Nov. 15, 1949 F. J. KENT 2,487,973

METAL BAR STRAIGHTENING MACHINE

Original Filed July 16, 1945 2 Sheets-Sheet 1

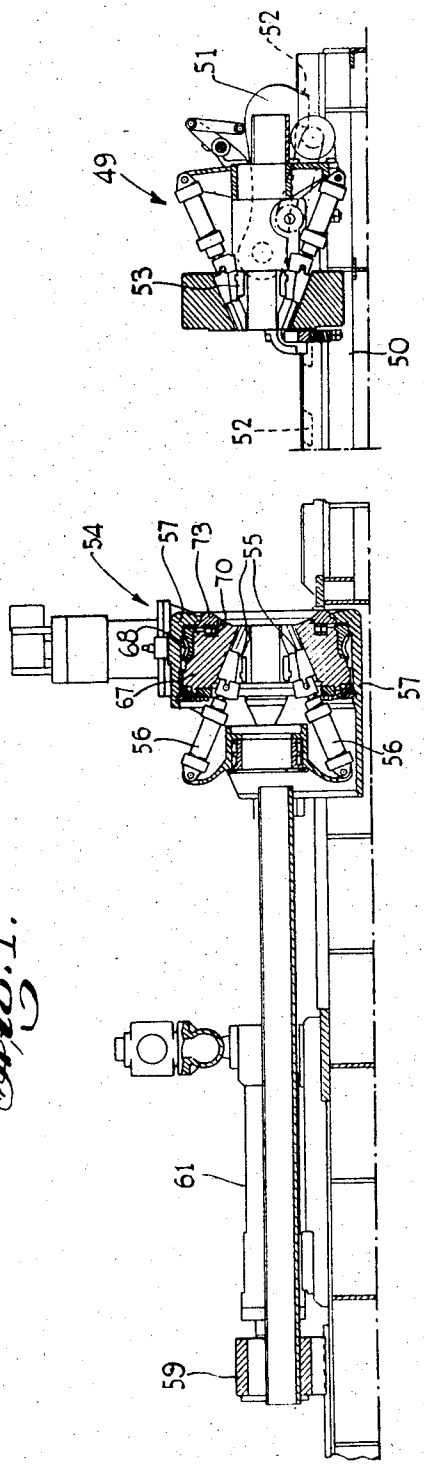


Fig. 1.

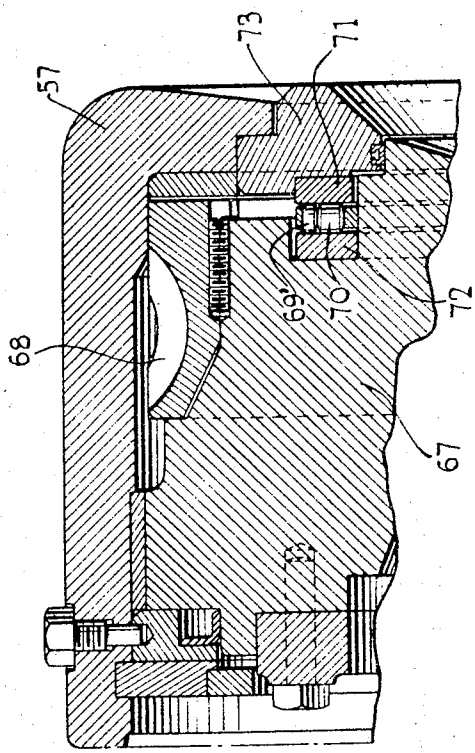


Fig. 3.

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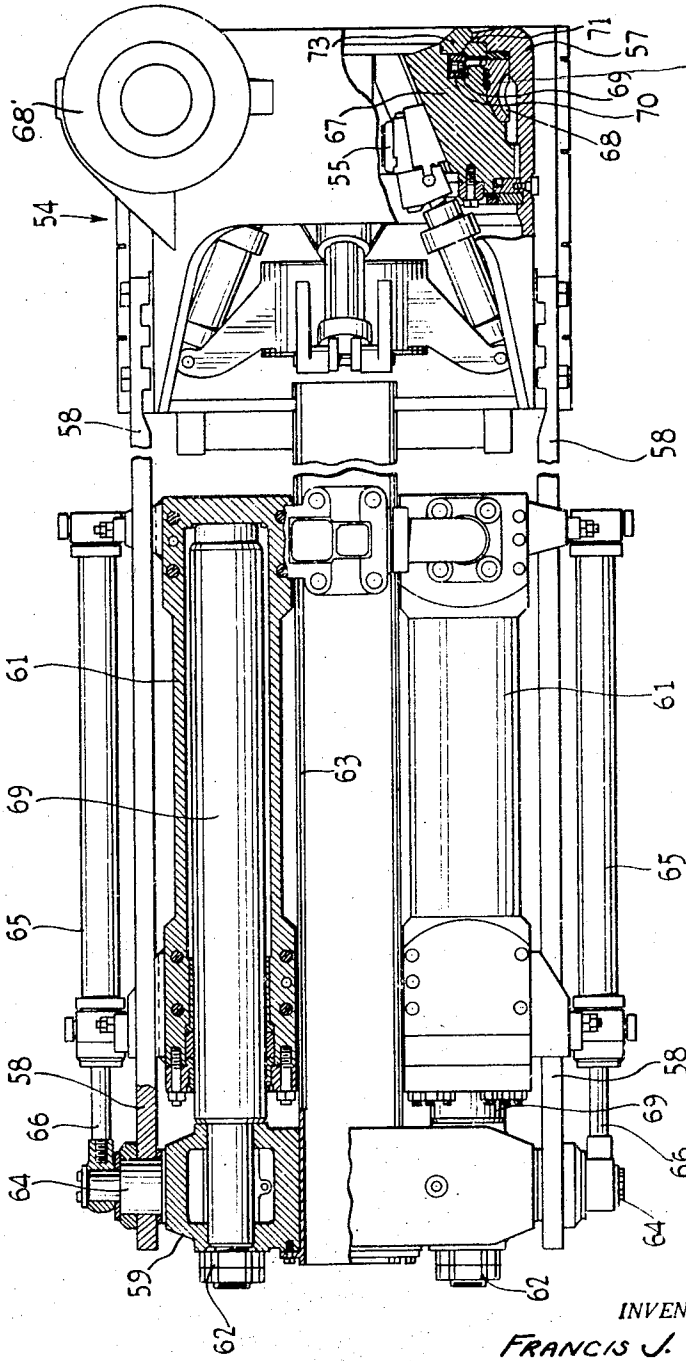


Fig. 2.

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METAL BAR STRAIGHTENING MACHINE

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6 Claims. (Cl. 153—35)

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This invention relates to a machine for straightening metal bars and particularly profiled or flanged bars of nonferrous metals such as aluminum, magnesium, their alloys and the like.

Bars of intricate shape and large size are produced by extrusion methods and they become deformed for various reasons after extrusion so that they are buckled or twisted either locally or throughout their entire length. It, therefore, is necessary to remove buckling and twists in the bars by some convenient method.

One of the objects of the present invention is to provide a machine having gripping heads with passages completely through the heads and grippers in said heads so that the bars can be passed completely through the machine and gripped between any desired points along the bar. The bar can be gripped and one of the heads moved relative to the other head, which has been previously anchored, so as to stretch the same beyond its yield point and thus remove any buckle that may be therein. If the bar has a twist therein, the present machine provides means for twisting the same in the opposite direction beyond the yield point of the metal so as to untwist the bar. Considerable force is necessary in order to perform these operations. It is preferred that the force applying means be attached to the longitudinally movable head in such a manner that said means is not rotatable as the head is rotated in an untwisting operation. This has proven to be quite difficult because of the high forces involved. In the preferred form of the straightening machine, hydraulic force is employed for the longitudinal stretching action and when such is used it has been found preferable not to rotate the hydraulic piston as the longitudinal force is applied to the stretching and detwisting head. One preferred form of thrust bearing comprises a divided radial roller bearing.

In one form of the invention, the hydraulic piston for stretching purposes is hollow for the passage of the bars therethrough, as described and claimed in applicant's co-pending application, Serial No. 605,271, filed July 16, 1945, of which this application is a division. In the form of the invention described and claimed herein, the hydraulic piston or pistons are parallel with a central tube and crosshead, with connecting bars for transmitting the force of the hydraulic means to the stretching and detwisting head.

Bars or shapes can be placed in the machine by passing them through the hollow gripping heads and then adjusting the position thereof so

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as to lock the desired portions of the bar between the two gripping heads. The bar then can be subjected to a stretching and/or detwisting operation. These and other objects of the invention will become apparent from the following description and drawings which are merely exemplary.

In the drawings:

Figure 1 is a broken longitudinal elevation partially in section of the invention.

Figure 2 is a fragmentary plan view partly in section of the headstock and hydraulic cylinder of the form shown in Figure 1.

Figure 3 is an enlarged fragmentary sectional view of the headstock of Figure 1 showing details of the thrust bearing construction.

Referring to Figure 1, tailstock 49 is adjustably mounted on bed 50 and is fixed in position thereon by means of anchor 51 engaging stop 52 in the bed 50, said tailstock having work gripping fingers 53. Headstock 54 has gripping fingers 55 operable by hydraulic pistons 56. Non-rotatable headstock housing 57 (Figs. 1 and 2) has connectors 58 (Fig. 2) extending to crosshead 59. Crosshead 59 has two hydraulic pistons 69 mounted in hydraulic cylinders 61, said pistons being connected to said crosshead at 62. Telescoping tube arrangement 63 may be provided centrally of the gripping head to serve as a guide for the bars being passed through the headstock. The housing 57 can be slidably mounted on the bed by means of suitable feet to assist in preventing rotation of the housing.

When it is desired to perform a stretching operation, hydraulic pressure admitted into hydraulic cylinders 61 will cause connecting bars 58 to move to the left with crosshead 59, said bars being connected thereto by pins 64. In order to return the headstock, hydraulic cylinders 65 are provided, the pistons thereof being connected by rods 66 to crosshead 59 at an extension of pins 64. The various hydraulic cylinders 61 and 65 are mounted on the frame so as to be non-rotatable with respect thereto, and may assist in holding housing 57 from rotation although normally all tendency of housing 57 to rotate will be prevented by the machine frame.

The headstock housing is provided with a worm wheel arrangement for turning gripping head 67. The worm wheel is seen at 68, said wheel being rotatably by a worm driven by motor 68'. A roller thrust bearing assembly has a plurality of longitudinally sub-divided rollers 69' and 70 between thrust bearing plates 71 and 72, the axis of the rollers extending radially from the center

of rotation of the gripping head. Rollers 69' and 70 are separate and may rotate at different speeds relative to each other. When non-rotatable headstock housing 57 is moved to the left, the thrust will be transmitted through ring 73 and radial split thrust rollers to the rotatable gripping head 67.

When it is desired to straighten a bar or shape, such shape is moved through the open passageways through the headstock and tailstock, it being possible to feed the shape, for example, from right to left through a tailstock, although the feeding may be in the opposite direction. The tailstock and headstock are adjusted relative to each other so that the bar may be gripped at the desired points and the control mechanism then operated so that the gripping fingers 53 and 55 firmly grip the bar. Pressure may be applied to hydraulic cylinders 61 to stretch the bar as it is pulled therein.

If the bar has a twist, motor 68' can be energized and the headstock body or gripping head 67 rotated thereby, the casing or headstock housing 57 not rotating therewith. The thrust bearing permits such rotation under the possible high pressure involved. If it is desired to stretch and twist at the same time, force also can be applied to the hydraulic cylinders 61. The force also may be applied after the stretching operation has taken place. The hydraulic cylinders have no rotation and have only a longitudinal motion relative to their bearings and stuffing boxes.

It is to be understood that various modifications may be made to the embodiments and details of construction, including variations of the form of the thrust bearing without departing from the spirit of the invention except as defined in the appended claims.

What is claimed is:

1. In a machine for straightening bars of the character described, a frame, two gripping heads mounted on said frame, said heads having housings and having aligned passageways therethrough for the passage of bars from end to end of and through the machine, bar gripping means in each of said heads for holding bars at spaced points, anchoring means on the first of said gripping heads adjustably positioning said head on the frame relative to the second head, said second housing being non-rotatable, means connected with the second head for rotating the same, a hydraulic motor located on either side of the passageway for the bars through the second head, a crosshead connecting the pistons of said motor, longitudinally extending means for connecting said crosshead to said non-rotatable housing of the second gripping head, thrust bearing means located between said housing of said second gripping head and the rotatable gripping head thereof so that longitudinally exerted force can be transmitted to the rotatable head, and means connecting said second gripping head housing and pistons with said frame for preventing relative rotation of the housing and frame.

2. In a machine for straightening bars of the character described, a frame, two gripping heads mounted on said frame, said heads having housings and having aligned passageways therethrough for the passage of bars from end to end of and through the machine, bar gripping means in each of said heads for holding bars at spaced points, anchoring means on the first of said gripping heads adjustably positioning said head on the frame relative to the second head, said second housing being non-rotatable, means connected with the second head for rotating the same, a hydraulic motor located on either side of the passageway for the bars through the second head, a crosshead connecting the pistons of said motor, longitudinally extending means for connecting said crosshead to said non-rotatable housing of the second gripping head, thrust bearing means located between said housing of said second gripping head and the rotatable gripping head thereof so that longitudinally exerted force can be transmitted to the rotatable head, a telescoping bar guide located between said crosshead and the rotatable gripping head, and means connecting said second gripping head housing and pistons with said frame for preventing relative rotation of the housing and frame.

3. In a machine for straightening bars of the character described, a frame, two gripping heads mounted on said frame, said heads having housings and having aligned passageways therethrough for the passage of bars from end to end of and through the machine, bar gripping means in each of said heads for holding bars at spaced points, anchoring means on the first of said gripping heads adjustably positioning said head on the frame relative to the second head, said second housing being non-rotatable, means connected with the second head for rotating the same, a hydraulic motor located on either side of the passageway for the bars through the second head, a crosshead connecting the pistons of said motor, longitudinally extending means for connecting said crosshead to said non-rotatable housing of the second gripping head, thrust bearing means located between said housing of said second gripping head and the rotatable gripping head thereof so that longitudinally exerted force can be transmitted to the rotatable head, hydraulic motor return means mounted on said machine and connected with said second housing for moving said housing in a direction opposite to that of the first mentioned hydraulic motor, and means connecting said second gripping head housing and pistons with said frame for preventing relative rotation of the housing and frame.

4. In a machine for straightening bars of the character described, a frame, two gripping heads mounted on said frame, said heads having housings and having aligned passageways therethrough for the passage of bars from end to end of and through the machine, bar gripping means in each of said heads for holding bars at spaced points, anchoring means on the first of said gripping heads adjustably positioning said head on the frame relative to the second head, said second housing being non-rotatable, means connected with the second head for rotating the same, hydraulic cylinders and pistons mounted on said frame on either side of the passageway for the bars through the second head, a crosshead connecting said pistons, longitudinally extending means for connecting said crosshead to said non-rotatable housing of the second gripping head, thrust bearing means located between said housing of said second gripping head and the rotatable gripping head thereof so that longitudinally exerted force can be transmitted to the rotatable head, and means connecting said second gripping head housing and pistons with said frame for preventing relative rotation of the housing and frame.

5. In a machine for straightening bars of the

character described, a frame, two gripping heads mounted on said frame, said heads having housings and having aligned passageways therethrough for the passage of bars from end to end of and through the machine, bar gripping means in each of said heads for holding bars at spaced points, anchoring means on the first of said gripping heads adjustably positioning said head on the frame relative to the second head, said second housing being non-rotatable, means connected with the second head for rotating the same, hydraulic cylinders and pistons mounted on said frame on either side of the passageway for the bars through the second head, a crosshead connecting said pistons, longitudinally extending means for connecting said crosshead to said non-rotatable housing of the second gripping head, thrust bearing means located between said housing of said second gripping head and the rotatable gripping head thereof so that longitudinally exerted force can be transmitted to the rotatable head, hydraulic motor return means mounted on said machine and connected with said second housing for moving said housing in a direction opposite to that of the first mentioned hydraulic motor, and means connecting said second gripping head housing and pistons with said frame for preventing relative rotation of the housing and frame.

6. In a machine for straightening bars of the character described, a frame, two gripping heads mounted on said frame, said heads having housings and having aligned passageways therethrough for the passage of bars from end to end of and through the machine, bar gripping means in each of said heads for holding bars at spaced points, anchoring means on the first of said gripping heads adjustably positioning said head on the frame relative to the second head, said second housing being non-rotatable, means connected with the second head for rotating the same, hydraulic cylinders and pistons mounted on said frame on either side of the passageway for the bars through the second head, a crosshead connecting said pistons of said motor, longitudinally extending means for connecting said crosshead to said non-rotatable housing of the second gripping head, thrust bearing means located between said housing of said second gripping head and the rotatable gripping head thereof so that longitudinally exerted force can be transmitted to the rotatable head, a telescoping bar guide located between said crosshead and the rotatable gripping head, hydraulic motor return means mounted on said machine and connected with said second housing for moving said housing in a direction opposite to that of the first mentioned hydraulic motor, and means connecting said second gripping head housing and pistons with said frame for preventing relative rotation of the housing and frame.

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