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[21] Appl. No. **765,850**
[22] Filed **Oct. 8, 1968**
[45] Patented **Jan. 26, 1971**
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[32] Priority **Jan. 20, 1968**
[33] **Germany**
[31] **1,608,088**

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[54] **APPARATUS FOR SEVERING HORIZONTAL STRANDS PRODUCED BY CONTINUOUS CASTING**
7 Claims, 4 Drawing Figs.

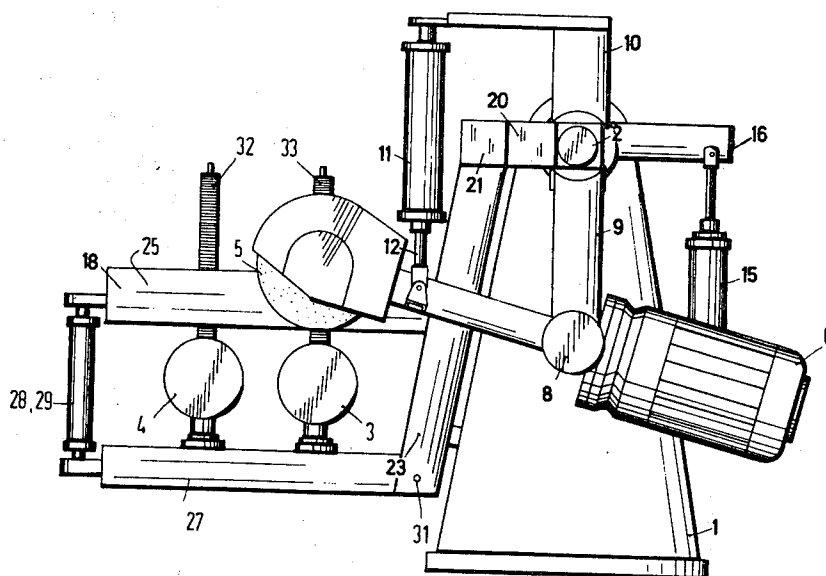
[52] U.S. Cl. **83/319,**
83/488, 83/574
[51] Int. Cl. **B23d 25/06,**
B26d 1/16
[50] Field of Search **83/319,**
488, 574

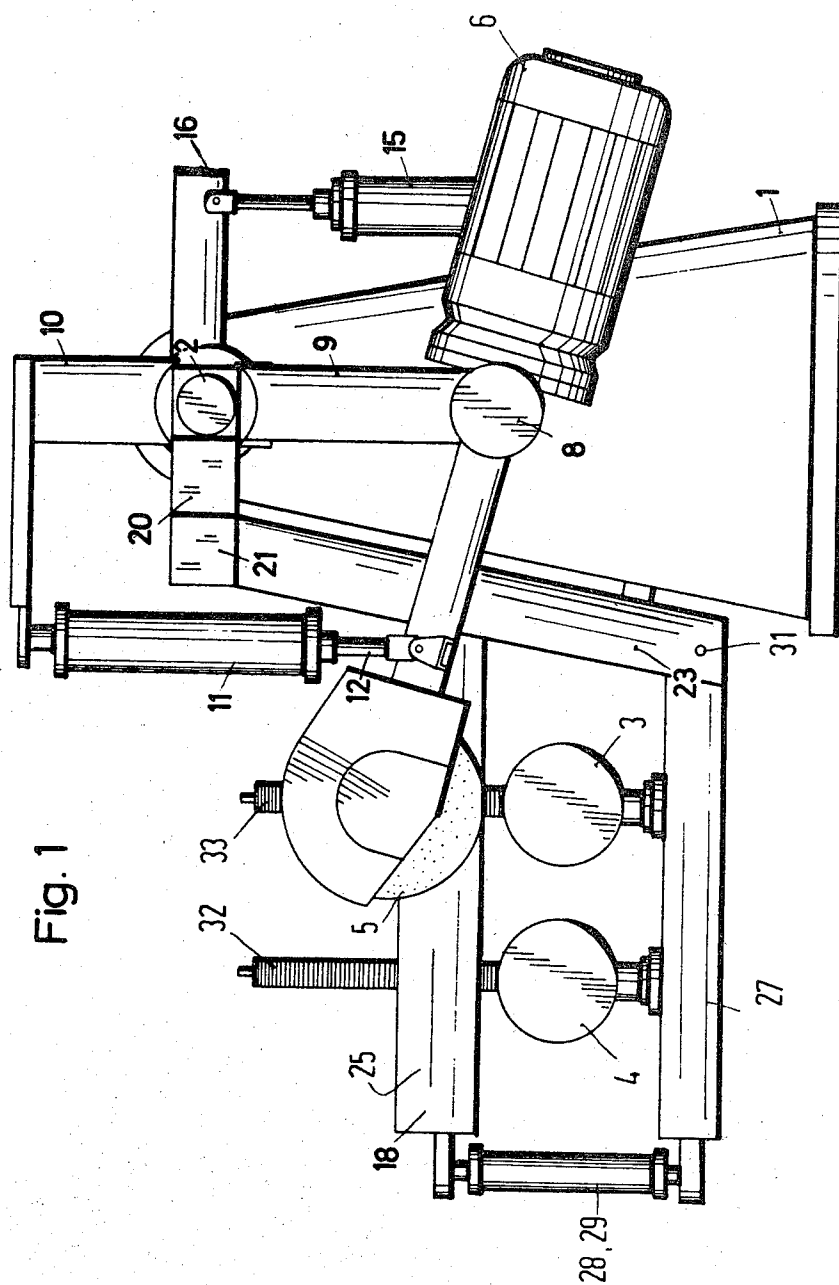
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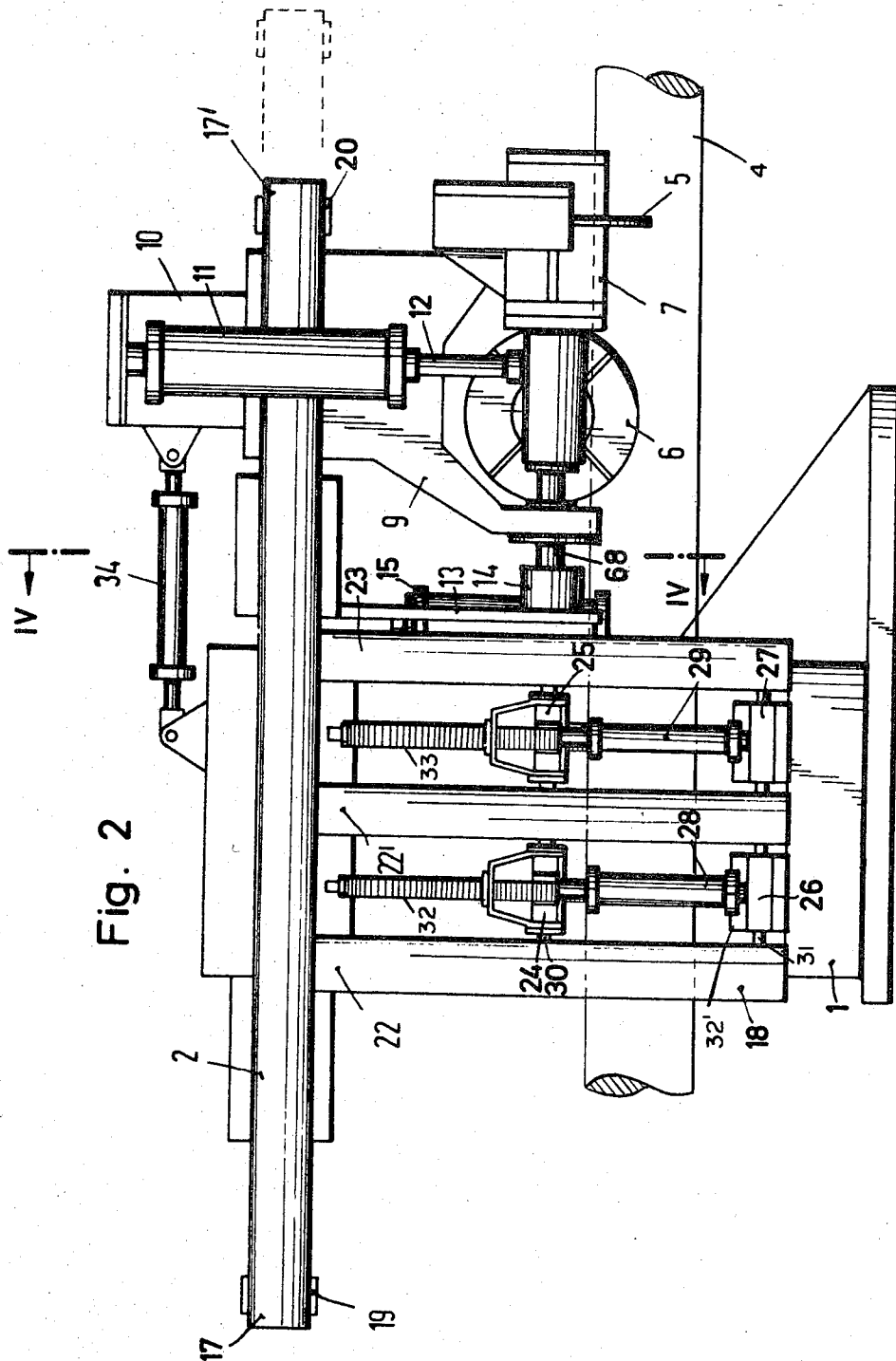
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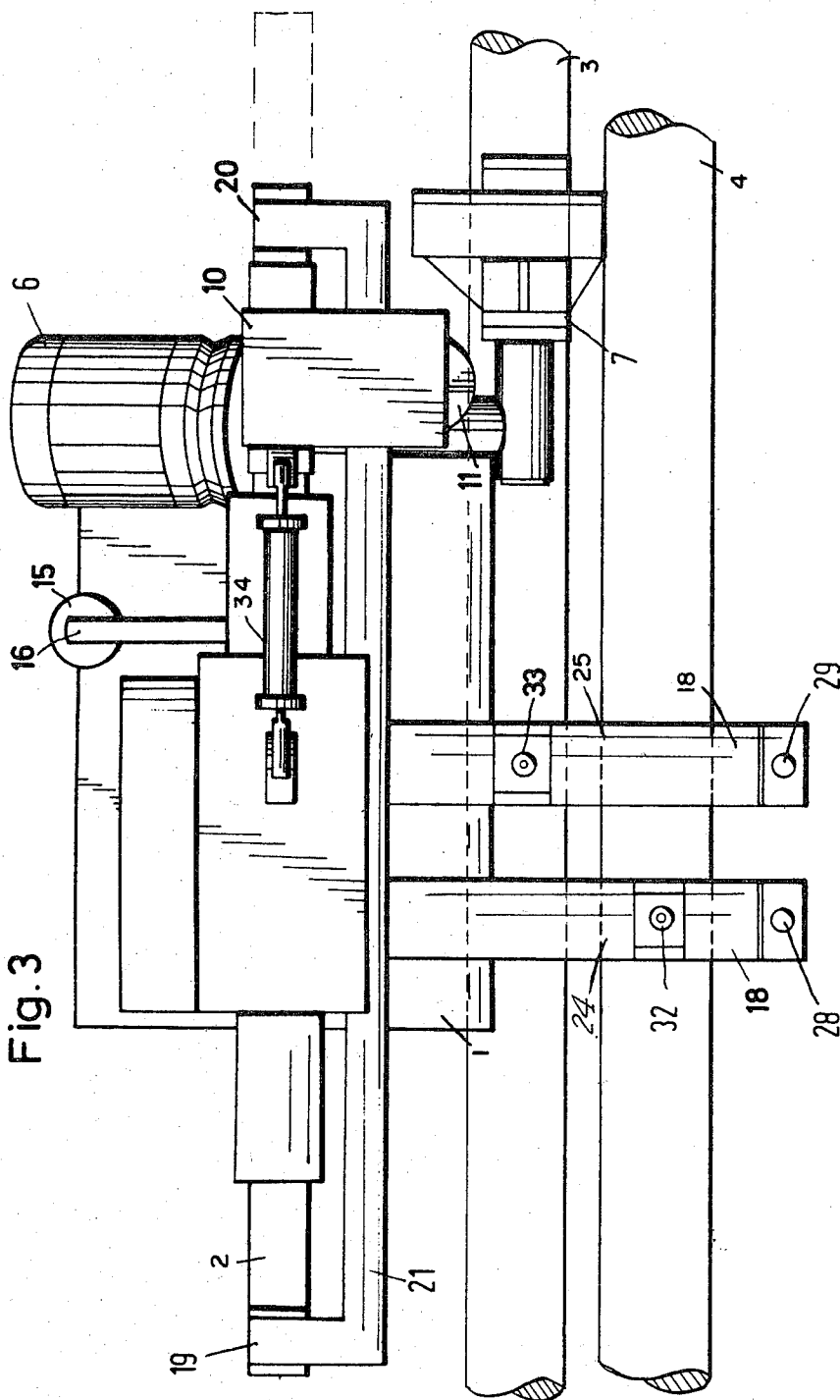
ABSTRACT: The disclosure relates to an apparatus for severing individual pieces from horizontal strands produced by continuous casting having varying drawing speeds. It has a base frame on which is mounted for movement a girder in a longitudinal direction and parallel to the strands to be severed. The girder has clamp means that move with it that grip onto a selected strand and are moved by the movement of the strand. Also mounted on the girder for longitudinal movement therewith but pivotal thereto is a rocker arm which pivotally carries a cutter means. There is mounted on the base a cylinder and piston that telescopically connects with the rocker arm to rock it into position with a strand, yet the rocker arm may move longitudinally with respect to the base through the telescopic connection. Another cylinder and piston are mounted on the rocker arm and connected to the cutter means to pivot it. A third cylinder and piston are connected at one end to the fixed base and extends parallel to the girder and is connected at their other end to the rocker arm and thus there is moved longitudinally the rocker arm and the girder on which the rocker arm is mounted. After a cut of a piece of the strand, the third piston and cylinder are actuated to return the girder and the parts mounted thereon to a position for reclamping of the clamp means to a selected strand for movement therewith for cutting off of another piece of the strand.







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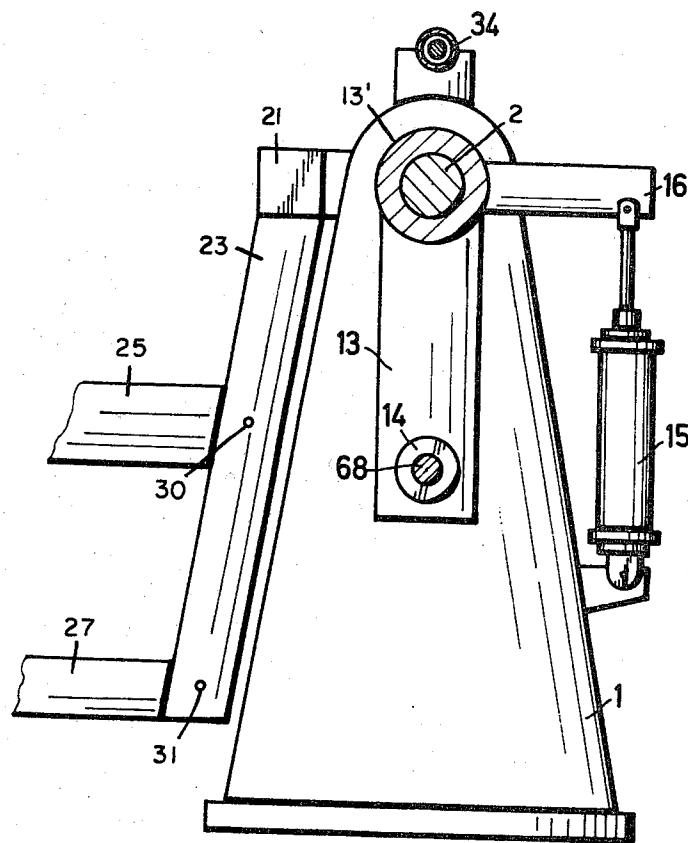


Fig. 4

APPARATUS FOR SEVERING HORIZONTAL STRANDS PRODUCED BY CONTINUOUS CASTING

BACKGROUND OF THE INVENTION

For continuous casting, the vertical and horizontal process are known. The vertical process produces strands, the length of which is limited by the depth of the foundry pit. When this length is reached, the casting process is interrupted and a new strand is cast, or else the casting process is continued and the strand is sawed off. There is also casting equipment available with which it is possible to divert the vertical strand into the horizontal position after having left the mold or even within the mold, with the result that when such metals are cast by the vertical process also strands of any length can be produced. In the course of the casting process, handy pieces are cut from horizontal strands either produced by the horizontal or the vertical process after the material is sufficiently solidified. This can take place manually or by means of severing machines.

In machines of this kind, the cutting tool post is in a transverse position to the strand and movably mounted in a parallel position to the strand. The shifting motion of the tool post is necessary because the strand advances according to its drawing speed when the individual pieces are cut therefrom. The shifting motion is initiated by closing of a gripping device representing the mechanical connection between strand and cutting tool slide. The infeed motion of the cutting wheel or saw blade is caused by the to and fro motion of the cutting device on a straight guide extending in a parallel position to the strand. By the device of the prior art, it is only possible to cut pieces of varying length from strands produced by single casting machines. Very often several strands are cast simultaneously from one furnace which are drawn out at varying speeds due to profile differences or for other reasons. To cut such adjacent strands, a respective number of cutting machines equaling the amount of strands would be required if equipment so far known were used. This is very expensive and can very often not be realized due to lack of space.

SUMMARY OF THE INVENTION

It is an object of the invention to provide means suited to cut individual pieces from two or more strands, all of which are drawn off at speeds differing from one another.

The problem is solved such that one of two or more parallel strands can be selectively engaged for severing with the cutting device whereby the cutting device is adjustable relative to the strand to be severed such that the rocker mounted on a projecting girder and carrying the cutting device is pivoted. The cutting device can be engaged with the strand to be severed and shifted in the longitudinal direction at any point of the strand during the casting process due to the projecting girder which also carries the gripping means that is movably mounted in a longitudinal direction. Pivoting of the rocker carrying the cutting device as well as engaging the cutting device with the strand to be severed can either be carried out mechanically, pneumatically or hydraulically.

The advantages arising from the invented device are obvious; by using a single apparatus almost any number of adjacent strands can be severed at the usual drawing speeds and lengths of pieces. The cutting device of the invention is easily adjustable to each strand and so is the drag coupling quickly converted to the dimension of the cast strand. The varying drawing speeds of the individual strands thereby present no difficulties. The present invention, therefore, represents an immense technical improvement.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention is hereinafter described by way of example with reference in the accompanying drawings but it is clearly to be understood that the invention is by no means restricted to the details of this embodiment.

FIG. 1 shows a view in the direction of the cast strand;

FIG. 2 an elevational view at the left of FIG. 1;

FIG. 3 a top view plan of the machine; and
FIG. 4 a sectional view along line IV-IV.

DESCRIPTION OF THE PREFERRED EMBODIMENT

On a base 1 of the device there is movably mounted a longitudinally extending girder or support bar 2. Parallel to girder 2 run strands 3 and 4 coming from a casting machine (not shown) and from which pieces of random length are cut by means of the new device with which is associated the grinding or cutting wheel 5 driven by motor 6 by an angular drive. The cutting device 7 consisting of grinding wheel 5 and motor 6 is pivotally mounted around axis 8. The cutting device 7 is held by rocker arm 9 which is pivotally though not movably mounted on girder 2. Rocker 9 also carries arm 10 to which cylinder 11 is secured, the piston rod 12 of which is connected with cutting device 7. When sufficient pressure is applied to the piston of cylinder 11 by a pressure means (not shown), the cutting device 7 can slowly reach from an upper starting position (see FIG. 1) of cutting wheel 5 to a lower position. In this way, for instance, either strand 3 or strand 4 is severed. Setting the cutter to the respective strand takes place through pivoting rocker arm 9 by means of lever 13 connected with rocker arm 9 by means of telescopic rod 14 and connection 68, see FIGS. 2 and 4.

Lever 13 is driven by the pneumatic or hydraulic cylinder 15 which pivotally engages arm 16 or lever 13. The other end of hydraulic cylinder 15 is secured to base 1. The telescopic connection 14, see FIGS. 2 and 4, is needed as cylinder 15 is connected to base 1 and rocker arm 9 carrying the cutting means 7 moves longitudinally and parallelly with the strands 3 and 4.

Lever 13 and lever 16 are attached to a bushing 13'. The bushing 13' is pivoted on the supporting bar 2. The clamping device 18 is firmly connected to the two ends 17 and 17' of the supporting bar 2. The clamping device consists of the cross bars 19, 20, the length bar 21, the bars 22, 22' and 23, as well as the proper pairs of clamping bars 24, 25 and 26, 27. The cross bars 19, 20 connect the supporting bar 2 firmly to the length bar 21. The bars 22, 22' and 23 are firmly connected to this. The pivots 30 and 31 are positioned on the bars 22, 22' and 23. The clamping bars 24, 25, 26 and 27 are journaled on these pivots 30 and 31. The clamping bars 24 and 26 can be moved towards each other and away from each other by the hydraulic cylinder 28 and the clamping bars 25, and 27 can be moved by the hydraulic cylinder 29. The pressure screw 32 is provided in the clamping bar 24 and can be adjusted to such an extent that it exerts a force on strand 4. A counterforce is generated by the counterpiece 32' which is firmly connected to the clamping bar 26.

The hydraulic cylinder 28 can now be operated in such a way that the two clamping bars 24, 26 are moved one towards the other. Owing to this strand 4 is clamped between the pressure screw 32 and the counterpiece 32'. Upon conveying strand 4 out of the casting mould by means of a drawing device not shown, the clamping device 18 is moved at the same speed as the strand. As already mentioned, the severing disc 5 is pivoted on the supporting bar 2, however, it is shiftably supported in the longitudinal direction. In view of this it moves at the same speed as strand 4 when operating hydraulic cylinder 28.

When operating hydraulic cylinder 29 the clamping device 18 is connected to strand 3 and the severing disc 5 moves at the same speed as strand 3. As a matter of fact only one cylinder 28 or 29 should be operated if the strands 3 and 4 have different drawing speeds.

After a piece from the strand has been severed, the severing disc 5 and the clamping device 18 have covered a portion of the path in drawing direction together with the strand to be severed. From this position they are to be returned again into their initial position for the next severing operation. For this purpose there is provided a compressed-air or hydraulic cylinder 34, see FIG. 2, which has one end attached to a lug on base 1 and on the other end to arm 10 of the severing unit 7.

The severing operation consists of:

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the clamping of the screw 32 or 33 on one strand 4 or 3, respectively, by operating one of the hydraulic cylinders 28 or 29;

the adjustment of rocker arm 9 to one of the strands 3 or 4; the swinging in of the severing unit 7 on the strand selected; and

the severing of the strand itself.

During the severing operation the clamping device 18 and the severing unit 7 cover a portion of the path in the drawing direction of the strand. After swinging back of the severing disc 5 it is returned into its upper resting position and after loosening the clamp, the clamping device 18 and the severing unit 7 are returned to their initial position.

We claim:

1. Apparatus for severing individual pieces from horizontal strands cast on end and having varying drawing speeds, whereby one of two or more parallel running strands can be selectively engaged and cut, including a base frame, a horizontally mounted girder extending parallel to the strands, means mounting the girder on the base frame for longitudinal movement, strand clamping means pivotally mounted on the girder and extending transverse thereto and longitudinally movable therewith, rocker arm means pivotally mounted on the girder and extending transverse thereto and longitudinally movable therewith, cutting means pivotally mounted on the rocker arm means and extending transversely to the girder for cutting a selected strand, means connected to the rocker arm means for moving same and the pivotally mounted cutting means thereon adjacent a selected strand from which a piece is to be cut, means connected to the pivotally mounted cutting means to bring it into engagement with the strand and to move it to cut through the strand, whereby on clamping said strand clamping means to the strand said clamping means and the girder to which it is attached are moved longitudinally with the strand and said rocker arm means moves simultaneously longitudinally with the girder and carries said pivotally mounted cutting means thereon that cuts through said strand as it moves at its drawing speed.

2. Apparatus according to claim 1 wherein the means connected to the rocker arm to move same and the means connected to the pivotally mounted cutting means to move it in-

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clude cylinder and piston type servomotors.

3. Apparatus according to claim 1 including means connected with the girder for moving the same longitudinally.

4. Apparatus according to claim 3 wherein said means to move the girder includes a cylinder and piston-type servomotor.

5. Apparatus according to claim 1 wherein said clamping means and its pivotal mounting on the girder includes, cross-beams pivotally mounted and extending transversely adjacent each end of the girder, a main beam connecting the cross-beams and extending parallel and proximal to the girder, generally vertically extending spaced apart support beams connected to and depending from said main beam, an upper pair of generally horizontally extending and horizontally spaced apart clamp beams pivotally connected at their inner ends to said support beams, a lower pair of clamp beams extending generally parallel to said respective upper pair of clamp beams and pivotally connected to the lower end portions of said support beams, power cylinder means connecting the outer ends of said respective pairs of clamp beams for moving each pair of clamp beams toward and from each other, pressure screw clamp means connected to said clamping beams and adapted for selectively clamping to parallel spaced apart strands extending between the clamping beams.

6. Apparatus as defined in claims 3 or 5 wherein said respective means connected respectively with said rocker arm to pivot the same, said cutting means to pivot the same and said means to move the girder and the means connected therewith include cylinder and piston-type servomotors.

7. Apparatus defined in claim 6 wherein said pivotally mounted cutting means is mounted adjacent said strand clamping means in the direction from which said strands are drawn and includes an arm pivotally mounted intermediate its ends to the depending end of said rocker arm, a rotary cutting disc mounted on the end of said arm adjacent said clamping means and a motor drive means mounted on the other end of said arm and having drive means connecting it with said rotary cutting disc, said means connected to the cutting means to pivot the same is connected to said arm last mentioned adjacent said cutting disc.

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