

No. 614,126.

Patented Nov. 15, 1898.

K. A. NESTMANN & L. HERZENBERG.

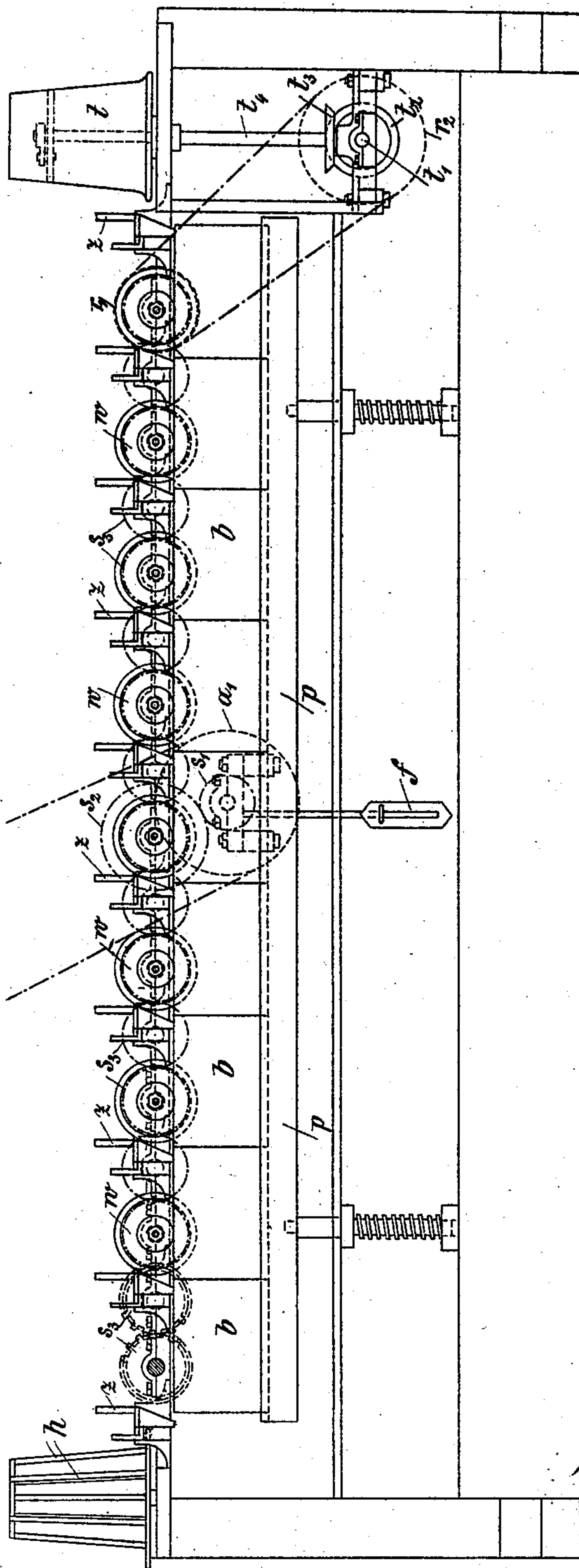
WIRE DRAWING MILL.

(Application filed Nov. 18, 1896.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1



WITNESS  
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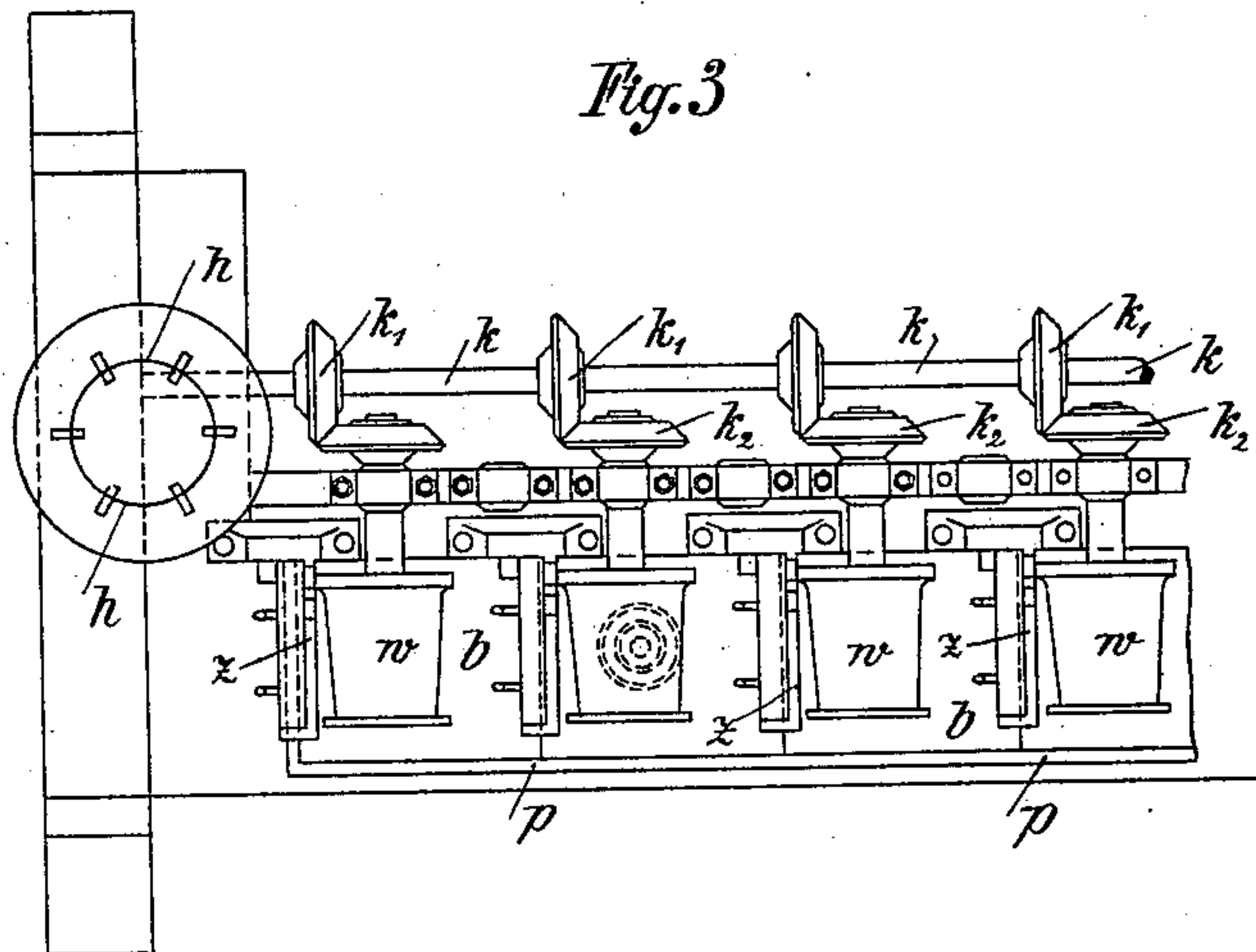
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WIRE DRAWING MILL.

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# UNITED STATES PATENT OFFICE.

KARL A. NESTMANN AND LOUIS HERZENBERG, OF RIGA, RUSSIA.

## WIRE-DRAWING MILL.

SPECIFICATION forming part of Letters Patent No. 614,126, dated November 15, 1898.

Application filed November 16, 1896. Serial No. 612,378. (No model.)

*To all whom it may concern:*

Be it known that we, KARL A. NESTMANN and LOUIS HERZENBERG, subjects of the Emperor of Russia, and residents of Riga, in the Russian Empire, have invented certain new and useful Improvements in Wire-Drawing Mills, of which the following is a specification.

The object of the machine which forms the subject of this invention is to simplify the drawing of wire by the cold process, as the methods hitherto in use do not fulfil all that is claimed for them or all that is required.

As is well known, the method hitherto employed for drawing wire consists in placing the winch or reel carrying the wire to be drawn in a vessel containing acid, drawing the wire through the draw-plate by winding it on a drum, then taking it off the drum and again laying it upon the reel in order to draw it through the draw-plate of the next number, and in repeating these operations until the desired number is reached. The disadvantages of this process are obvious. A great deal of time is spent unproductively in taking off and laying on the wire. In taking off especially, fine-drawn wire is frequently greatly deteriorated. Also when the wire cannot stand the pull and breaks the wire upon the reel and in the acid is spoiled. Finally, the chemical action of the acid is not uniform, as one end of the wire remains in it for a longer time than the other.

The object of this invention is to remedy these defects, and this is effected in the following manner: Our improved machine draws wire of ten or even more numbers or sizes by an uninterrupted motion, thereby entirely obviating the lengthy processes of taking the wire off the drum and putting it on the reel. By this means wire of any desired number can be continuously obtained. The wire is uniformly immersed in the acid and for a short time only, and the motion of the machine is so uniform and rapid that it is possible to draw even the finest wire very quickly.

In the accompanying drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a plan view of the same, and Fig. 3 shows a modification of the drawing mechanism.

The main parts of the machine are at one end the reel *h* for carrying the wire which is

to be drawn, at the other end the drum *t* for receiving the drawn wire, and between these a series of porcelain rollers *w*, nine in number in this instance, arranged each in a separate trough *b*, containing acid, draw-plates *z* being provided between the reel *h* and the drum *t* and the said rollers and also between each pair of rollers. The rollers *w* are either driven in the manner shown in Figs. 1 and 2 by means of spur-wheels *s*<sup>3</sup>, fixed either upon their spindles or upon intermediate shafts *w'*, which may conveniently receive their motion from a driving-shaft having pulleys *a'* *a*<sup>2</sup> through the spur-wheels *s*<sup>2</sup> *s'* or, as shown in Fig. 3, by means of bevel-wheels *k'*, mounted upon a common shaft *k*. Motion is imparted to the drum-shaft *t*<sup>4</sup>, which engages the drum *t* by means of pawls, by bevel-wheels *t*<sup>3</sup> *t*<sup>2</sup>, actuated by the horizontal shaft *t'*, which is itself driven by means of pulleys *r*<sup>2</sup> *r'* from the nearest of the spindles *w'*.

At the commencement of operations the whole of the wire to be drawn is wound upon the reel *h*. The wire is then drawn through the first of the draw-plates *z* and given a few turns around the first porcelain roller *w*. The wire should be given as many turns around the roller as are necessary in order that the friction consequent upon the rotation of the roller may be sufficient to overcome the resistance of the draw-plate to the passage of the wire. In this manner the strain is so divided among the different windings upon the roller *w* that the wire forming the first few turns is in tension; but as it continues to wind around the roller this tension becomes gradually less until as it leaves the first roller the wire is unstretched. About one-half of each of the rollers *w* is within a lead-lined trough *b*, which is filled with acid, through which the wire runs. From the first roller the wire passes through the passage in the second draw-plate, which is one number higher than the first, to the second roller, and so on in succession until the wire has been wound around each of the nine rollers. From the ninth roller the wire is passed through the last draw-plate onto the drum *t*, which then commences to draw wire of the desired number uniformly and uninterruptedly.

As the machine is provided with ten draw-plates, a wire can be drawn direct and with-



out its being necessary to change either the drum or the reel, which is ten numbers finer than the original wire. Should, however, so fine a wire not be required, one or more of the  
 5 draw-plates at the delivery end of the series are simply passed over.

The rollers *w* fulfil the purpose of winding the wire as it is drawn through the draw-plate and of thus freeing the end of the wire  
 10 from tension. It will, however, of course be understood that the rollers do not themselves draw the wire, because if that were so, seeing that all the rollers are of the same size, while the wire is constantly becoming thinner, and  
 15 consequently longer, each roller would produce more wire than the next following roller could provide for. The wire then is, properly speaking, drawn only by the drum, and if this is put out of gear the rollers indeed  
 20 continue to rotate; but the wire itself does not move. Two special features are also aimed at in the construction of these rollers. First, they are made of porcelain, as being the most suitable material for resisting chemical ac-  
 25 tion of the acid employed, to which rollers made of iron or steel would be exposed. Second, the shape of the rollers themselves is conical, owing to which the wire is more loosely wound upon them spirally, and con-  
 30 sequently unwinds easily and without cutting into the rollers, as would be the case were metal rollers employed.

The manner in which the rollers are fixed upon their spindle is clearly shown with re-  
 35 spect to the first pair, of which in the plan view, Fig. 2, the first roller is supposed to be removed and the second is shown in section. A bush *w*<sup>2</sup> is provided upon the spindle *w*<sup>1</sup>, such bush being furnished with two studs  
 40 for the purpose of engaging the roller *w*. The spindle passes through the roller, and upon its end a tightening-nut is screwed. The drum *t* can be put out of gear by means of a well-known clutch or other means, (not  
 45 shown,) while, nevertheless, the motion of the machine as a whole remains unaffected, and all the rollers continue to turn; but the wire is no longer unwound. The troughs *b* are filled with liquid, such as acid, fat, and  
 50 vitriol of copper solution, for example. The number of said troughs corresponds to the number of rollers, of which nine are provided in the present case. They are completely di-  
 55 vided one from another and are mounted upon a common frame *p*, which rests upon springs and can be raised and lowered by means of a pedal *f*. This arrangement obvi-  
 60 ates the necessity of unnecessarily exposing the wire to the deteriorating action of the acid.

A special trough is provided for each number of wire, each trough being filled with acid of the desired degree of concentration. This provision is important, because the action of  
 65 strong acids upon the wire of the higher numbers is prejudicial and easily causes fracture

to take place. It is also necessary to provide for raising and lowering the frame, so that the rollers when not in use may not remain  
 70 in the acid. The troughs, apart from the acid necessary for the manufacture of the wire, may be filled with other liquids—those, for example, adapted to the manufacture of galvanized wire direct.

A further distinguishing feature of this in-  
 75 vention is the combination in a single machine of all the separate processes hitherto employed for wire-drawing, this being effected through the arrangement in succession of the draw-plate holders, of the rollers, and the  
 80 troughs, whereby the uninterrupted drawing of the wire from one number to the next higher is rendered practicable without its being necessary to take the wire off the drum and again wind it upon the reel. It is obvious  
 85 that this process will be so much the quicker, as the manufacture goes on uninterruptedly. In addition, owing to the exactly similar motion of the parts of the machine and to the uniform tension of the wire on the rollers as  
 90 a whole, a comparatively high speed might be attained even when wire of the finest number or size is being produced.

The constructional details of the machine all contribute to the production of the above  
 95 results, and among such details the following may be specially mentioned: (a) the special features of the rollers, (shown in two ways,) first, as regards the choice of a substance such as porcelain, which is capable of resisting the  
 100 action of the acid employed, and, secondly, as regards the slightly conical form given to the said rollers with a view to facilitating the unwinding of the wire from one roller onto an-  
 105 other, and so obviating fracture of the wire; (b) the arrangement of separate troughs, which permits of the use of liquids of different degrees of concentration and of different consistency; (c) the assemblage of the troughs  
 110 on a spring-mounted frame, which may be raised or lowered by means of a pedal.

Having now particularly described and as-  
 115 certained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

A wire-drawing machine comprising a series of draw-plates, the rollers between the draw-plates, independent baths for the rollers, and a movable frame carrying the baths, said frame being vertically adjustable so that  
 120 all the baths may be raised or lowered at one operation, substantially as described.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 17th day of  
 125 October, 1896.

KARL A. NESTMANN.  
 LOUIS HERZENBERG.

Witnesses:

PETER M. SIMONI,  
 Y. Y. MÖRCK.