

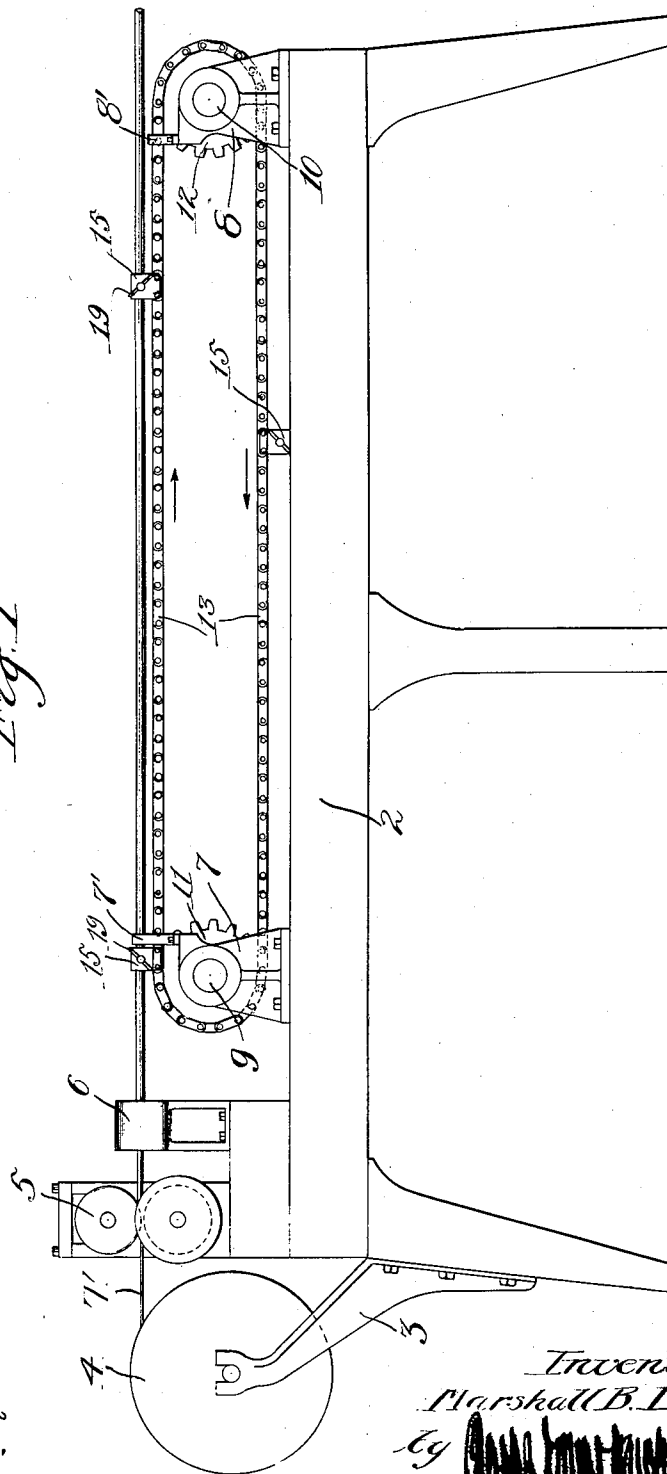
M. B. LLOYD.
MACHINE FOR MANUFACTURING TUBING.
APPLICATION FILED APR. 6, 1912.

1,124,757.

Patented Jan. 12, 1915.

2 SHEETS—SHEET 1.

Fig. 1



Witness:
Arthur W. Wren
J. M. Davis,

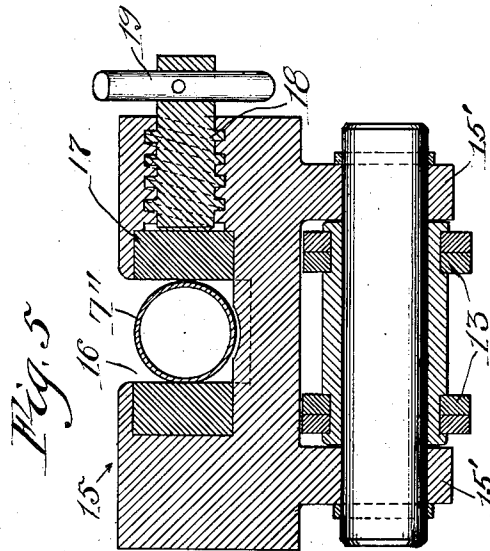
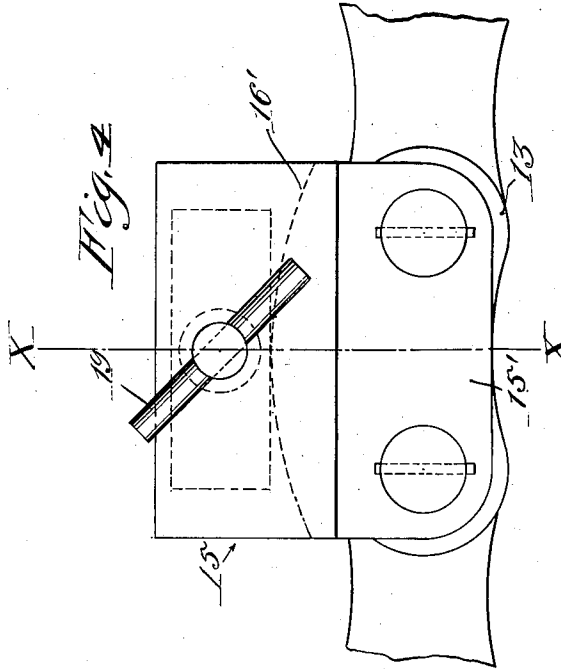
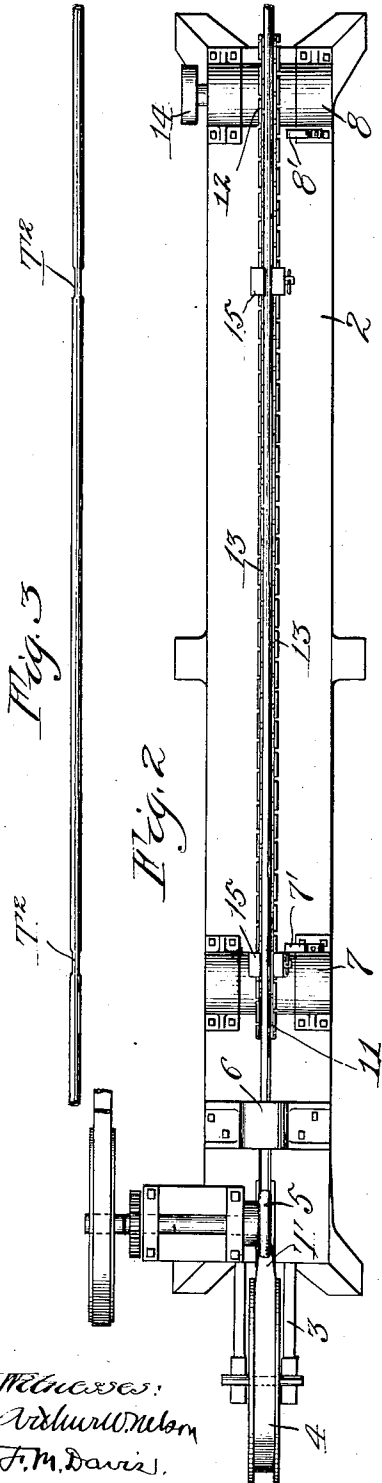
Inventor:
Marshall B. Lloyd:
by *[Signature]* Atty.

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2 SHEETS—SHEET 2.



Witnesses:
Arthur W. Nelson
J. M. Davis.

Inventor:
Marshall B. Lloyd.
By *Marshall B. Lloyd* Atty.

UNITED STATES PATENT OFFICE.

MARSHALL BURNS LLOYD, OF MENOMINEE, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ELYRIA IRON & STEEL COMPANY, OF ELYRIA, OHIO, A CORPORATION OF OHIO.

MACHINE FOR MANUFACTURING TUBING.

1,124,757.

Specification of Letters Patent.

Patented Jan. 12, 1915.

Application filed April 6, 1912. Serial No. 689,096.

To all whom it may concern:

Be it known that I, MARSHALL BURNS LLOYD, a citizen of the United States, and a resident of Menominee, Menominee county, Michigan, have invented a certain new, useful, and Improved Machine for Manufacturing Tubing, of which the following is a full, clear, and exact description, such as will enable others to make and use the same.

My invention relates to improvements in machines for manufacturing metal tubing, and the primary object of the invention is to provide a draw bench which shall be adapted to draw successive lengths of tubing in a continuous non-intermittent manner, *i. e.*, without stopping and also without reversal of any of its principal parts.

A special object of the invention is to provide a machine which shall be adapted to continuously draw a flat strip of metal from a reel or bundle and form the same into serially connected yet distinguishable lengths of tubing.

My invention consists in a machine having the above outlined characteristics and wherein these objects are attained; all as hereinafter described and particularly pointed out in the claims.

My invention will be more readily understood by reference to the accompanying drawings which illustrate a preferred form thereof.

In these drawings, which form a part of this specification; Figure 1 is a side elevation of my novel machine for manufacturing tubing; Fig. 2 is a plan view thereof; Fig. 3 shows the product of the machine, depicting one complete section and two partial sections, or lengths, interconnected therewith; Fig. 4 is an enlarged side elevation of one of the clamping jaws or draw-heads of the machine; and Fig. 5 is a sectional view of the draw-head on the line X—X of Fig. 4.

I desire it to be understood that my invention may be used for making and for drawing other articles besides tubing, but is chiefly adapted to the manufacture of tubing, its greatest value being in that art. The working elements of the machine are preferably mounted on a long rigid frame, or

bed 2, one end of which may bear a reel support 3 to accommodate a reel 4. As will appear hereinafter the flat strip stock is wound on this reel and is drawn off the reel in the process of forming the strip into tubing. At the end of the frame, adjacent to the reel, I arrange suitable forming dies, as the rotary dies 5 and the stationary finishing die 6. These dies may be of any of the well known forms. They are so constructed and operate in such manner that the originally flat strip T in passing through the dies is rolled or bent transversely into tubular form. The final dies, whatever their nature, operate to close the edges of the strip together, usually in butt relation. It is obvious also that the final dies, as die 6, give the tube its final cross-sectional shape. Very considerable force is required to draw the strip through these dies. The work of drawing the strip could be done by an ordinary draw bench of the same length as the strip which is wound on the reel. My purpose is to utilize strips T of great length and finding it impractical to construct a draw bench of such length I have devised the continuous mechanism herein shown. Tubes of this kind are usually made in standard or commercial lengths and I so construct my machine as to adapt it to act continuously on the strip and yet measure off and mark the resultant tubing in sections or lengths corresponding to commercial standards. On the frame 2 are two sets of bearings 7 and 8. In these I place heavy shafts 9 and 10 and equip these shafts with heavy sprockets 11 and 12. The sprockets carry an endless chain 13 of sufficient strength to exert the necessary pull on the tubing. I have not fully shown the means for driving the sprockets and endless chain; but the driving mechanism is indicated by an extension of the shaft 10 and by a driving pulley 14 thereon. The endless chain or belt carries three or more draw-heads or clamps. These are spaced at equal distances upon the belt or chain. They are all of one form. The endless chain travels in the direction indicated by the arrows in Fig. 1 and the upper stretch thereon constitutes the active or working portion of the draw-

bench. It is obvious that the draw-heads successively move from a point adjacent to the die 6 to the opposite end of the bench. They travel upon the projected axis of the die 6, *i. e.* in alinement with said die. The bearings 7 and 8 are provided with upwardly extended arms or dogs 7' and 8' respectively. The dog 7' rises nearly to the height of the draw-head while the dog 8' is shorter, rising only to the level of the lower part of the draw-head on the upper stretch of the endless belt. These dogs, as herein-after described, serve to operate the clamping members of the draw-heads automatically as they travel above the two sprockets. Referring to Figs. 4 and 5 it will be seen that each draw-head 15 is provided with depending webs 15' secured to the underlying link or links of the endless belt. The upper portion of the draw-head is in the form of a rectangular block having a groove 16 in its upper side. The groove extends longitudinally and is of a sufficient width to admit the tube T'. The bottom of the groove 16 may be curved, as indicated by the dotted line 16' in Fig. 4, to avoid contact with the tube at the time that the draw-head rises and begins to move forward over the sprocket 11. Within the block or head 15 is a movable gib 17 adapted to slide transversely therein. Such movement of the block compresses or flattens the portion of the tube which lies within the block and this compression or clamping of the tube is relied upon to positively attach the head to the tube.

Various devices may be employed for automatically actuating the gibs or clamping members of the heads. A simple mechanism is shown in Figs. 4 and 5. This mechanism comprises a screw that is threaded in the end of the head and which bears against the movable gib 17. The screw is operated by a cross bar 19 on its outer end, the arrangement being such that a quarter turn of the bar 19 serves to thrust the gib into clamping position. A quarter turn in the other direction serves to return or open the clamp. The operating bars of the clamps are arranged upon that side of the chain which is next to the dogs 7' and 8'. As is best shown in Fig. 2, the upper ends of the dogs 7' and 8' extend inwardly and cross the paths of the upper and lower ends of the actuating levers 19 of the draw heads. At the moment that a draw-head rises and starts to move forward over the sprocket 11 its lever 19 stands in the "open" position indicated in Fig. 1 and at the moment that the draw-head passes the sprocket 11 the upper end of its lever 19 strikes against the dog 7'. The dog being stationary causes the upper end of the lever to move back as the head moves forward and the rotation thus imparted to the screw 18 drives the

gib or clamp 17 against the tube; whereupon the head begins to exert drawing force on the tube. Soon after the clamping of the tube by the head at the receiving end of the belt, the head which is next in advance on the belt is caused to free the tubing. This is done by the engagement of the lower end of its lever 19 with the dog 8'. It will be observed that each head is thus unclamped from the tube before it starts downward around the sprocket 12. Danger of distorting the tube is thus avoided. A particular advantage of the described arrangement of draw-heads and actuating dogs is that the head which is approaching the discharge end of the bench does not release its hold upon the tube until the next succeeding draw-head has been clamped to the tube, and no draw-head is freed from the tube until the head which follows has taken up the load or work of drawing the tubing through the dies. The distance between the heads upon the endless belt equals the standard length of a commercial tube. As each head partially flattens the portion of the tube which lies within it, it is apparent that the heads automatically mark or distinguish successive lengths of tubing, and the finished tubing emerges from the machine in the form indicated in Fig. 3. In this condition it may be divided into separate standard lengths by cutting the flattened portions T².

As various modifications of my invention will readily suggest themselves to one who is skilled in the art, I do not confine or limit the invention to the specific structure herein shown and described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A tube-drawing machine comprising a frame, in combination with a reel standard at the end of the frame, a die mounted on that end of the frame to receive material from a reel on said standard, a single endless carrier having its active stretch in alinement with and movable away from said die, mechanism for continuously driving said carrier, a plurality of clamping members at intervals on said carrier, means at the die end of the frame for automatically closing the clamp of said members upon the product of said die, and means near the opposite end of said carrier for automatically releasing said clamps from said product.

2. A tube-drawing machine comprising a tube die, in combination with a series of clamping devices, secured to a single moving member, constantly operating in one direction and separated by distances approximating the length of a commercial tube, said devices having an active travel beginning at a point in front of said die and terminating at a point more than the

length of a commercial tube therefrom, means adapted to actuate each clamping device automatically by the movement of said devices and to operate to clamp each device to the tube at the beginning of said active travel and to free the tube at a point near the end of said travel.

3. In a device of the class described a frame, in combination with parallel shafts journaled thereon at points more than a tube length apart, a sprocket wheel on each shaft, means for driving one of said sprocket wheels, a sprocket chain mounted on said wheels, three clamps spaced upon and about said chain, an actuating device on each clamp for closing and opening the same and fixed stops on the frame to engage each actuating device and close its respective clamp at the beginning of its active travel and open the clamp at the end of its active travel.

4. In a tube-drawing machine the combination of a frame having a forming die mounted on one end thereof, material supplying means adjacent thereto, with automatically operable and continuously movable drawing mechanism mounted on the said frame, said drawing mechanism comprising a pair of sprocket wheels mounted on opposite ends of the frame in the same vertical plane, a chain mounted on said wheels to travel thereon, means to drive one of said wheels, a regularly spaced series of tractor gripping devices secured to said belt, said devices being so spaced that there is always a gripping device on the side which moves away from the die end of the frame, the gripping device on said side being in operating alinement with the opening in the die, and automatic means controlling engagement of said tractor devices for gripping the material at standard commercial lengths and drawing it from the die.

5. In a metal-drawing machine the combination of a frame or bench having material supplying means at one end thereof and a forming die mounted on the said end with automatically operable and continuously movable feeding mechanism mounted on the said frame, said mechanism comprising a sprocket gear and chain mechanism extending from a point adjacent to the die to the opposite end of the frame, the upper side of said chain being substantially in alinement with the die, means to drive said mechanism to move the upper side of the chain away from said die, a draw-clamp on the chain adapted to receive and to grip the formed material, a lever on said clamp arranged to close the clamp when turned one way and to open the clamp when turned the opposite way, stationary means fixed at the end of the said mechanism which is nearest to the die and adjacent to one side of the path of the clamp to engage said lever to

turn it to close the clamp as it passes away from the die and other stationary means at the opposite end of the mechanism and adjacent to the other side of the path of the clamp to engage said lever as the clamp passes and while it is still moving in alinement with and away from the die to turn said lever to open said clamp.

6. In a device of the class described, a tractor clamp mounted on a moving support, said clamp comprising a frame or head having a slot therein adapted to receive an object to be drawn and a lateral perforation in said frame extending from the said slot through the side of the frame, the outer end of said perforation being threaded, a plunger or gib reciprocally mounted in the inner end of said perforation and arranged to engage the said object to clamp it securely in the frame, and a screw fitting in the threaded outer end of said perforation and engaging the outer end of said gib, means on the outer end of the screw extending oppositely and transversely of the direction of movement of said clamp, and suitably positioned dogs spaced apart and mounted beside the path of said clamp to alternately engage the oppositely extending ends respectively of said transversely extending means, to close and open said clamp as it successively moves past the said dogs.

7. In a device of the class described, a tractor clamp mounted upon a moving support, said clamp comprising a head portion having a slot therein adapted to receive an object to be drawn, a movable member in said head mounted for bodily parallel movement into and away from said slot, means for automatically moving said member into the slot as the tractor member passes a definite point, and means for releasing the clamping force when the tractor clamp passes another definite point.

8. In mechanism of the class described, the combination of a single endless chain, spaced bearings and sprocket wheels thereon for supporting the chain, tube-forming mechanism adjacent one end thereof, a plurality of clamps mounted on said chain and spaced a tube's length apart thereon, said clamps adapted successively to straddle the tubing as they move from their lowest to their highest position, and means fixed at a given point to cooperate with the clamp as it passes this point to cause the clamp by a movement parallel to the tube powerfully to grip the tube, and means fixed at another point to cooperate with the clamp and automatically release same when passing this point.

9. In a machine for forming tubing, a clamp, a movable block therein and means for guiding the block in a parallel path, a single endless chain for moving said clamp continuously in a definite path, means fixed

at a certain point in said path and engaging the clamp as it passes thereby and serving to force the movable block into clamping position, and other means at another point
5 for engaging the clamp and opening same as it moves by said means.

In testimony whereof, I have hereunto

set my hand this 11th day of March, 1912, in the presence of two subscribing witnesses.

MARSHALL BURNS LLOYD.

Witnesses:

HILDA C. PETERSON,
CHARLES GILBERT HAWLEY.