No. 686,911. Patented Nov. 19, 1901.

T. SCHWARZ.

VARIABLE FEED MECHANISM FOR WORK TABLES OF MACHINE TOOLS.

(Application filed Sept. 20, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

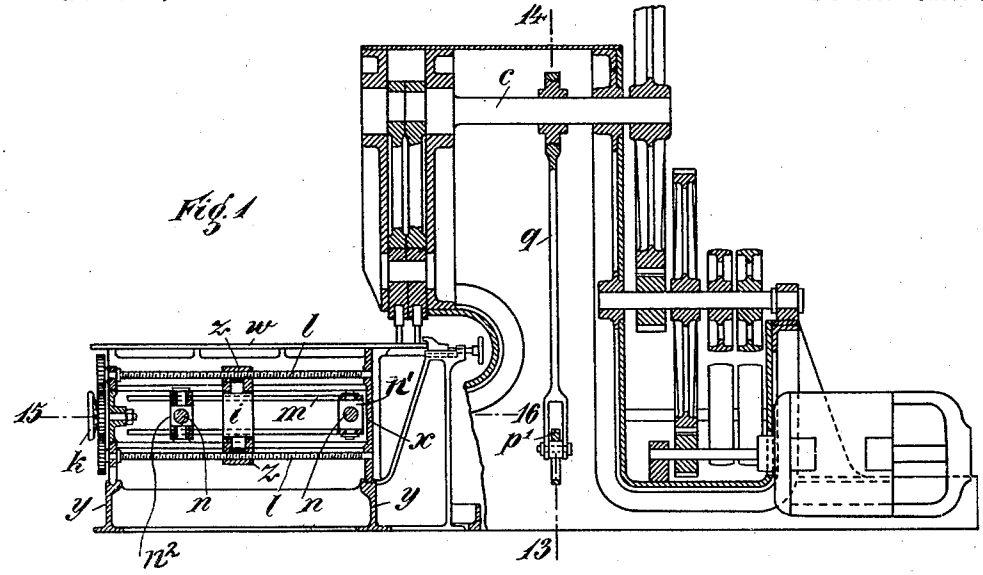


Fig. 2

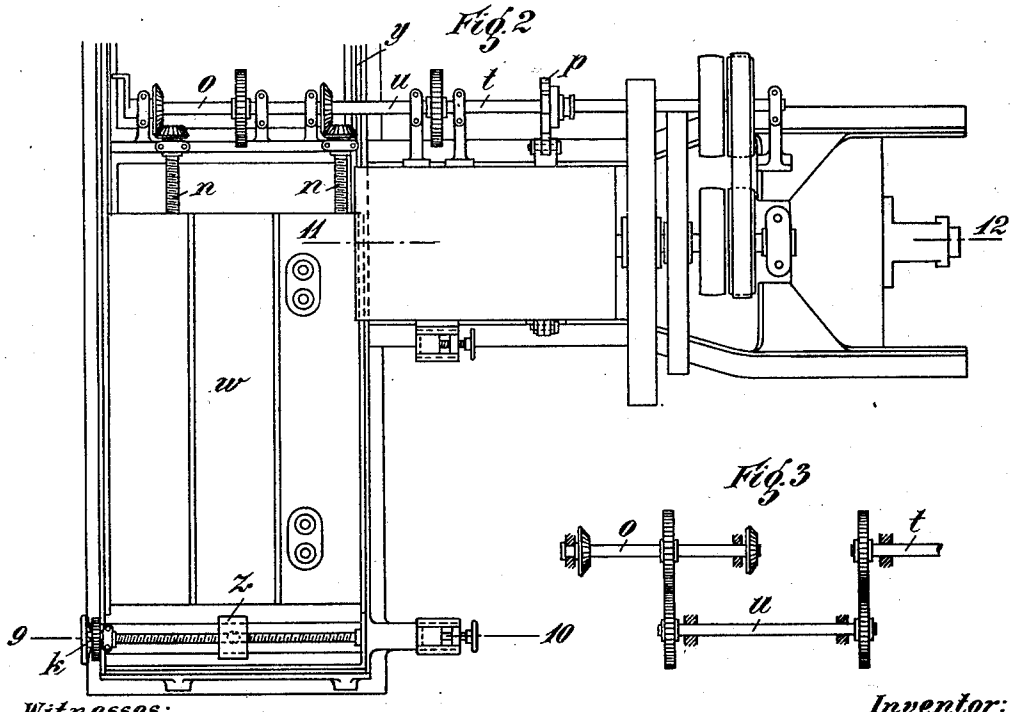


Fig. 3

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Fig. 4

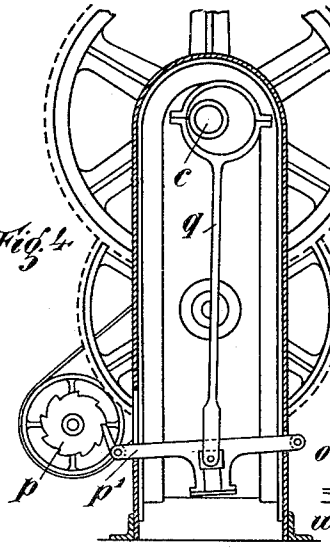


Fig. 6

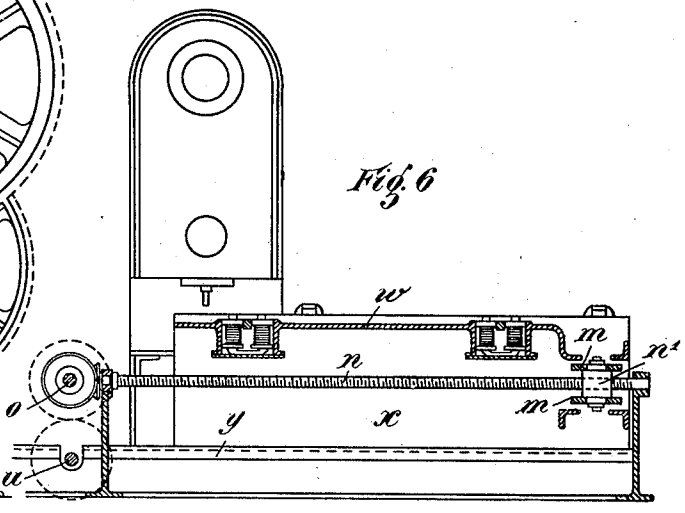


Fig. 5

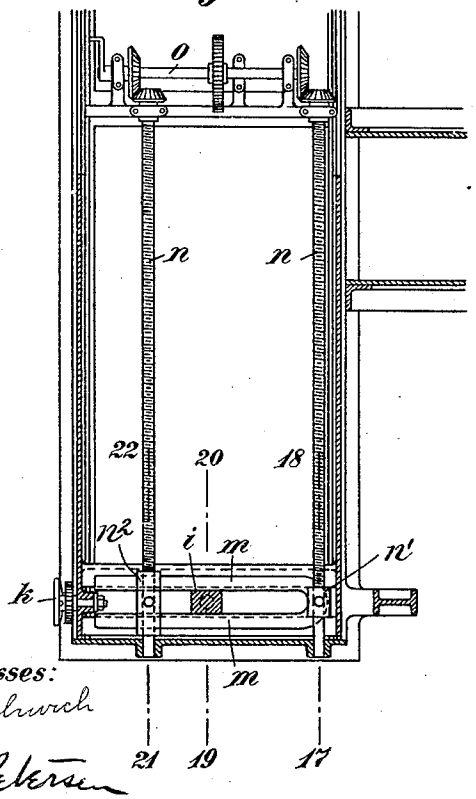


Fig. 7

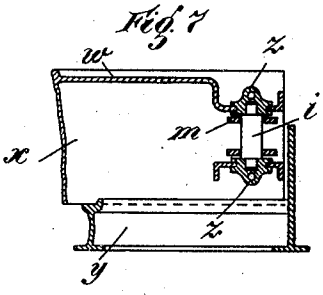
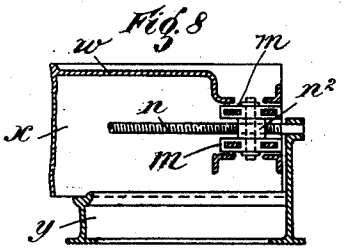


Fig. 8



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UNITED STATES PATENT OFFICE.

TJARD SCHWARZ, OF BERLIN, GERMANY.

VARIABLE-FEED MECHANISM FOR WORK-TABLES OF MACHINE-TOOLS.

SPECIFICATION forming part of Letters Patent No. 686,911, dated November 19, 1901.

Application filed September 20, 1901. Serial No. 75,920. (No model.)

To all whom it may concern:

Be it known that I, TJARD SCHWARZ, chief marine surveyor of the Imperial Government and managing chief marine constructor, a subject of the King of Prussia, German Emperor, residing at No. 17 Friedrich Wilhelm street, Berlin, W., in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Variable-Feed Mechanisms for the Work-Tables of Machine-Tools, of which the following is a specification.

This variable-feed mechanism is intended for the work-tables of machine-tools of all descriptions, especially, however, for automatic punching-machines or the like, and it can be made use of in all those cases where an intermittent motion is required, as is the case, for instance, in punching sheet-metal plates for ships and metal plates for girders and the like. The feed of the work-table is in the present case effected by means of two threaded spindles, the pitch of the threads of which is preferably different, and the rotary movement of these spindles is transferred to the work-table by means of an intermediate device, which may be moved crosswise to the direction of movement of the table. This intermediate device forms thus a kind of connecting or transferring device, and just as this device is situated nearer to or more distant from the one or the other spindle either the one spindle or the other exerts a preponderating influence upon said device, in a measure depending on the proportion of the distance of the same from the said two spindles. The device in question is thus moved in this case in the longitudinal direction of the work-table of the respective machine, the speed of that movement being determined by the proportion between the pitches (or may be by the rotary speeds) of the threaded spindles as well as by the proportion between the distances of the said device from the two spindles, as aforeindicated.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts throughout the several views, and in which—

Figure 1 is a vertical cross-section through an automatic punching-machine provided with my improved variable-feed mechanism, the section being taken in lines 9 10 and 11 12 of Fig. 2. Fig. 2 is a plan of the machine. Fig. 3 is a view of some shafts with their gearings, which form a connection between the punching-machine proper and the feed mechanism proper, which will duly be referred to in the further course of the description. Fig. 4 is a section in line 13 14 of Fig. 1. Fig. 5 is a horizontal section through the feed mechanism taken in line 15 16 of Fig. 1. Fig. 6 is a vertical section in line 17 18 of Fig. 5. Fig. 7 is a vertical section in line 19 20 of Fig. 5, and Fig. 8 is a vertical section in line 21 22 of Fig. 5.

Referring first to Figs. 1, 2, 6, 7, and 8, w is the work-table, to be fed or to be intermittently moved, respectively. The sides x of said table rest upon guide-rails y, and parallel to said rails are located, between said sides x, threaded spindles n, Figs. 1, 5, and 6, by the rotation of which the feed movement of the table shall be effected. In the example shown the threads of the spindles are of different pitch, and the rotation of these spindles is effected by means of a shaft o, Figs. 2 and 5, arranged perpendicular to said spindles and connected with them by pairs of conical wheels, as represented in Fig. 2. Instead of said conical wheels exchangeable sets of wheels may be employed, and the wheels upon the shaft o or those upon the spindles n may be of different sizes in case the threads upon these spindles should be of the same pitch, so that they must be turned with ununiform speed. In the example shown in the drawings the rotation of the shaft o itself is effected from a shaft t, Fig. 3, by means of an intermediate shaft u and the necessary gearing, as is clearly to be seen from said figure without any further explanation.

The right-hand spindle n is provided with a nut n', Figs. 1 and 6, and the left-hand spindle has a nut n^2, Fig. 8. These nuts carry a pair of forked links m, which consists of two forked guide-pieces located one in some distance above the other, said pieces serving as guides for a block i, Fig. 7, adapted to be moved crosswise with regard to the table w. This block i is connected at its up-

per and at its lower ends with two slide-like bodies z, through each of which passes a threaded spindle l, Figs. 1 and 2, the said bodies z forming a connection between the table and the block i. The bearings for these spindles are formed by parts of the sides x of the table w, and each of said spindles is at one end provided with a cog-wheel, and between the two cog-wheels is located a third, firmly connected with a hand-wheel k. By turning this hand-wheel the two spindles are rotated in the same direction and the slide-like bodies z are moved along suitable guides, which are firmly connected with the table-plate w as well as with the sides x. By so doing also the block i is moved along the parts m, so that the proportion between the distances of the block i from the two threaded spindles n is changed corresponding to the extent of movement of the block i. The connection of the parts m with the nuts n' n^2 is effected in such a manner that said parts may assume an oblique position with regard to the nuts. This possibility of the parts m assuming an oblique position is necessary because the spindles n, the threads of which, as aforementioned, have in the example shown different pitches, are not turned with the same speed, so that consequently the nuts n' n^2 move along the spindles s with different speeds, corresponding to the difference in the pitches of the threads of said spindles. There occurs thus an advance of one nut against the other, and as this acceleration occurs uniformly during the continuing rotation of the spindles n the obliquity of the position of the parts m increases by and by, and this increase is transferred in a higher or lower degree also to the block i, according to the position of this block in said parts m, and as, further, the said block forms the connecting-piece for the table; also, this latter is correspondingly displaced, which may be either a continuous or intermittent displacement, just as in the manner in which the shaft o is actuated.

As shown most clearly in Fig. 5, the block i is angular, and consequently does not turn in the links m, but necessarily, therefore, turns with said links as they assume an oblique position. The connections of the block with the slides z are also angular, so that the turning of the block with the links causes the slides also to turn, and consequently effect the desired turning of the table. The turning of the table causes the sheet of armor-plate to pass under the punches in a curved line, corresponding to the curvature of the edge of the sheet.

In the example shown, in which the improved feed mechanism is used in connection with an automatic punching-machine, the movement of the table w is an intermittent one, and to produce this kind of motion the shaft l, Figs. 2 and 3, is provided with a ratchet-wheel p, Figs. 2 and 4, actuated by means of a pawl from a lever p', which in its turn is operated from the shaft c of the punching-machine by means of the rod q of an eccentric attached to said shaft.

Having now described my invention, what I desire to secure by a patent of the United States is—

1. In a variable-feed mechanism for the work-tables of machine-tools, the combination with a work-table and two threaded spindles arranged parallel to the feed direction of said table, of an intermediate device connecting the latter with said spindles, and being adapted to be displaced crosswise to the latter and to transfer their movement to the said table, and means for displacing said device and for rotating the said spindles, for the purpose as described.

2. In a variable-feed mechanism for the work-tables of machine-tools, the combination with a work-table and two threaded spindles arranged parallel to the feed direction of said table and having threads of different pitch, of an intermediate device connecting the latter with said spindles and being adapted to be displaced crosswise to the latter and to transfer their movement to the said table, and means for displacing said device and for rotating the said spindles, for the purpose as described.

3. In a variable-feed mechanism for the work-tables of machine-tools, the combination with a work-table having sides adapted to glide on guides, and with two threaded spindles arranged parallel to said sides and below said table in bearings independent of the latter and its sides, of an adjustable connecting and transferring device between the said table and said spindles, the connecting and transferring part proper of said device being adapted to be displaced crosswise to the direction of feed of the table, and means for operating the said device independent of the spindles, said means being carried by the sides of the table, for the purpose as described.

4. In a variable-feed mechanism for the work-tables of machine-tools, the combination with a work-table and two threaded spindles arranged parallel to the feed direction of said table, of nuts screwed upon said spindles, guides carried by said nuts and adapted to be moved obliquely with regard to the same, a block adapted to be displaced in said guides, a slide holding said block, a threaded spindle extending perpendicular to said other two and adapted to move said slide, and means for guiding the latter at the work-table to be fed, for the purpose as described.

5. In a variable-feed mechanism for the work-tables of machine-tools, the combination with a work-table and two threaded spindles arranged parallel to the feed direction of said table, of nuts screwed upon said spindles, guides carried by said nuts and adapted

to be moved obliquely with regard to the same, a block adapted to be displaced in said guides, slides holding said block at its upper and lower ends, threaded spindles extending perpendicular to said other two and being adapted to displace said slides with the block crosswise to the direction of movement of the table, and having their bearings in the sides of the latter, and means for actuating said latter two spindles at a time, for the purpose as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

TJARD SCHWARZ.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.