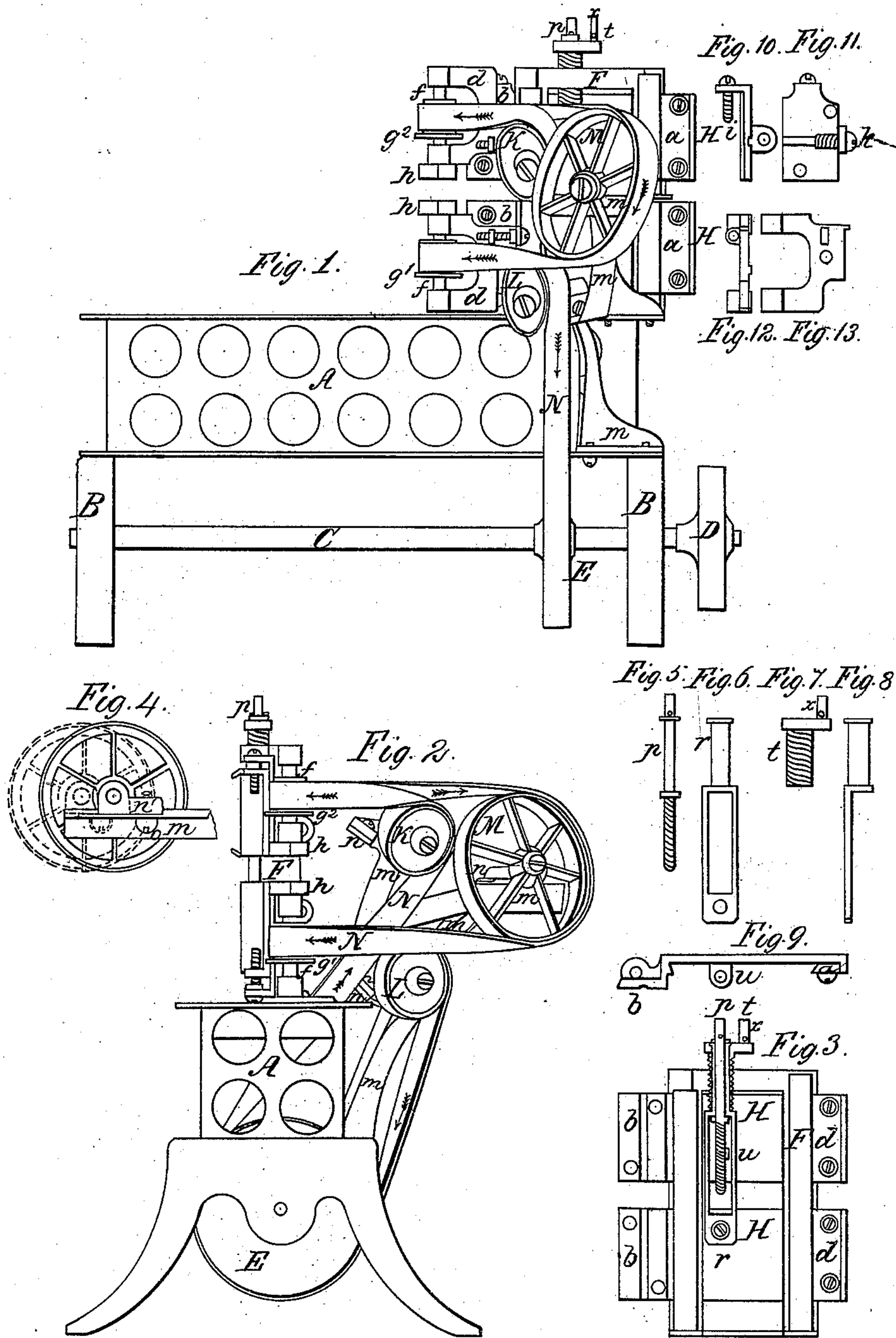


Behel & Nelson

Tanning Mach.

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JACOB BEHEL AND JOHN NELSON, OF ROCKFORD, ILLINOIS.

Letters Patent No. 86,496, dated February 2, 1869.

IMPROVEMENT IN TENONING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that we, JACOB BEHEL and JOHN NELSON, of the city of Rockford, in the county of Winnebago, and State of Illinois, have invented certain new and useful Improvements in Tenoning-Machines; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a rear elevation of a tenoning-machine, embodying our invention.

Figure 2 represents a rear end elevation of the same.

Figure 3 represents the supporting-frame of cutting and coping-heads, with their bearers and adjusting device, cut through its centre, on a perpendicular transverse line to the sectional view.

Figures 4 to 13 inclusive, represent views of parts of same machine, denoted by the same letters of reference as are applied to the same parts in previous figures.

The object of our invention is to increase the efficiency of tenoning-machines, by devices in themselves more simple and reliable; and, with a view to this end, we have employed the following devices, in the manner and form as follows.

The first part of our invention consists in the employment of intermediate carrying-pulleys, in the construction of tenoning-machines, instead of counter-shafts and pulleys, as commonly used.

The second part of our invention consists in the employment of but one endless belt, by means of which motion is imparted to the coping-heads from the main driving-shaft of the machine.

The third part of our invention consists in such a construction of the cap in which the stud on which the larger intermediate carrying-pulley revolves, as will permit it to be moved back and forth on its main support, and fastened at any desired place, by means of a set-screw, or other device.

The object of the fourth part of our invention is to raise and lower both cutting and coping-heads, without changing their relative distance from each other, which consists in the employment of a screw-rod tube and screw-tube, in combination with both cutting-head bearers and the frame supporting them.

The object of the fifth part of our invention is, to adjust the relative distance of the cutting and coping-heads to each other, by raising or lowering the upper heads, which consists in the employment of a screw-rod, in combination with a tube, screw-tube, and upper head-bearer.

In the drawings we have represented the major portion of a tenoning-machine to which we have applied our invention, in which—

A represents the main frame, supported on feet B B, which furnish support for the bearings of main driving-shaft C, on which is placed the driven pulley D, and also the pulley E, which becomes one of the main driving-pulleys of the machine.

F represents the frame which supports the cutting and coping-head bearers H H, and is bolted fast to the top of the main frame A.

a a are clamp pieces, which, by means of screws, represented on them, passing through them into the head bearers H H secure them in position on the supporting-frame F.

Fig. 10 is an edgewise view of fig. 11, fitted with adjusting screws and tongue, to be applied on the extending ends of H H, at b b b, figs. 3 and 9, and as applied at b b, figs. 1 and 2.

We have shown but one of these pieces in the drawings, whereas two are required, the other being the reverse of the one represented.

Fig. 12 is an end view of fig. 13. This is also one of a pair, the other being the reverse of the one represented.

These pieces are also fitted with a tongue, to fit into the groove in the last-mentioned pieces, at fig. 11. These pieces are provided with boxes on their extended ends, to support the bearings of the coping-shafts, and are seen in place at d d, figs. 1 and 2, with coping-shafts f f, in place, on which are properly placed the pulleys g¹ and g², and coping-heads h h, on which the coping-knives are to be placed.

These pieces, from their construction, will permit the coping-heads to be raised or lowered, by means of the screw I, and will also permit them to be moved back and forth, by means of the screw k, and held in place by means of sufficient screws.

This arrangement is for the purpose of adjusting the coping-heads, so as to work in harmony with the cutting-heads, as desired.

In dispensing with the counter-shafts and pulleys, as commonly used in tenoning-machines, for the purpose of imparting motion to the coping-heads, we have substituted these for the intermediate carrying-pulleys K, L, and M, in figs. 1 and 2, with proper bearings and supports screwed to the main frame.

These pulleys may be placed at any convenient distance in the rear of the machine, and sufficiently toward the head thereof to permit the tenon, when cut of the greatest length, to pass through to the rear of the machine without coming in contact with the parts. The distance at which these pulleys are placed toward the head of the machine will determine the locality of the driving-pulley E, upon the shaft C, as a line at right angles to the shaft C, from the rear-face centre of the driving-pulley E, will cut the rear-face centre of the pulley L.

This pulley L is placed in a plane, cutting the rear-face centre of the driving-pulley; and the front left-oblique-face centre of the lower cope-pulley g¹, at such a height, that a line drawn from its top-face centre will cut the face-centre of the cope-pulley g¹ at right angles to its shaft.

The pulley K is placed in a plane, cutting the front-face centre of the driving-pulley E, and the rear right-

oblique-face centre of the upper cope-pulley g^2 , and at such a height that a line drawn from its top-face centre will cut the face-centre of the cope-pulley g^2 , at right angles to its shaft. This pulley is also placed at such a distance toward the head of the machine that a line drawn at right angles to the shaft C, from the front-face centre of driving-pulley E, will cut its rear-face centre.

The pulley M is placed to the rear of pulleys K and L, and in a plane, cutting the rear right-oblique-face centre of the cope-pulley g^1 , and the front left-oblique-face centre of the cope-pulley g^2 . The diameter of this pulley is equal to the length of an oblique line-cutting opposite face-centres of the pulleys g^1 and g^2 , and as in raising and lowering the cope and cutting heads, the relative distance of the pulleys will be changed, and when so changed to any considerable distance, it will be necessary to change the position of pulleys g^1 and g^2 , so as to preserve nearly their original relative distance from each other.

To accomplish this, the pulleys are constructed so as to permit them to slide lengthwise on their respective shafts, to any desired position, and are provided with set-screws, by means of which they can be secured in any desired or necessary position on their respective shafts.

The pulleys K, L, and M revolve upon studs, secured in suitable caps n n' , figs. 1, 2, and 4, which are secured, by means of screws or otherwise, to sufficient and suitable frame-works, secured to the main frame of the machine, as at m m , &c., in figs. 1, 2, and 4.

The axes of these studs are all placed at right angles to the respective planes in which the pulleys are placed.

In order that we may be able to give to both copes equal velocity and equal power, as well as greatly to increase their power with less tension of belt, we have employed but one belt, N, which passes from the front side of the driving-pulley E, figs. 1 and 2, over the pulley K, in the direction indicated by the arrows, thence around the cope-pulley g^2 , thence around the pulley M, thence around the cope-pulley g^1 , thence over the pulley L, thence to the rear side and around the driving-pulley E, to the place of beginning, in the arrangement of which we are enabled to encompass a much greater portion of the surface of the cope-pulleys, as we can bring our belts, after leaving the cope-pulleys, as close together as possible to not come in contact; and that we may be able to keep this belt at any desired tension, or change its tension at pleasure, without cutting, restitching, &c., we have constructed the bearings of pulley M, in its parts, so that it can be moved back and forth, as seen in fig. 4, by the position of the pulley M, and its possible position, as represented by the dotted lines.

To this end the stud on which the pulley M revolves is secured in the cap n' , with its under side grooved to fit on to the top of its main support, m , so that it can be moved lengthwise on it, and be kept parallel thereto, by means of its grooved under side.

The top of this support, m , is slotted lengthwise, to permit the set-screw o , in cap n' , to move with it, and by means of which the pulley M, on its bearing, when moved, can be held in any required position.

This main support, m , to pulley M, on which it slides, is parallel to the plane of the pulley and its top, on a line at right angles to the coping-shafts.

As it is necessary to the complete working of the tenoning-machine that both cutting and coping-heads can be raised and lowered without changing their relative distance from each other, for the purpose of cutting the tenon in the centre of stuff of different thickness, or for cutting the tenon eccentric on the material to be tenoned, without changing the size of

the tenon; also that the relative distance of the cutting and coping-heads may be changed for the purpose of cutting tenon of different sizes—

To meet these requirements we have devised and employed the following devices, as seen at figs. 5, 6, 7, and 8, detached, and at fig. 3, in section, in place.

Fig. 5 is a rod, fitted with a pin passing through it, near its top, below which there is a loose washer. Nearly midway of its length it is fitted with a fixed collar, below which it is screw-threaded, which works into a female screw in a projection on the upper head-bearer, as at u u , figs. 3 and 9, and seen in place at p , fig. 3.

Figs. 6 and 8 are two views of the same piece, the upper part of which is a tube of the proper size to receive the upper part of fig. 5. The top of this tube is fitted with a washer, so that it will not turn on it. The lower end of this tube is fitted with a fixed collar, to which is attached, eccentrically, two rods, so as to leave space sufficiently large between them to receive the projection u , at figs. 3 and 9. The lower ends of these rods are connected together in such a manner as to admit of their being secured to the lower head-bearer, by screw or otherwise. The washer and pin, at the top of the rod p , being removed, this tube is slipped on it from the top, and its lower end made fast to the lower head-bearer, and seen in place at r , fig. 3.

Fig. 7 is a tube of the proper bore to receive the tube at fig. 6, and is screw-threaded on its outside. The top of this tube is fitted with a collar, projecting sufficiently on one side to support the stud x , which is fitted with a pin through its base, to receive a wrench, by means of which it can be turned. In the top of this tube there is a counter-sink sufficient to receive the washer on the top of tube, fig. 6, and may be to receive the washer on the upper end of the rod, fig. 5. Also, this tube works into a female screw in the top of the frame F. The washer on the top of the tube, fig. 6, being removed, this tube is slipped over it, and turned into its prepared female screw, on the top of the frame, and seen in place, as at t , fig. 3. When the washer fitted to the top of the inner tube is put in place, then the washer fitted to the top of the centre rod is put in place, above which, and through the rod, is passed the final pin, which holds all in place, as seen at r , u , p , and t , in fig. 3, and serves to place the wrench on, for turning it, by means of which the upper head can be raised and lowered at will; and by applying the same wrench on to the stud x , both heads can be raised and lowered, as required.

As tenoning-machines are constructed for various purposes, with but one coping-head, which may be either the upper or lower one, according to the requirements of the machine, it will be readily seen that our invention will apply to all such machines, with but slight modifications, and will require but two intermediate or carrying-pulleys.

As the frame A, B, and F, with coping-heads, and most of their mechanisms, is the same substantially as that of various machines now in use, and as we have made no substantial change in the cutting-heads of such machines, nor in the manner of communicating motion to these, nor have we made any material change in the tables of such machines, therefore we do not deem it necessary to represent these parts in our drawings, as in the parts of a complete tenoning-machine, not represented in our drawings, and not herein particularly described, our machine is substantially the same as others now in use.

We do not wish to confine ourselves to the precise construction or application, or position of the parts in this, or any other machine to which our invention, or parts of it, may be applied, for these may be varied to suit circumstances, to adapt it to other and similar machines, or as manufacturers of machines may deem

expedient, without departing from our invention, so long as the parts, as entities, be retained.

Parts of our invention may be used without others, in different machines, and for different purposes, as, for instance, the adjusting-device, for adjusting the heads, may be used advantageously for other purposes. Also, less carrying-pulleys may be used in machines with but one coping-head, without changing the mode of operation, and with or without the tension-device.

Having thus fully described our improvements, and application thereof,

We claim as our invention, and desire to secure by Letters Patent—

1. The construction and arrangement of carrying-pulleys M K L, for transmitting motion to the two vertical arbors, driving them in the same direction by means of one belt.

2. The construction and arrangement of the parts r , p , t , and u , in combination with H H and F, for the purpose of changing the relative position of the cutters, and also for raising and lowering both cutting and coping-heads without changing their relative distance from each other, substantially for the purpose set forth.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

JACOB BEHEL.
JOHN NELSON.

Witnesses:

W. W. BURSON,
Jd. NIDO.