. 5 is a cross section taken on the line 5—5 of Fig. 2;

Fig. 6 is a side elevation partly in section similar to Fig. 2, showing a modified construction;

Figs. 7, 8 and 9 are perspective views and cross sections of the roll shown in Fig. 6 and correspond to Figs. 3, 4 and 5;

Fig. 10 is a side elevation partly in section of another modified form of roll, and

Figs. 11, 12 and 13 are views of the roll shown in Fig. 10 and correspond to Figs. 3, 4, and 5.

But these particular illustrations and the corresponding description are used for the purpose of disclosure only, and those skilled in the art will be able to make other forms embodying the invention intended to be covered by the claims.

In the diagram of Fig. 1, 10 indicates the walls of a furnace equipped with rolls 11, projecting through the walls and journaled in suitable bearings 12, and driven in unison by selected means 13. Also by way of diagrammatic illustration, 14 indicates nozzles by which the furnace is heated.

Furnaces of this character are operated at high temperatures, for instance, between 1200° F. and 2100° F. The sheets, or other material to be normalized, or treated, are fed onto the rolls and by them moved through the furnace at a speed suited to the condition of treatment. The rolls have to bear the load, do the driving or propelling of the sheet, and resist the temperatures and sometimes a corrosive atmosphere in the furnace. For that reason they are often made of so-called heat-resistant alloys. For instance—

Per cent

Nickel.....	35 to 9
Chromium.....	15 to 28
Iron.....	Principal remainder

Alloys of this general character are difficult to work and machined surfaces are less resistant to the furnace conditions than unmachined sur-

faces. The rolls must be perfectly balanced and truly cylindrical, or the feeding will be uneven and hence there will be friction against the material under treatment to the damage of the material and the rolls.

According to this invention the body portion 15 of each roll is a hollow cylinder preferably made by centrifugal casting, a familiar process that need not be described, but has the great advantages of making the cylinders with great uniformity throughout and making the outer walls or surfaces of a character suited to this service without any subsequent treatment.

Each end of the cylindrical body portion is slotted at 16 to define or form broad teeth 17 to be intermeshed with narrower but deeper teeth 18, projecting from the corresponding end portion 19 of the roll. Each end portion has a tapering or conical section 20, and reduced portions 21, the latter suited for journals and receiving elements of the driving gear.

In the form shown in Figs. 2 to 5, the teeth 18 extend from a point 22 well into the tapered portion 20, and are of sufficient depth to form generous reinforcing ribs for the roll, as will appear clearly in Figs. 2 and 5. The teeth 17 and 18 may be called reciprocal and when intermeshed, as indicated in Figs. 2 and 5, they interlock the body portion and end portions. After being brought to this relation the adjacent surfaces of the body and end portions are welded, as indicated at 23. This, in effect, makes a homogeneous union between the separately formed parts and by virtue of the deep reinforcing ribs formed by the teeth 18, this union is given a strength suited to the severe service.

The end portions being relatively complicated in form, are most easily made by sand casting. Whether they are of the same heat resistant alloy as the body portion is somewhat a matter of choice dependent upon the construction of the furnace. When the walls 10 of the furnace are in the positions indicated by the dotted lines, very little of the end portion metal will be exposed to the furnace conditions and, for that reason, a less expensive material can be used in making the end portions.

In the form shown in Figs. 6 to 9, the teeth 24, corresponding to the teeth 18 in the first form, are shorter, and their ends towards the tapered section 20 are reinforced by webs, or gussets 25, separated by narrow slots 26 to facilitate casting. Otherwise the construction is substantially the same as in the first form described.

In the form shown in Figs. 10 to 13 the tapered section is very short. The body portion 27 is correspondingly longer than in the other forms. The slots 28 are tapered thereby defining tapering teeth 29, which are swaged down to intermesh with the teeth 30 on the end portions, after

which the adjacent surfaces are welded at 23, as before.

In this form it will be noted that the metal of the erstwhile end portions of the roll is hardly exposed to furnace conditions at all. Hence, it can be made of a cheaper alloy even when the furnace conditions are extremely severe both as to temperature and as to atmosphere. The construction, however, requires an additional length of heat resistant alloy in the centrifugally cast body portion and a forming operation to make the teeth 29 properly cooperate with the teeth 30 and, in effect, make up the tapered section of the roll.

I claim as my invention:

1. A roll for conveying material through heat treating furnaces comprising a hollow body section of high heat resisting material, a pair of end sections having reduced outer portions forming journals, one of said sections at each end of the roll having narrow slots forming comparatively wide teeth and the other section adjacent thereto having narrow teeth engaging in said slots, said teeth having a materially greater dimension radially of said roll than circumferentially thereof and materially greater than the thickness of the material of said roll, and welds along the meeting edges of said teeth.

2. A roll for conveying material through heat treating furnaces comprising a hollow cylindrical

body section of heat resisting material, its ends being provided with narrow slots spaced about the periphery of said ends to provide a broad tooth between each adjacent pair of slots, roll end sections having narrow teeth of materially greater depth than the thickness of the material of said body section engaging in the slots in said body section and welded thereto, the teeth of the end sections extending radially inwardly beyond the inner periphery of said body section to form strengthening ribs for the roll, and the ends of said roll being reduced to form journals for said roll.

3. A roll for conveying material through heat treating furnaces comprising a hollow body section of high heat resisting material having tapered outer ends provided with narrow slots to provide comparatively wide teeth on the outer ends of said body section, roll end sections having complementally tapered inner end portions provided with narrow teeth engaging in said slots, said last-named teeth having a materially greater dimension radially of said roll than circumferentially thereof and materially greater than the thickness of the material of said roll, and welds along the meeting edges of said teeth, said end sections having their outer ends reduced to form journals for said body section.

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