

June 11, 1935.

L. IVERSEN

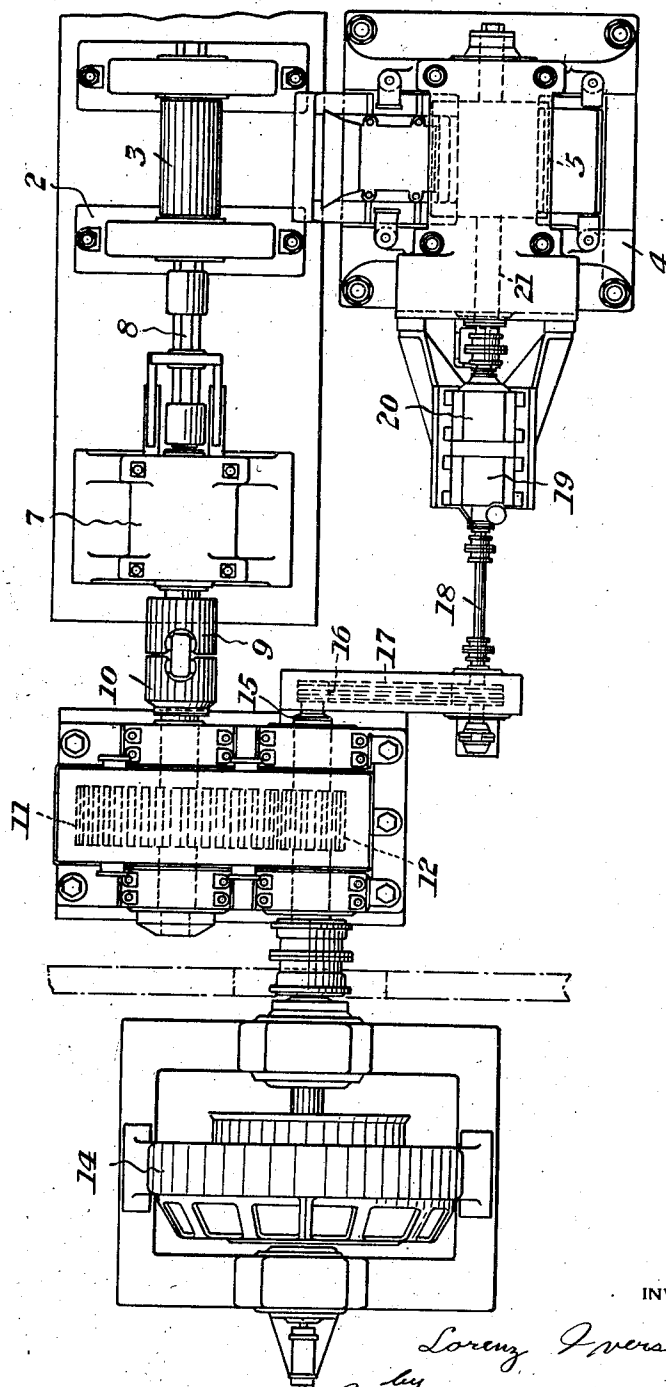
2,004,871

FEEDING AND SHEARING MECHANISM

Filed Aug. 15, 1932

2 Sheets-Sheet 1

Fig. 1



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Fig. 2.

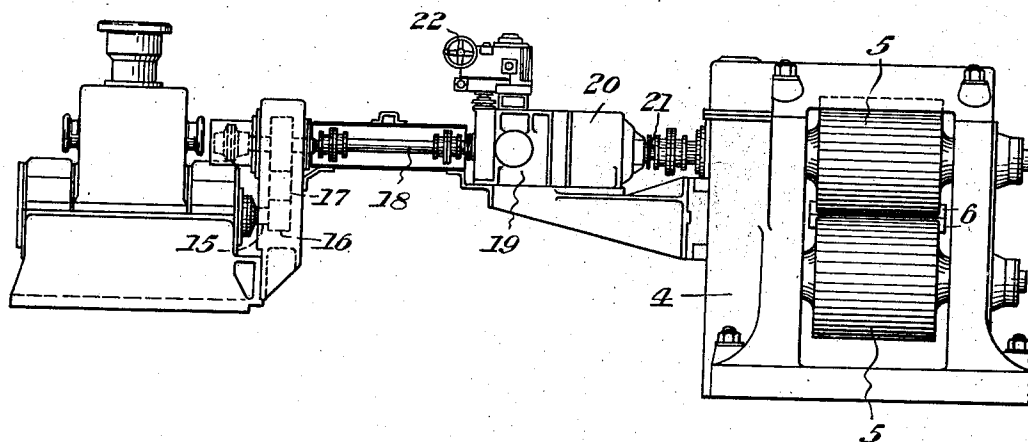
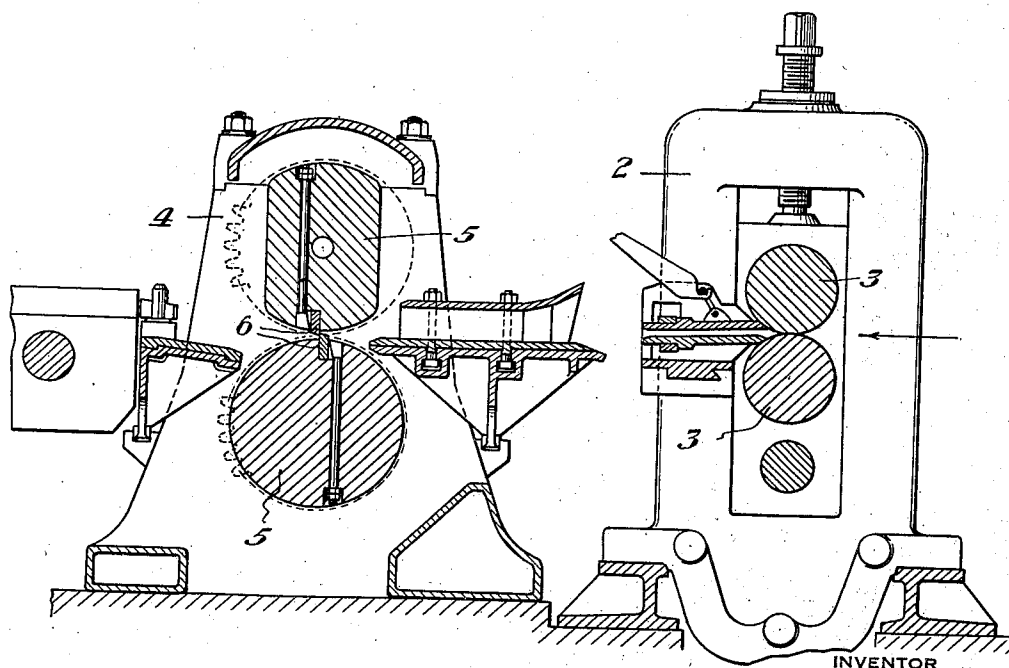


Fig. 3.



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UNITED STATES PATENT OFFICE

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FEEDING AND SHEARING MECHANISM

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5 Claims. (Cl. 164—68)

The present invention relates broadly to the art of cutting, and more particularly to the cutting of metal stock into predetermined lengths.

Sheet and strip stock is now generally produced in long lengths, and in order to facilitate handling and storing, it is frequently formed into coils as delivered from the finishing stand of the mill in which it is produced. In many cases, either before, or after having been coiled, it is desirable to shear the parent stock into a number of individual sheets or plates. In order that the shearing may be so performed as to effect the production of successive pieces of the same length, it is necessary that a definite feeding speed of the material be maintained with respect to the speed of operation of the shear. On the other hand, if the speed relationship is fixed, it becomes impossible to effect adjustment of the parts so as to shear into pieces of different lengths.

It is one of the objects of the present invention to provide a shearing means and feeding means adapted to be driven in definite predetermined relationship one with the other, wherein the drive includes means for varying the speed of one of the units relatively to the other unit whereby the length of the sheared pieces may be varied at will.

In the accompanying drawings, I have shown largely diagrammatically and for purposes of illustration only, a preferred embodiment of the present invention. In the drawings—

Figure 1 is a top plan diagrammatic view illustrating one embodiment of the invention;

Figure 2 is a side elevation of a portion of the structure illustrated in Figure 1, the figure being taken from the shear side of the installation; and

Figure 3 is a transverse sectional view through the installation.

In accordance with the invention, there may be provided a feeding unit comprising a roll stand 2 provided with a pair of feed rolls 3, and a shearing unit comprising a suitable stand 4 provided with rotors 5. Each of the rotors is illustrated more particularly in Figure 3 as being provided with a shear blade 6 effective once during each revolution of the rotors to come into shearing relationship as shown in this figure and effecting a shearing operation on material passing between the rotors. It will be noted that the rotors themselves are of such diameter as to provide appreciable clearance therebetween, the clearance preferably being such as to accommodate

freely material of the maximum thickness being handled by the installation.

For driving either one or both of the feed rolls 3 there may be provided a housing 7 containing a suitable pinion stand as well understood in the art, the pinions being provided with a driving connection 8 extending to the roll stand 2 from the gearing therein, and a driving spindle 9 extending from the housing on the opposite side thereof.

Operatively connected to the spindle 9 is a similar spindle 10 carrying a gear 11 meshing with a driving pinion 12 adapted to be driven from a suitable source of power, such as a motor 14.

Secured to the shaft 15 which carries the pinion 12 is a sprocket 16 operatively connected through a chain drive 17 to a shaft 18. This shaft drives an hydraulic pump 19 adapted to hydraulically drive a motor 20. The motor 20 in turn has a shaft 21 operatively connected to the upper rotor 5 of the shearing unit. The hydraulic pump 19 is preferably of the variable displacement type, the displacement of which is adapted to be varied by a suitable control 22 whereby the total fluid pumped per revolution of the pump may be increased or diminished by minute quantities.

Pumps of this character are obtainable on the open market, usually being of the piston type with means for varying the effective displacement of each of the pistons. Such a pump may be conveniently assembled as a unit with the hydraulic motor 20 whereby the inlet and outlet connections (not shown) from the pump constitute a closed circuit with the motor 20. The motor, which may also be of the piston displacement type, will thus be driven in a definite speed relationship to the speed of the pump 19, the speed increasing as the displacement of the pump increases, and decreasing as the pump displacement decreases. Thus, through the medium of the adjustment 22, the hydraulic unit including the pump and motor may be driven in absolute synchronism one with the other, or the motor speed increased or decreased relatively to the pump with the pump operating at a constant number of revolutions per minute.

The hydraulic drive just described also forms an element of the combinations claimed in my copending applications Serial Nos. 624,174 and 623,930.

Assuming any given speed of the feeding unit 2, which always represents a speed within a maximum and minimum range determined by

the initial design of the apparatus, there will be effected a corresponding feeding movement of the material to be sheared into the pass of the shear rotors and through the same. With a given setting of the adjustment 22, the material will be sheared into pieces of a certain length and as long as such speed relationship is maintained, the length of successive pieces will be uniform. If it is desired to increase the length of the sheared pieces while maintaining the speed of the feeding unit constant, the adjustment 22 will be utilized to decrease the displacement of the pump 19 and thereby slow down the speed of the shearing unit, while if it is desired to decrease the length of the sheared pieces, the displacement of the pump will be increased to effect a corresponding increase in the speed of operation of the shear.

If the installation is operating on material which has been previously coiled, any desired speed of operation of the respective parts within the permissible range, is possible. If, however, the installation is being operated in conjunction with the last stand of rolls of a mill, for example, the feed rolls 3 are preferably driven at a speed which will take care of the material as delivered by the last roll stand. The speed at which the shear is operated, even though driven by the same source of power as that which drives the feeding means, may be varied at will by means of the adjustment 22. While normally it is desirable to maintain an instantaneous cutting speed of the shears substantially equal to the delivery speed of the feeding unit, the relative speeds may be varied within an appreciable range without interfering with the successful operation.

To those skilled in the art it will be apparent that my invention provides a common drive for both a feeding unit and a shearing unit, which drive includes a mechanical connection between a source of power and the feeding unit, with a combined mechanical and hydraulic drive between the source of power and the shearing unit. The hydraulic transmission provides in effect an almost micrometric adjustment by means of which infinitesimal speed changes of the shear relative to the feeding means may be obtained while the common driving means for both of the units is being operated at a constant speed. The unit thus provided is therefore extremely flexible in operation, not only as to the speed ranges within which it is operative, as may be required for example by the operating speed of a mill, but also by reason of the relative speed adjustments obtainable between the different component parts.

The installation is further operable as a complete mechanism for shearing previously formed lengths of material, or as part of a larger mill installation for shearing material as formed by such mill. As a matter of fact, the invention contemplates that the stand 2 shall actually constitute a roll stand wherein a rolling operation is being accomplished. Such a roll stand, due to its rolling operation, may be considered as comprising pinch rolls. Therefore the expression "pinch rolls" as utilized herein, and in the appended claims shall be construed as including either a set of pinch rolls provided purely for feeding purposes, or the rolls of a roll stand provided for rolling purposes.

While I have herein illustrated and described a preferred embodiment of my invention, it will be apparent that changes in the construction

and operation of the parts may be made without departing either from the spirit of the invention or the scope of my broader claims.

I claim:

1. Apparatus for shearing metal strip comprising two units, namely, a feed means and a rotary shear, in direct alignment with one another, the shear having a rotor with a cutting blade thereon, the feed means being effective for substantially continuously advancing material to the shear, and length controlling means effective for causing the shear blade to move at peripheral speeds differing in an adjusted amount from the linear speed of the material, said means including a fluid pump operatively connected with one of said units, a fluid motor actuated thereby and operatively connected to the other of said units, and an adjusting device for adjusting the speed of the fluid motor, the units running at substantially constant relative speeds for any adjusted position of said device.

2. Apparatus for shearing metal strip comprising two units, namely, feed rolls and a rotary shear, in direct alignment with one another, the shear having a rotor with a cutting blade thereon, the feed rolls being effective for substantially continuously advancing material to the shear, and length controlling means effective for causing the shear blade to move at peripheral speeds differing in an adjusted amount from the linear speed of the material as determined by the feed rolls, said means including a fluid pump operatively connected to one of the units, a fluid motor actuated thereby and operatively connected to the other of said units, and a device for adjusting the speed of the motor, the units running at substantially constant relative speeds for any adjusted position of said device.

3. Apparatus for shearing metal strip comprising two units, namely, a feed means and a rotary shear, in direct alignment with one another, the shear having a rotor with a cutting blade thereon, the feed means being effective for substantially continuously advancing material to the shear, a drive for the feed means, and a driving connection for the shear, said driving connection including a fluid pump operatively connected to the drive for the feed means, a motor actuated by the fluid pump and operatively connected to the shear, and means for adjusting the speed of the motor whereby the shear blade may be driven at adjusted peripheral speeds differing from the linear speed of the material.

4. Apparatus for shearing metal strip comprising two units, namely, a feed means and a rotary shear, in direct alignment with one another, the shear having a rotor with a cutting blade thereon, the feed means being effective for substantially continuously advancing material to the shear, and length controlling means effective for causing the shear blade to move at peripheral speeds differing in an adjusted amount from the linear speed of the material, said means including a driving member operatively connected with one of the units, a driven member actuated thereby and operatively connected to the other of said units, and an adjusting device for adjusting the speed of the driven member relative to the driving member, the units running at substantially constant relative speeds for any adjusted position of said device.

5. Apparatus for shearing metal strip comprising two units, namely, a feed means and a rotary shear, in direct alignment with one another,

other, the shear having a rotor with a cutting blade thereon, the feed means being effective for substantially continuously advancing material to the shear, a drive for the feed means, and a driving connection for the shear, said driving connection including a driving member operatively connected to the drive for the feed means, a driven member actuated from the driving member and operatively connected to the

shear, and means for adjusting the speed of the driven member relative to the driving member whereby the shear blade may be driven at adjusted peripheral speeds differing from the linear speed of the material, the shear blade running at substantially constant speed for any adjusted position of the last-mentioned means.

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