March 13, 1934. C. H. WALLIS 1,951,073

TUBE DRAWING APPARATUS

Filed Feb. 3, 1932 3 Sheets-Sheet 1

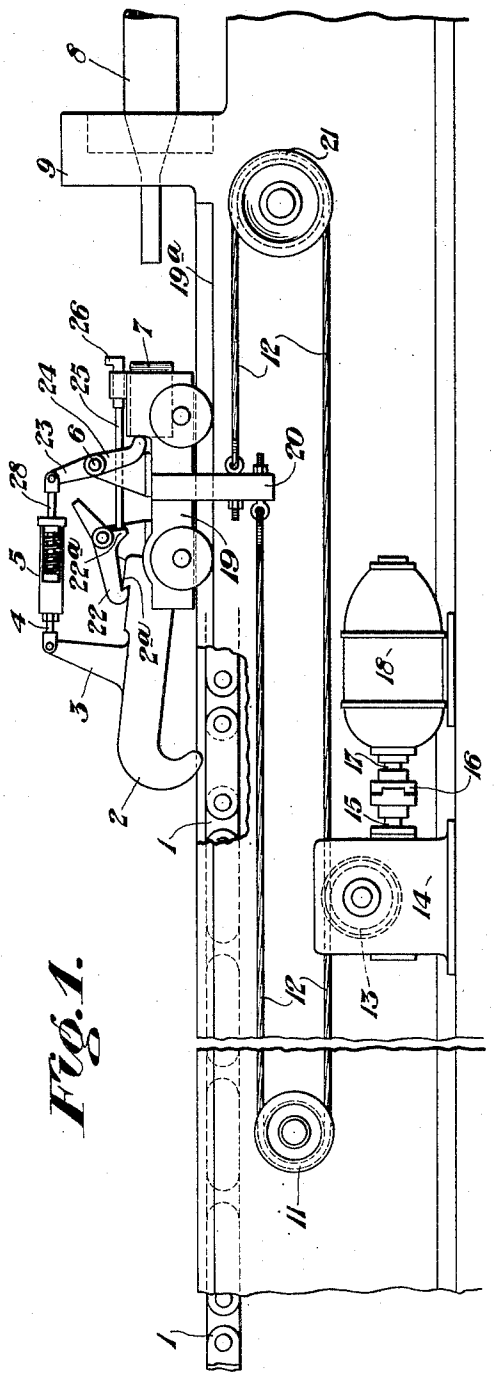


Fig. 1.

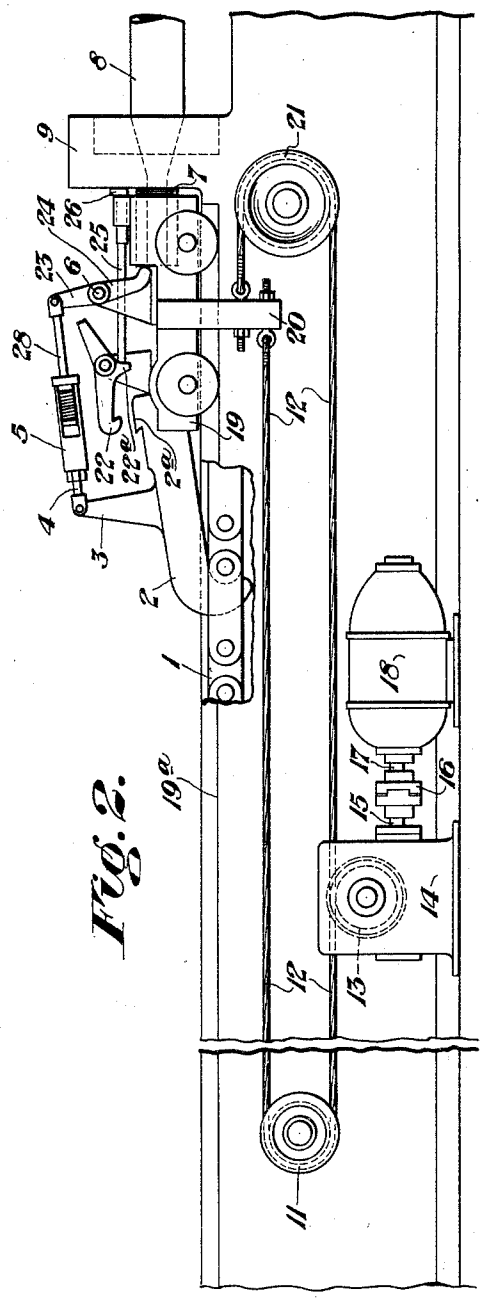


Fig. 2.

Inventor:
CLARENCE H. WALLIS,
by: Usina & Rauber
his Attorneys.

March 13, 1934. C. H. WALLIS 1,951,073

TUBE DRAWING APPARATUS

Filed Feb. 3, 1932 3 Sheets-Sheet 2

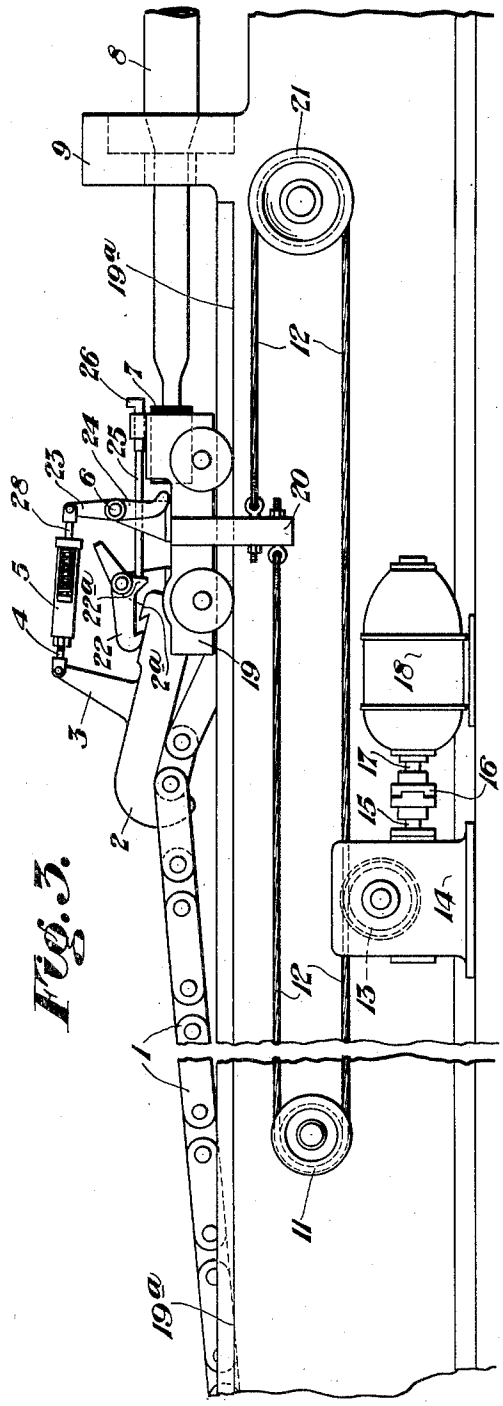


Fig. 3.

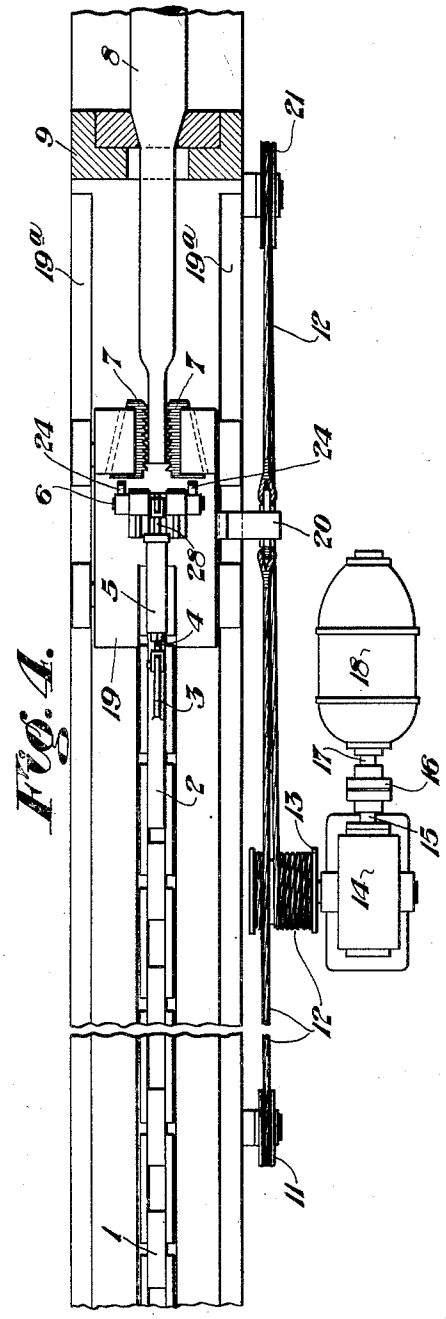


Fig. 4.

Inventor:
CLARENCE H. WALLIS,
by: Ussina & Rauber
his Attorneys

March 13, 1934. C. H. WALLIS 1,951,073

TUBE DRAWING APPARATUS

Filed Feb. 3, 1932 3 Sheets-Sheet 3

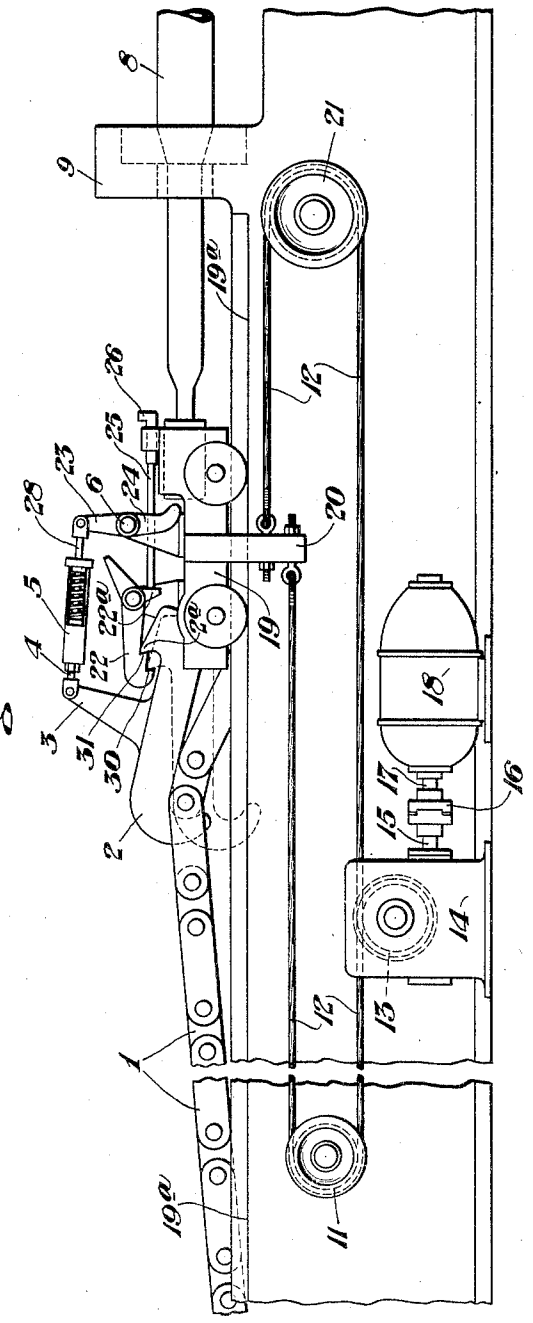


Fig. 5.

Inventor:
CLARENCE H. WALLIS,
by: Masina & Rauber
his Attorneys.

Patented Mar. 13, 1934

1,951,073

UNITED STATES PATENT OFFICE

1,951,073

TUBE DRAWING APPARATUS

Clarence H. Wallis, Ellwood City, Pa., assignor to National Tube Company, a corporation of New Jersey

Application February 3, 1932, Serial No. 590,682

3 Claims. (Cl. 205—3)

This invention relates to tube drawing apparatus, and more particularly to automatically operated pliers for tube drawing benches, and has for its object the provision of a plier or tube gripping mechanism which will automatically grip the pointed end of the tube to be drawn and will automatically disengage from the tube when the tube has been completely drawn through a reducing die.

In the drawings:

Figure 1 is a fragmentary side elevation of a draw bench showing the pliers of this invention with its draft hook free of the draw bench chain.

Figure 2 is a similar view showing the pliers immediately after the draft hook has been automatically dropped into engagement with the draw bench chain.

Figure 3 is a similar view showing the pliers with the draw bench chain under draft tension.

Figure 4 is a plan view of the apparatus positioned as shown in Figure 3.

Figure 5 is a fragmentary side elevation of a draw bench showing a modified form of pliers with its draft hook engaged in the draw bench chain while said chain is under draft tension.

Referring more particularly to the drawings, the numeral 1 designates the draw bench chain, which is of usual construction and is propelled along the draw bench in the usual manner by a motor reduction unit (not shown). The pliers or tube gripping device is designated generally by the numeral 19 and comprises a wheeled carriage adapted to travel along suitable trackways 19a on the draw bench and is provided with a hook 2 which is adapted to be engaged in the chain 1. The hook 2 is adapted to be held in elevated position above the chain 1 by a latch 22 which engages a lug 2a, as shown in Figure 1, when the pliers are out of engagement with a tube to be drawn and while the pliers are being returned to the die end of the bench. The hook 2 is provided with an arm 3 which is connected by an adjusting rod 4, compression spring cylinder 5 and plunger rod 28 with a lever arm 23 fixed on a shaft 6 which carries a pair of levers 24 for a purpose to be described. A pair of gripping jaws 7 is slidably mounted in the pliers carriage for movement in a direction parallel to the longitudinal axis of the carriage, and have their side faces opposite their gripping faces beveled and in contact with inclined surfaces in the carriage body so that they will move toward or away from each other when they are moved in a direction parallel with the longitudinal axis of the carriage.

The levers 24 are adapted to engage the rear ends of the jaws 7 when the hook 2 is disengaged from the latch 22 and drops down into engagement with the chain 1 so as to force the jaws forwardly along the inclined faces in the pliers carriage, thereby causing said jaws to move toward each other and grip the pointed end of the tube to be drawn.

In the drawings, the head block or die holder is designated by the numeral 9, and the tube to be drawn is designated by the numeral 8.

A latch release rod 25 is slidably mounted along the top of the pliers carriage and is provided with a head 26 which is adapted to engage or strike the head block 9 when the carriage is moved into tube engaging position and as the head 26 of the rod 25 engages the head block 9 the rod 25 will move rearwardly and engage a lug 22a on the latch 22, thereby rocking said latch upwardly and disengaging the hook 2.

The carriage is adapted to be moved rearwardly along the draw bench by means of a cable 12 which is trained over suitable sheaves 11 and 21 and is given several wraps around a drum 13 and has its end anchored to a leg 20 secured to the carriage 19 of the pliers. The drum 13 is adapted to be operated by a motor 18 and gear reducing unit 14. The drive shaft 15 of the gear reducing unit 14 is connected by a flexible coupling 16 to the power shaft 17 of the motor 18.

It is advantageous for the plier grips or jaws 7 to take hold of the point end of the tube prior to the start of the reduction pass. At the end of the reduction pass it is advantageous for the plier grips 7 to immediately release the point end of the tube. The downward travel of the plier hook 2 actuates the levers 24 and provides a means for automatically moving the jaws or grips 7 forwardly into gripping engagement with the point end of the tube prior to the start of the reduction pass. The compression spring in the cylinder 5, in conjunction with the plunger rod 28, provides a means for compensating for point ends of varying diameters, allowing the plier hook 2 to drop a sufficient distance to engage the draw chain 1 regardless of the diameters of the point end within operating limits.

The levers 24, which are actuated by the dropping of the plier hook 2, move the plier grips or jaws 7 forwardly an equal amount so as to cause equal gripping or engagement of the point end of the tube.

After the jaws or grips 7 have gripped the pointed end of the tube 8 and the hook 2 has dropped into engagement with the chain 1 the tension or pull of the chain 1 against the hook will cause the hook to rock about its pivotal connection and rise up into the position shown in Figure 3. This upward movement of the hook 2 under pull of the chain 1 will rock the lever 23 and levers 24 so as to move the levers 24 rearwardly clear of the jaws or grips 7 so as to permit said jaws to have free movement for disengagement from the point end of the tube after the tube has been completely drawn through the reducing die. The pliers 19 and the tube 8 will travel at a predetermined drawing speed during the reduction pass. Immediately after the reduction pass the tremendous pull which is exerted on the drawing mechanism during the reduction pass causes the tube 8 and pliers 19 to coast or run forward ahead of the chain 1 sufficiently to permit the chain 1 to drop or disengage from the hook 2 and, therefore, allows the hook to drop toward the chain 1 until the latch 22 again engages the lug 2^a of the hook 2.

As stated before, during the drawing or reducing pass the hook 2 and chain 1 are forced upwardly by the tension or pull of the draw chain and the hook 2 is positioned so that the latch 22 is supported on the hook immediately forward of the lug 2^a and, therefore, is in position to engage the lug 2^a when the hook is freed from the chain 1. The position of the hook 2 and latch 22 while the hook is suspended above the chain 1 is shown clearly in Figure 1, and the position of the hook immediately after it is disengaged by the latch 22 and prior to the application of force by the draw chain 1 is shown clearly in Figure 2.

During the reduction pass of the apparatus the motor 18 is deenergized and the forward movement of the pliers 19 will be communicated through the cable 12 and reducing gearing 14 to the motor 18 so as to operate the motor 18 in the reverse direction.

This operation of the reduction gearing and motor 18 in reverse direction serves as a brake upon the pliers 19 and, therefore, the pliers will stop suddenly when the hook 2 is disengaged from the chain 1. This sudden stop of the pliers 19 when the tube 8 and pliers 19 move forwardly will cause the momentum of the tube to be exerted on the grips or jaws 7 and will, therefore, move said jaws rearwardly along the inclined surfaces of the carriage 19 so as to release said jaws or grips from the point end of the tube 8.

In Figure 5 I have shown a modified form of pliers 19 in which the latch 22 is provided with retaining lugs 30 and 31 for holding the draft hook 2 of the pliers in elevated position. In the previously described plier construction the latch 22 is provided with a single lug or catch. When the pliers are under draft tension the draft hook 2 is forced upwardly an amount depending on the amount of draft tension. In the prior described construction, therefore, the latch 22 must have its catch lug positioned so as to be beyond the lug 2^a of the hook 2 when the minimum draft is applied to the pliers. When the maximum draft is applied to the pliers previously described, the latch 22 will be positioned substantially as shown in Figure 3. When in this position considerable free movement of the hook 2 takes place when the hook is disengaged from the chain 1 prior to the engagement of the lug 2^a with the catch lug of the latch 22.

In some instances this free movement of the hook 2 may be injurious to the latch. Therefore, I have provided the modified form of latch of Figure 5 in which the lugs 30 and 31 are provided for engaging the lug 2^a of the hook when said hook is elevated the minimum and maximum amounts, respectively. The latch lug 31 is positioned so as to engage the lug 2^a of the hook at some point intermediate the minimum and maximum elevation of the hook 2 and serves to reduce the free movement of the hook materially.

While I have shown and described one specific form of my invention, it will be understood that I do not wish to be limited thereto, since various modifications may be made without departing from the scope of my invention, as defined in the appended claims.

I claim:

1. In a tube drawing bench, a head-block and die, a draw chain, pliers comprising a carriage, means for returning said carriage toward said head-block, a hook provided with a lug mounted on said carriage and adapted to be engaged with said draw chain, a latch for engaging the lug on said hook to hold said hook out of engagement with said chain, a lug on said latch, a rod movably mounted on said carriage and having one of its ends adapted to engage the lug on said latch, and the other end of said rod being positioned for engagement with said head-block.

2. In a tube drawing bench, a head-block and die, a draw chain, pliers comprising a carriage, means for returning said carriage toward said head-block, a hook provided with a lug mounted on said carriage and adapted to be engaged with said draw chain, plier grips slidably mounted in said carriage for a combined movement longitudinally of said carriage toward and away from each other, a latch for engaging the lug on said hook to hold said hook out of engagement with said draw chain, a lug on said latch, a rod mounted for sliding movement on said carriage, one end of said rod being adapted to engage the lug on said latch and the other end of said rod being positioned to contact with said head-block.

3. In a draw bench, the combination of a die head, a drawing carriage movable with respect to said die head, an endless chain, a connecting hook mounted on said carriage and adapted to engage with said chain, a pawl adapted to hold said hook in inoperative position, and a rod mounted in said carriage, one end of said rod adapted to contact with the face of said die head, the other end being adapted to trip said pawl.

CLARENCE H. WALLIS.