Sept. 27, 1927. 1,643,291

A. ARMSTRONG

APPARATUS FOR THE PRODUCTION OF WELDED WIRE FABRIC

Original Filed Nov. 18, 1924 4 Sheets-Sheet 1

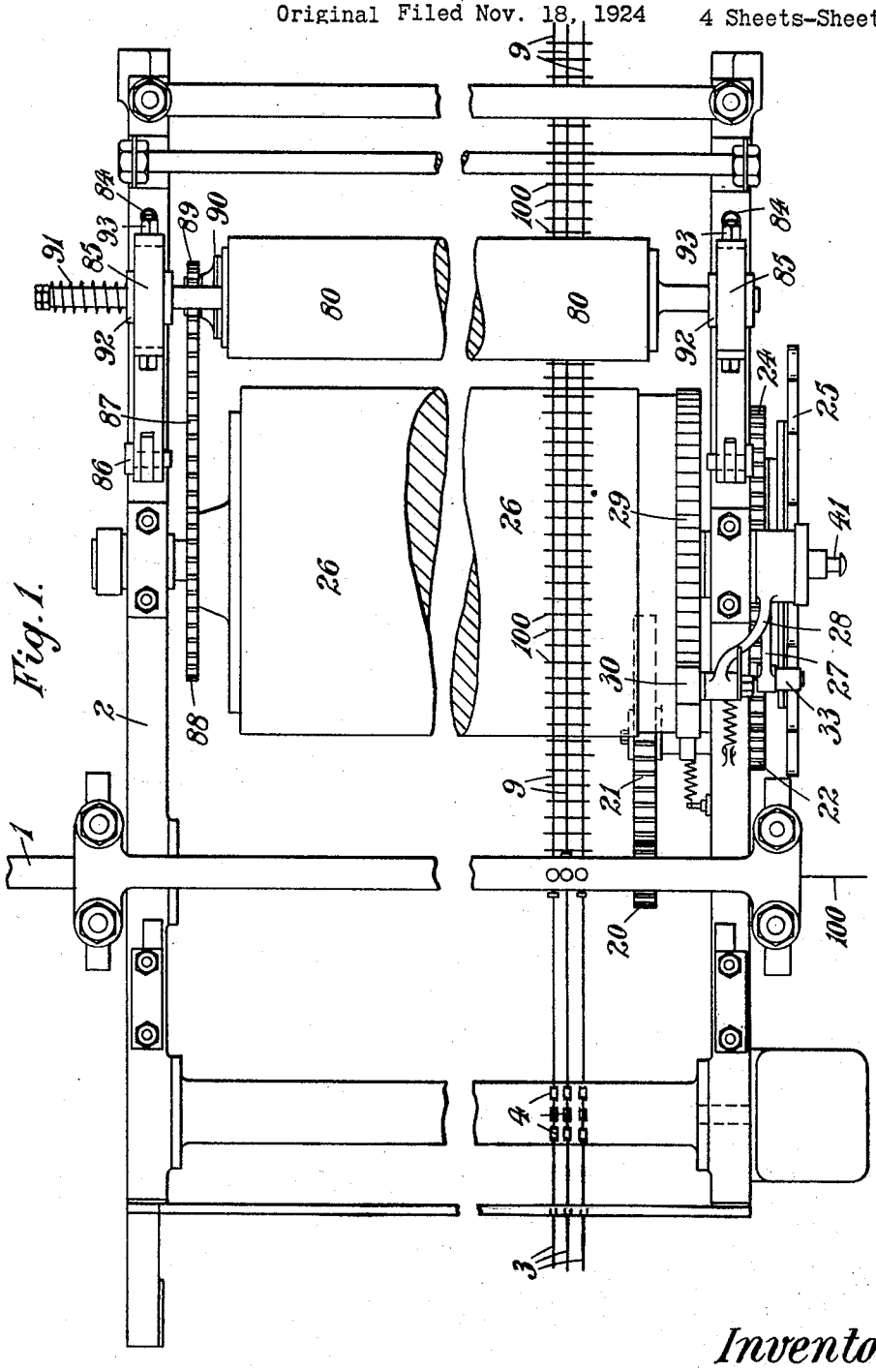


Fig. 1.

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Original Filed Nov. 18, 1924 4 Sheets-Sheet 2

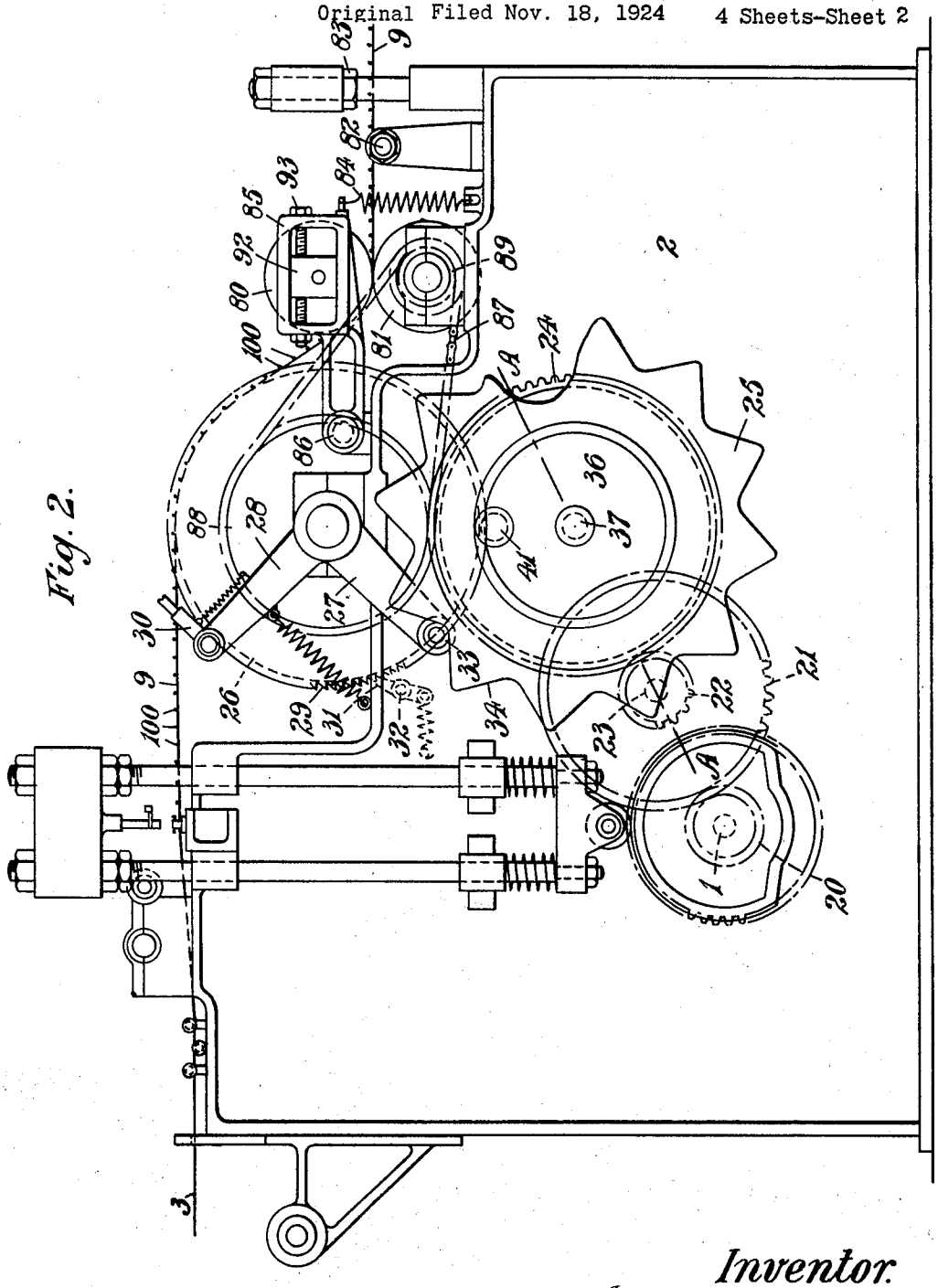


Fig. 2.

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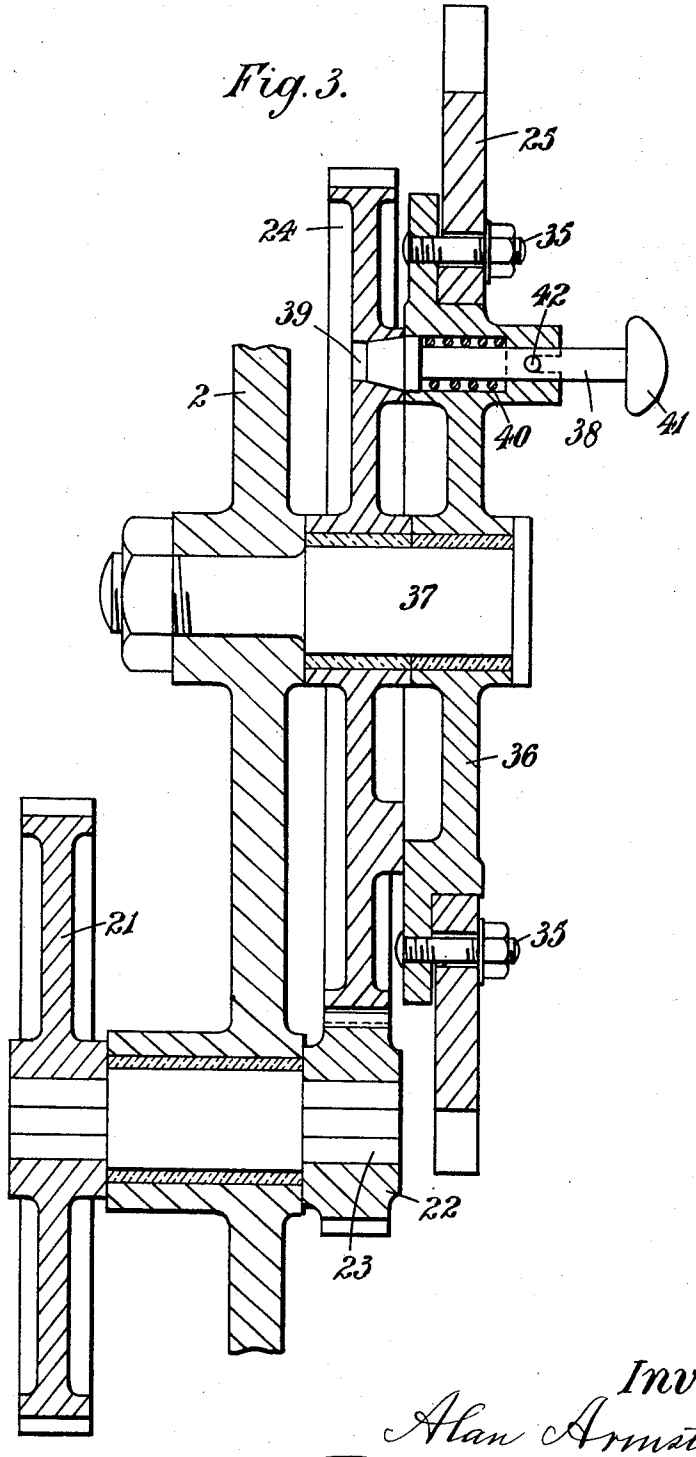
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Fig. 3.



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APPARATUS FOR THE PRODUCTION OF WELDED WIRE FABRIC

Original Filed Nov. 18, 1924 4 Sheets-Sheet 4

Fig. 4.

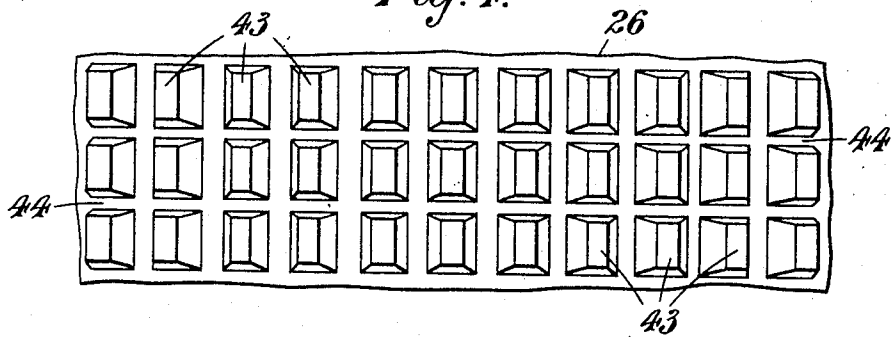


Fig. 5.

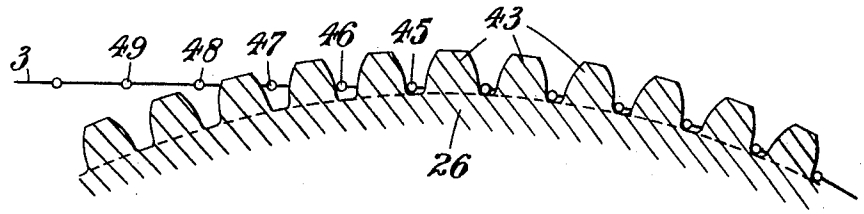
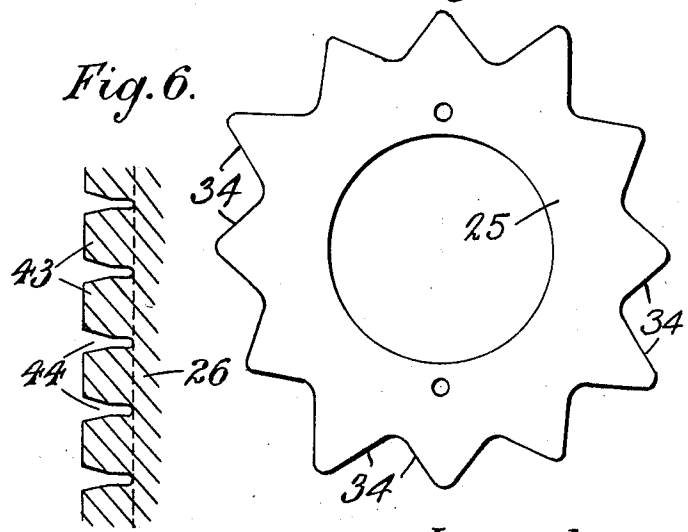


Fig. 7.

Fig. 6.



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Patented Sept. 27, 1927. 1,643,291

UNITED STATES PATENT OFFICE.

ALAN ARMSTRONG, OF WHITLEY BAY, ENGLAND, ASSIGNOR TO PILKINGTON BROTHERS LIMITED, OF LIVERPOOL, ENGLAND.

APPARATUS FOR THE PRODUCTION OF WELDED-WIRE FABRIC.

Original application filed November 18, 1924, Serial No. 750,715, and in Great Britain November 20, 1923. Divided and this application filed May 28, 1926. Serial No. 112,272.

This invention relates to apparatus for producing wire fabric in which the wires are electrically welded at their crossing points, and it has for its object improved means for effecting the automatic feeding forward step-by-step of the non-crossing wires to produce either a uniform mesh or a pattern mesh according to requirements, and for the straightening of the fabric.

Apparatus according to the invention may be constructed in many different forms, and it is therefore to be understood that the form which is hereinafter described is given merely as a convenient example.

The invention will be described as applied to the production of a fabric with rectangular meshes, but it is not limited to that particular production.

For convenience of description, the series of non-crossing wires are herein termed the warp or the warp wires, and the crossing wires are herein termed the weft or the weft wires.

In the accompanying drawings:—

Figure 1 is a plan view of the apparatus embodying the invention (the centre portion being broken away);

Figure 2 is an elevation of the front thereof;

Figure 3 is a section through a portion of the apparatus along the inclined line A—A, Figure 2, showing the cam plate with its disc and driving means;

Figure 4 is a plan view of a portion of the feed drum showing the teeth thereon;

Figure 5 is a section of the same showing the fabric;

Figure 6 is a section of the same taken on a line at right-angles to that on which Figure 5 is taken, and

Figure 7 is a view of an alternative form of feed cam.

Referring to Figures 1 and 2, the main driving shaft 1 supported in the two side frames 2 of the apparatus, carries a pinion 20 (Figure 2) which meshes with a reduction gear 21, 22 carried on a shaft 23. The pinion 22 meshes with a wheel 24 on a stud 37 for turning a cam plate 25, which operates a warp wire feed drum 26 by means of a ratchet lever 27, 28.

The warp wires 3 of which three only are shown in Figure 1, pass from spools (not shown) at the left-hand end of the apparatus, through straightening rollers 4, and after the weft wires have been welded to said warp wires to form the fabric 9, this latter passes partially round the feed drum 26, between a pair of straightening and feeding rollers 80, 81 over a guide roll 82 and through a guillotine 83.

One turn of the main shaft 1 produces the feed of one weft wire 100, one welding operation and one-twelfth of a turn of the cam plate 25, and constitutes one complete cycle of the apparatus.

The means for feeding and severing the weft wire and for effecting the welding constitute the subject matter of separate application for Letters Patent S. N. 750,715 from which the present application has been divided.

The fabric feed drum 26 is turned clockwise (as viewed in Figure 2) so as to feed the fabric by the amount corresponding to the desired pitch of the weft wires, by means of a ratchet wheel 29 fixed to the drum, and a ratchet 30 pivoted on the lever arm 28, a detent 31, pivoted to the frame 2 at 32 engaging with the ratchet wheel 29.

The lever 27, 28 is moved to feed the drum by means of a roller 33 on its arm 27 engaging under spring pressure with the cam surfaces 34 of the cam plate 25. The radial height of the cam surfaces 34 therefore determines the amount of the feed and the pitch of the weft wires.

The cam plate 25 is arranged for easy disengagement from its driving mechanism as follows:—The cam plate 25 (see particularly Figure 3) is held by studs and nuts 35 on the cam driving disc 36, which is adapted to turn on the stud 37 which carries the gear wheel 24. The cam driving disc 36 can be locked to, or freed from, the gear wheel 24 by means of a pin 38, slidably mounted in the disc 36 and adapted to engage in a hole 39 on the gear wheel 24. The pin is pressed by a spring 40 into engagement with the hole 39 and can be manually withdrawn therefrom by its knob 41 and held out of engagement by a pin 42, on giving the pin 38 a partial turn when withdrawn.

By means of this device, the feed of the fabric may be stopped, without stopping the main shaft 1, and may be started again by releasing the pin 38, which locks together the gear wheel 24 and the cam driv-

ing disc 36 in the same relative positions as those at which they were disengaged.

The pitch of the weft wires 100 may be varied by attaching to the apparatus, cam plates having cam surfaces of different radial heights, and a pattern, in which succeeding weft wires are at different pitches, may be produced by attaching a cam plate in which, as exemplified in Figure 7, succeeding cam surfaces are of different radial heights.

The gear ratio between the pinion 20 and the wheel 24 is preferably 1 to 12 so that a considerable number of different patterns can be produced by substituting different cam plates 25 and without changing the pinions and wheels of the reduction gear.

The feed drum 26 is provided with teeth 43 (Figures 4, 5 and 6) parallel to its axis, the pitch of the said teeth being equal to or a sub-multiple of the pitch of the smallest mesh desired between the warp wires 3. The teeth of the ratchet wheel 29 have an angular pitch equal to, or a sub-multiple of, that of the teeth 43. The detent 31 is preferably adjustable in position or length, and is so adjusted that, after the feed has been effected the feed drum can turn backwards through a small angle under the tension of the warp wires, before being held by the detent, and thereby diminish the said tension during the welding operation.

The teeth 43 of the drum 26 are cut by circumferential grooves 44 at a pitch equal to that of the welding dies. The warp wires enter the said grooves and the depth of the grooves is such that the weft wires can rest at the bottom of the hollows between the teeth 43 as shown at 45, Figure 5. The grooves 44, as shown best in Figure 6, are given a tapering form so as to guide the warp wires into their correct position on the feed drum, centrally of the groove. The teeth 43 are so shaped that when one weft wire 46 is engaged by a line of teeth, the following weft wires, 47, 48, 49, as the feed progresses, pass quite clear of the tops of the teeth and come into contact with the teeth at a line such as that occupied by the weft wire 47 which is distant from the top of the teeth a considerable portion of the height of the teeth. By this means provision is made for the correct engagement of a weft wire which may have become distorted.

In order to diminish the pressure between the teeth of the feed drum 26 and the weft wires of the fabric in feeding the fabric, and also in order to straighten the fabric from any curve which it may have, the following mechanism is provided. The feeding and straightening rolls 80, 81, are covered with a soft material such as rubber, and grip the fabric between them under the pressure of springs 84 which act on the housings 85 of the roll 80 each said housing being pivoted at 86, to the respective side frame 2. The roll 81 is driven through a clutch 90, Figure 1, by a chain 87 on chain wheels 88 and 89 attached respectively to the feed drum 26 and clutch 90. The clutch 90 is a friction clutch with spring 91, adapted to permit of slip between the chain wheel 89 and the roll 81. The chain wheel 89 is driven at such a speed relatively to that of the feed drum 26 that, if there were no slip in the clutch 90, the peripheral speed of the roll 81 would be slightly in excess of the peripheral speed of the drum 26. The friction in the clutch 90 is so adjusted that the pull exercised on the fabric by the feed rolls 80, 81 is nearly, but not quite, sufficient to pull the weft wires of the fabric from the teeth of the drum 26.

The feed roll 80 is mounted in blocks 92 adapted to slide in the housings 85 and to be held in any position therein by screws 93. By varying the position of the blocks 92 in the housings 85, the feed roll 80 may be positioned closer to or further from the drum 26, whereby any permanent curve previously in the fabric may be counteracted by the inverse curve taken by the fabric in passing from the drum 26 to and between the feed rolls 80 and 81.

Having described my invention, I declare that what I claim and desire to secure by Letters Patent is:—

1. In apparatus of the type described for producing welded wire fabric, fabric-feeding means consisting of a drum the partial rotation of which determines the feed, teeth on the drum adapted to engage the weft wir a pair of rolls located beyond the drum, between which the fabric passes, driving means for the rolls adapted to turn them at a peripheral speed exceeding that of the drum, and a clutch between the driving means and the rolls adapted to slip when the desired feed has been effected.

2. In apparatus of the type described for producing welded wire fabric, means for feeding the fabric and the warp wires, comprising in combination a toothed drum the partial rotation of which determines the feed and with the teeth of which the weft wires of the fabric engage, ratchet gear intermittently rotating the drum, a plurality of cam surfaces each adapted to actuate the ratchet gear to rotate the drum to an extent depending on its height, a member carrying the cam surfaces and means to rotate the member to bring each cam surface in succession into operative engagement with the ratchet gear.

3. In apparatus of the type described for producing welded wire fabric, means for feeding the fabric and the warp wires, comprising in combination a toothed drum the

partial rotation of which determines the feed and with the teeth of which the weft wires of the fabric engage, ratchet gear intermittently rotating the drum, a plurality of cam surfaces of different heights adapted to actuate the ratchet gear to an extent depending on the heights of the said surfaces, a member carrying the cam surfaces and means to rotate the member to bring each cam surface in succession into operative engagement with the ratchet gear.

4. In apparatus of the type described for producing welded wire fabric, means for feeding the fabric and the warp wires, comprising in combination a toothed drum the partial rotation of which determines the feed and with the teeth of which the weft wires of the fabric engage, ratchet gear intermittently rotating the drum, a plurality of cam surfaces each adapted to actuate the ratchet gear to an extent depending on its height, a member carrying the cam surfaces, a constantly rotating part adjacent to the member, means to connect the constantly rotating part to the member during the operation of the machine and in a definite relative position.

5. In apparatus of the type described for producing welded wire fabric, the combination with a toothed drum the partial rotation of which determines the feed and with the teeth of which the weft wires of the fabric engage, ratchet gear intermittently rotating the drum, and rotating cam surfaces adapted to actuate the ratchet gear, of a detent adapted to permit the drum to turn backwards to relieve the tension on the warp wires and thereafter to arrest the said drum.

6. In apparatus of the type described for producing welded wire fabric, the combination with a drum adapted to determine the feed of the fabric of a pair of rolls adapted to exert traction on the fabric in a direction to effect its feed, the fabric and the tangent plane common to the two rolls passing on opposite sides of the axis of the drum.

7. In apparatus of the type described for producing welded wire fabric, the combination with a drum adapted to determine the feed of the fabric and a pair of rolls adapted to exert traction on the fabric in a direction to effect its feed, the fabric and the tangent plane common to the rolls passing on opposite sides of the axis of the drum, of means adjustable to vary the distance between the tangent plane common to the two rolls and the axis of the drum.

In testimony whereof I have affixed my signature hereto.

ALAN ARMSTRONG.