

(No Model.)

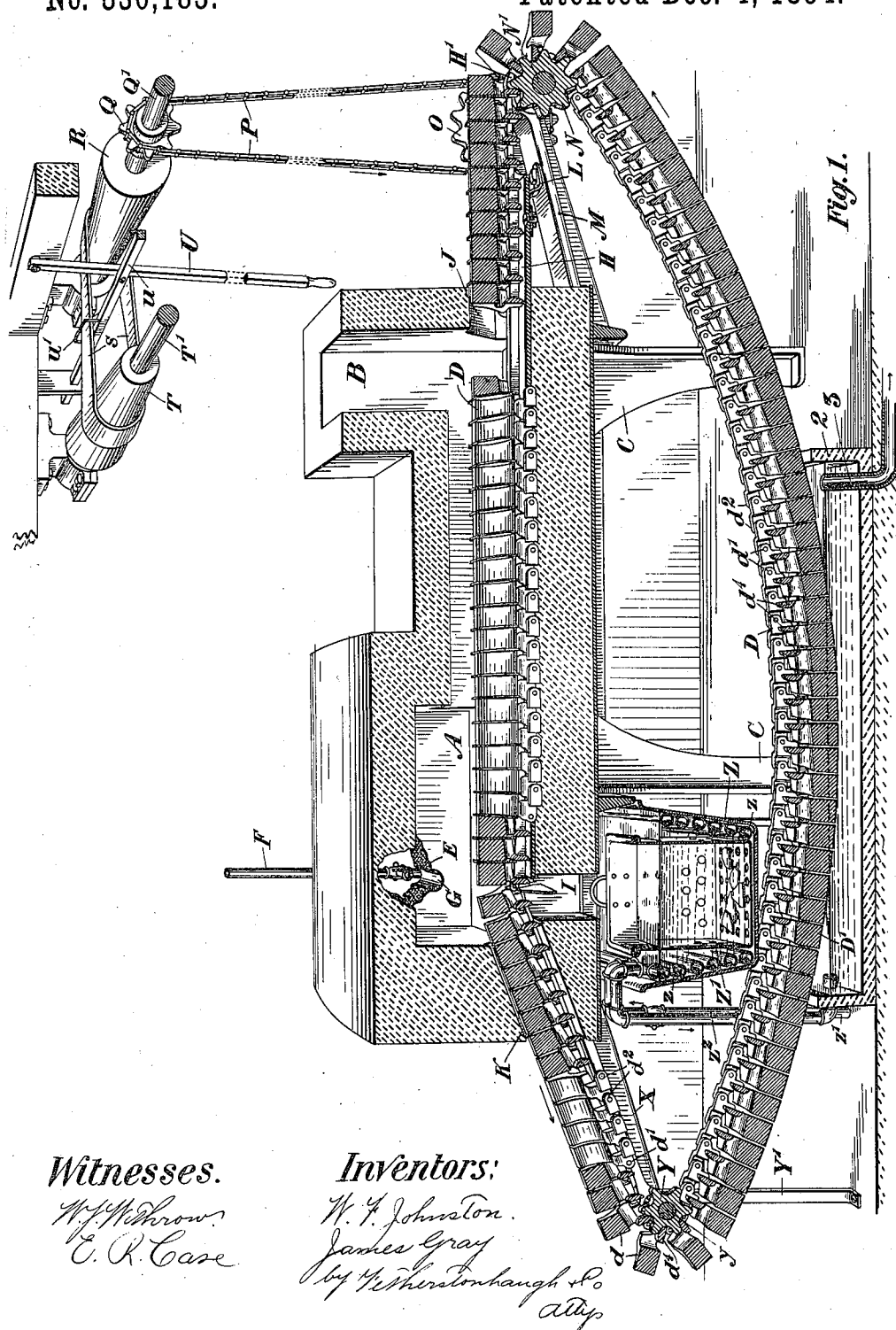
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W. F. JOHNSTON & J. GRAY.

APPARATUS FOR HARDENING KNIFE SECTIONS OR OTHER ARTICLES.

No. 530,183.

Patented Dec. 4, 1894.



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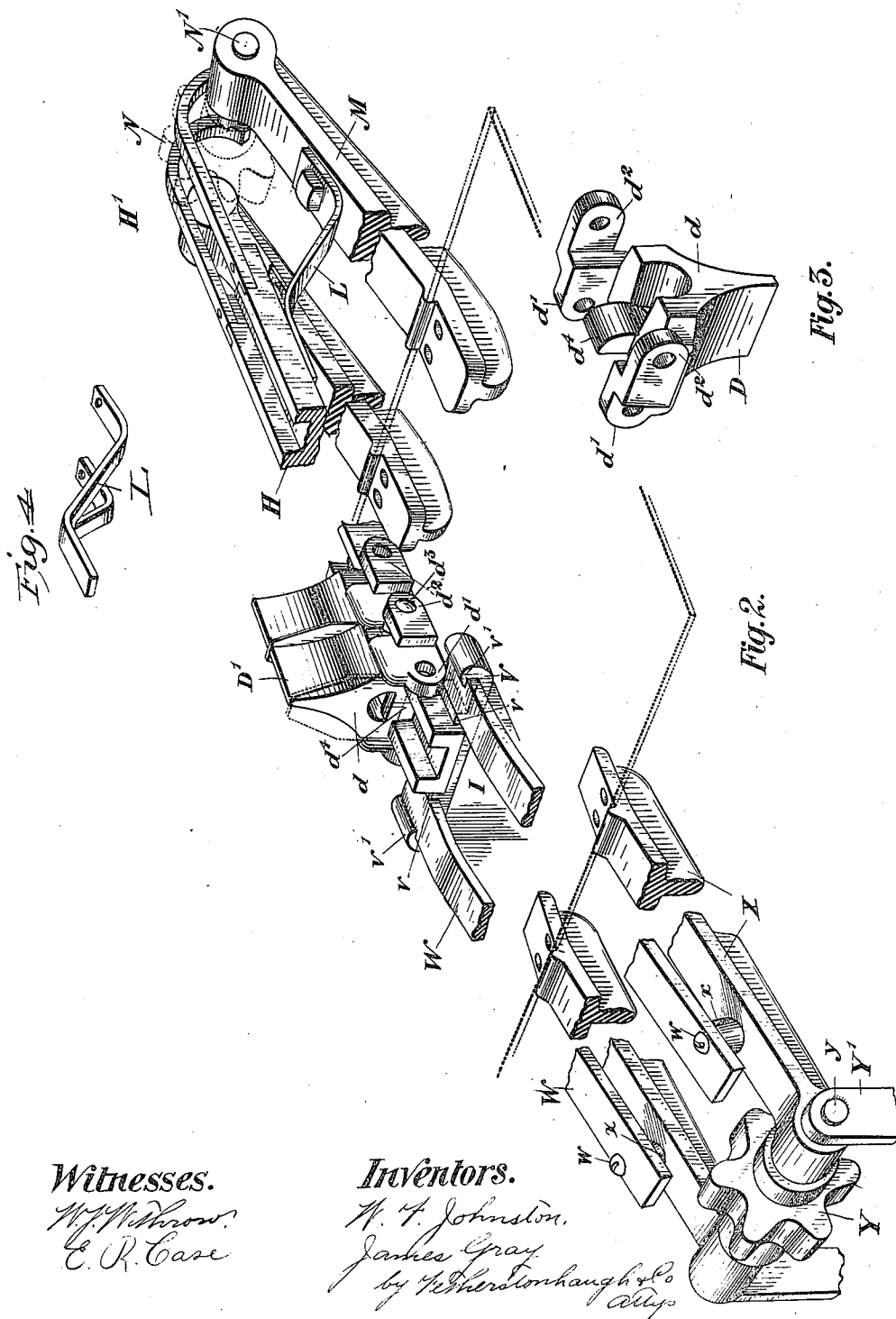
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UNITED STATES PATENT OFFICE.

WILLIAM F. JOHNSTON AND JAMES GRAY, OF TORONTO, CANADA, ASSIGN-
ORS TO THE MASSEY-HARRIS COMPANY, OF SAME PLACE.

APPARATUS FOR HARDENING KNIFE-SECTIONS OR OTHER ARTICLES.

SPECIFICATION forming part of Letters Patent No. 530,183, dated December 4, 1894.

Application filed March 7, 1894. Serial No. 502,757. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. JOHNSTON, manufacturer, and JAMES GRAY, mechanic, both of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Apparatus for Hardening Knife-Sections of Harvester-Binders or Similar Articles, of which the following is a specification.

Our invention relates to an improved apparatus for hardening the edges or other desired portions of knives, sections of knives, ledger plates and such like articles and the object of the invention is to design such an apparatus whereby the cutting edges of the sections may be successively and rapidly hardened with greater uniformity in heating and hardening than by the apparatus now employed, without affecting such portion of the section, which it is desirable to leave soft and tough, and thereby effect by our improved apparatus an economy both in time and labor, and for placing each section or piece to be heated or hardened between peculiarly formed links of a traveling chain, which passes through a fire chamber where it is subjected to a high degree of heat, so that the edges of these sections or pieces to be heated or hardened are brought to the desired heat, means being provided whereby each section or piece may be taken from, or may drop from or through the chain from the fire chamber into a hardening tank, the apparatus being arranged and constructed in detail as hereinafter more particularly explained.

Figure 1, is a perspective sectional view through the fire chamber of a furnace, traveling chain, and other parts of the apparatus, the chain being shown for the major portion in section. Fig. 2, is an enlarged perspective detail showing the means whereby the chain is supported. Fig. 3, is an inside view of the form of link, in chain shown, which is adapted for the sections of knives of harvesting machinery. Fig. 4 is a detail view.

In the drawings like letters and numerals of reference indicate corresponding parts in each figure.

A, is the ordinary fire chamber of an oil

furnace and B, the flue. The furnace body is supported preferably upon legs, C.

D, is an endless chain, which is shown mostly in cross section and is comprised of a series of links, *d*. Each of the links is preferably made up of two forwardly extending lugs, *d'*, and two rearwardly extending lugs, *d''*, a greater distance apart than the forwardly extending lugs, *d'*; the rearwardly extending lugs of each link being pivotally connected to the forwardly extending lugs of the succeeding link by suitable rivets, *d'''*. The space between the lugs of each link is open with the exception of a downwardly extending tooth, *d¹*, situated between the forwardly extending lugs, *d'*. The side portion, *D'*, of each link is preferably concavo-tapered to an apex. The ends of the outer portion *D'*, are parallel to each other.

E, is an oil burner, which is supplied with oil from a pipe, F, and has air pumped into the burner, so as to spray it into the interior of the fire chamber through the opening, G, shown in Fig. 1. It will be understood that there is preferably a burner at each side or end although only one is shown, which burners when ignited serve to keep the interior of the fire chamber at a very great heat. Although we preferably use petroleum as fuel we do not wish to confine ourselves to its use as other kinds of fuel might possibly be used as advantageously.

H, is a channel iron, which extends from the opening I, at one end of the furnace to a point beyond the opposite side of the furnace. The chain passes through an opening, J at the flue end of the oil furnace and an inclined opening K, at the opposite end. The end of the channel iron, H, is supported upon the forked bracket, L, which is bolted to the channel brackets, M, which in turn are secured to the bottom plate of the body of the furnace as indicated in Figs. 1 and 2 and particularly in Fig. 2, in which the holes for the bolts are shown.

N, is a sprocket wheel shown in section in Fig. 1, and in dotted lines in Fig. 2. The sprocket wheel, N, is secured on the shaft, *N'*, which is journaled in the outer ends of the brackets, M, as indicated.

11', are curved extension bars of the channel iron, H, the bars being of the same width as the side ribs of the channel iron. The outer ends of the bars 11', are curved on a slightly smaller arc than, and one which is preferably concentric with, the circle described by the top of the tooth as the sprocket wheel rotates. It will thus be seen that as the width of the knife sections is the same as from outside to outside of the channel iron that the curved extending bars, 11', will receive the teeth and hold them up in position until they reach the channel iron, H. The sprocket wheel, N, is driven through the sprocket wheel, O, by a sprocket chain, P, to the sprocket wheel, Q, on the shaft, Q', which is supported in suitable bearings, which are preferably suspended from the beams of the ceiling.

R, is a tapered pulley, which is connected by a belt, S, to a tapered pulley, T, on the driving shaft, T', which is supported in suitable bearings.

U, is a lever pivotally connected to a bar, u, which is suitably supported. The bar, u, has a loop u', which extends over the belt. By tilting the lever on its pivot the position of the belt on the tapered pulleys may be changed so as to drive the sprocket wheel, N, and consequently the chain, D, at such a desired speed as will best effect the proper heating of the knives as they pass through the fire chamber as hereinbefore described. We preferably use means for speeding the chain instead of increasing or decreasing the intensity of the heat in the fire chamber which alternative means; however, we lay claim to in connection with our invention.

The channel iron, H, is supported upon the bed of the fire chamber through which it extends longitudinally slightly beyond the edge of the opening, I.

V, is a bar, which extends beneath the end of the channel iron above the opening and has two upwardly extending ribs, v, one on each side of the channel iron and two end lips, v'.

W, are two parallel bars, the upper ends of which are horizontal and extend underneath the lips at each side into the recess formed between the ribs, v, and lips, v'. The inner edges of the bars, W, are entirely outside the line of the channel iron and the bars are bent so as to extend downwardly obliquely from immediately above the opening, I, to the bearing brackets, X, at the forward end of the machine to which they are secured by screw bolts, w, passing through the bars W, near the outer edge into the bosses, x, attached to or forming part of the bearing brackets, X, which in turn are secured to the bottom of the furnace body by suitable bolts, holes being shown for such bolts in Fig. 2.

The bars, W, are designed to form a support for the chain, D, and the bend in the bars is designed to cause the links of the chain to open as they pass over the angle as

indicated in Fig. 1, so as to permit a section when heated to drop through the opening, I. The teeth of the chain pass over the sprocket wheel, Y, at the forward end, which sprocket wheel is supported on the shaft, y, which is journaled in the end of the bearing brackets, X, and supports, Y'.

Z, is a tank, which is filled with sperm oil, water, or other suitable liquid and has situated within it the open work basket, Z'. The tank is made of a greater width than the width of the furnace so that the basket can be inserted into it or taken out from it at each end.

z, is a series of coils which extend throughout the length of the tank at each side and have a continual supply of cold water from the main by means of the pipe, z', which is connected to one end of the coil, z. The object of passing the cold water through these pipes is to keep the liquid in the tank cool and thereby effect the proper hardening of the section.

z², is a pipe which leads from the other end of the coil into a tank, 2, which is located on the floor. 3, is an over flow pipe for such tank, so that the water returned from the coil is always kept at the same level in the tank, 2. The height of the water in the tank, 2, is such that the sag of the chain admits of the points of the outer portion of the link passing through the water as indicated in Fig. 1. We find in practice that the outer points of each link are heated to such an extent that were such a device as the tank not provided, the outer end of each link would in time become heated and thus destroy their usefulness by communicating such heat to that portion of the section, which it is necessary to keep cool. By submerging the points, however, in the water in the tank as they pass around their temperature is reduced to such a degree that when they reach the fire chamber they serve to keep that portion of each section, with which they come in contact, cool as it passes through the fire chamber.

As hereinbefore described the endless chain, D, is driven in the direction indicated by arrow through the sprocket wheel, O, chain, P, sprocket wheel, Q, and the rapidity at which the chain is driven is regulated by the position of the belt upon the tapered pulleys, R, and T. The flame emitted from the burners, E, on each side of the fire chamber, A, of course acts upon the exposed parts of the sections as they pass through the fire chamber. On account of the thickness of material in the outer portion or point of the links of the chain it will be seen that intense heat is prevented from reaching the covered parts of the sections, which will consequently remain soft and tough. The outer edges of the teeth are heated to the degree desired and when each tooth reaches the opening, I, it passes through the opened chain down through the opening into the open work basket, Z', in the cooling tank, which rapidly cools each section. When the basket, Z', is filled it can be removed from

either side and another basket substituted in its place.

From this description it will be seen that we provide a very simple and efficient means by which the desired parts of the sections of knives or other similar articles may be hardened without affecting the portion of the section which it is desired to leave soft and tough.

It will of course be understood that the links of the chain would be necessarily constructed according to the specific form of article which it is desired to harden. It will also be understood that although we show a drive through the tapered pulleys that our machine might be driven by hand, or in any other suitable manner.

What we claim as our invention is—

1. In an apparatus for hardening the edges or desired portions of knife sections and similar articles, the combination with the fire chamber, of an endless chain passing therethrough consisting of a series of links suitably formed to receive the sections between the abutting faces of said links so as to cover the portions to be left soft and tough and expose the portions to be heated or hardened.

2. In an apparatus for hardening the edges or desired portions of knife sections and similar articles, the combination with a fire chamber of a furnace, of an endless chain passing therethrough consisting of a series of links suitably formed to receive the sections or pieces and expose the portions to be heated and hardened, means for supporting the sections or pieces within the links of the chain as they pass to and through the fire chamber and for opening the links of the chain to free each section or piece and discharge it after having passed through the fire, and a hardening tank adapted to receive the pieces discharged.

3. In an apparatus for hardening the edges or desired portions of knife sections and similar articles, the combination with the fire chamber of a furnace, of an endless chain passing through said fire chamber, consisting of a series of links suitably formed to receive the sections or pieces, between the abutting faces of said sections, so as to cover the portions to be left soft and tough, and expose the portions to be heated and hardened, and means for speeding the chain, substantially as described.

4. The combination with the fire chamber of a furnace and an endless chain passing through the fire chamber consisting of a series of links with concavo-tapered outer portions and parallel ends between which the sections fit so that their edges project, of a channel iron H, in the fire chamber, and the chain teeth passing over said channel iron and supported thereby, substantially as described.

5. The combination with the fire chamber of a furnace and an endless chain passing therethrough consisting of a series of links suitably constructed to receive the sections or pieces and expose the desired portions of

the same, of the channel iron H, in the furnace, the bearing bracket M secured to the bottom of the furnace and projecting therefrom, and the forked bracket L secured to the upper side of said bracket M and supporting the extending end of said channel iron H substantially as described.

6. The combination with the fire chamber of a furnace, the opening I therein near one end thereof, an endless chain passing through said fire chamber consisting of a series of links suitably constructed to receive the sections or pieces and expose the desired portions of the same, the channel iron H in the fire chamber the forwardly extending curved extension bars H', forming a continuation of the edges of the channel iron, and the means for carrying the lugs or edges of the chain over the opening I, whereby the chain will open in its passage above the opening I, substantially as described.

7. The combination with the fire chamber of a furnace having a discharge opening therein and an endless chain passing through said fire-chamber consisting of series of links suitably constructed to receive the sections or pieces and expose the desired portions of the same, of the channel iron H, extending into the fire chamber, the forwardly extending curved extension bars H', forming a continuation of the edges of the channel iron, and the side bars W, bent above the opening and situated at greater distance apart than the width of the channel iron and suitably connected to the channel at one end, and the bearing brackets X extending outside to the rear of the furnace and supporting the opposite end of said bars W, substantially as described.

8. The combination with the fire chamber of a furnace having a discharge opening therein and an endless chain passing through said fire chamber consisting of a series of links suitably constructed to receive the sections or pieces and expose the desired portions of the same, of the channel iron H, extending into the fire chamber, the forwardly extending curved extension bars H', forming a continuation of the edges of the channel iron, the side bars W, secured to the rear end above the opening, the bar V, extending underneath the channel iron and the bearing brackets X, as and for the purpose specified.

9. The combination with the fire chamber, of an endless chain passing through said fire chamber consisting of a series of links with concavo-tapered outer portions and parallel ends between which the mower sections fit so that their side edges project, and having formed on them the lugs d', and d², which are riveted together as specified, and central teeth d⁴ situated between the forward pair of lugs, the channel bar H co-operating with the teeth d⁴, and the sprocket wheels N, and Y, secured on the end shafts and having suitable bearings, as and for the purpose specified.

10. The combination with the fire chamber

and endless chain passing through said chamber consisting of a series of links constructed to receive the sections or pieces between the abutting edges and expose the desired portions of said sections or pieces to the action of the fire chamber, of the sprocket wheels N and Y secured to the end shafts and having suitable bearings, the sprocket wheel O, on the end of shaft N', chain P, sprocket wheel Q, driving belt S, pulleys R and T encircled by said driving belt, the said pulleys being tapered to vary the speed of said driving belt in accordance with the position of the driving belt upon the pulleys, and means for adjusting the said belt thereon, whereby the speed of the endless chain may be controlled, substantially as described.

11. In combination with a fire chamber having the discharge opening I leading therefrom, the oil burner E for emitting the flame, the endless chain D passing through the fire chamber composed of links, the abutting faces of said links adapted to carry the sections to be heated, means for releasing said sections when directly above the discharge opening, and a hardening tank below the opening to catch the falling sections, substantially as described.

12. The combination with the fire chamber

and oil burners E, for emitting the flame into it from opposite sides, of the endless chain D, passing through said fire chamber, suitably constructed and driven, the opening I, in the bottom of the fire chamber, through the furnace, means for opening the chain above such opening, and the tank 2, beneath said furnace into which the outer points of the sagging portion of the chain extend, the said tank being supplied with water and having an overflow pipe as and for the purpose specified.

13. The combination with the fire chamber, and oil burners E, for emitting the flame into it from opposite sides, of the endless chain D passing through said fire chamber, suitably constructed and driven, the opening I, in the bottom of the fire chamber, through the furnace, means for opening the chain above such opening, and the oil tank Z, beneath said opening and in line therewith, supplied with water from the main, the tank 2, below said tank Z having an overflow pipe 3, and the pipe Z² connecting said tanks as and for the purposes specified.

WILLIAM F. JOHNSTON.
JAMES GRAY.

Witnesses:

B. BOYD,
H. G. S. YOUNG.