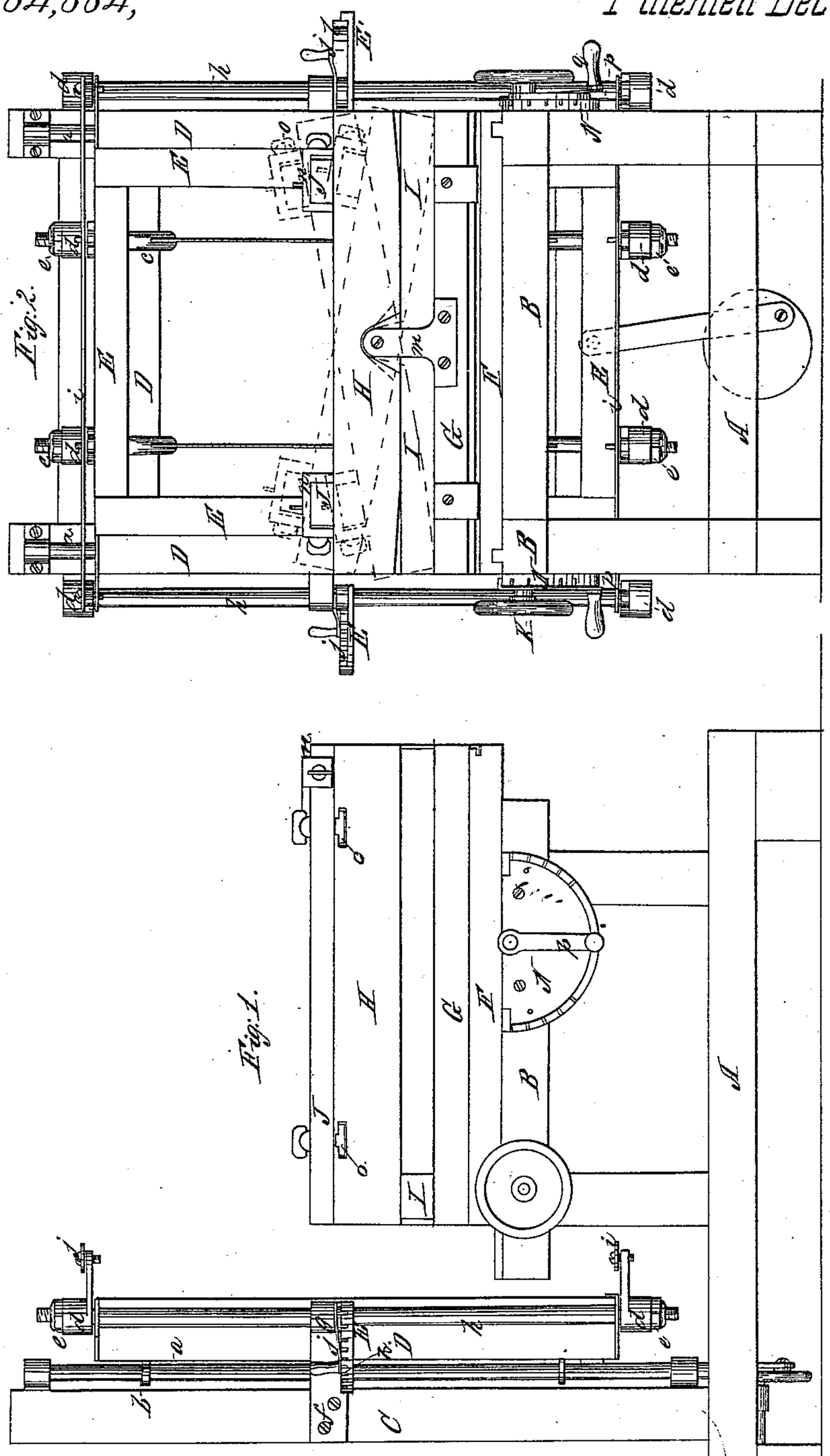
Sheet 1-3 Sheets.

C. F. Kuhnle,

Doretailing Machine,

No. 84,884, Patented Dec. 15, 1868.



Witnesses:

C. F. Smith
J. G. Thacker

Inventor:

Charles F. Kuhnle
by J. G. Thacker
Atty

Sheet 2 - 3 Sheets.

C. F. Kuhnle,

Doretailing Machine,

No. 84,884, Patented Dec. 15, 1868.

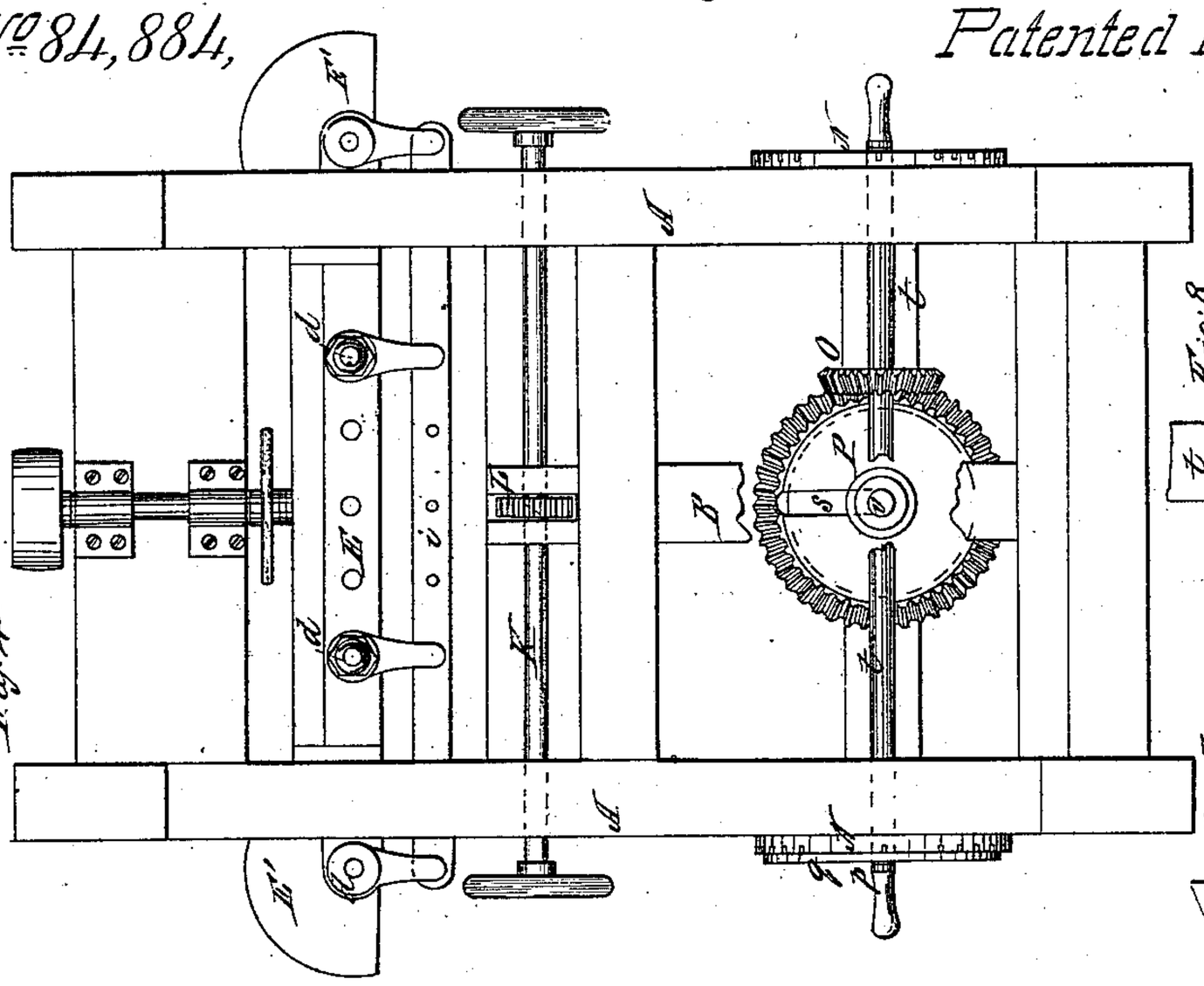


Fig. 4.

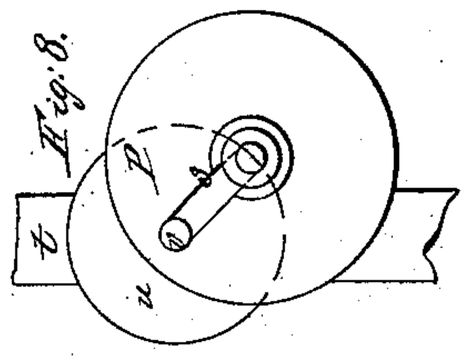


Fig. 8.

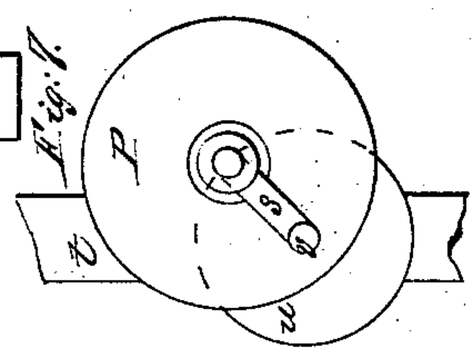


Fig. 7.

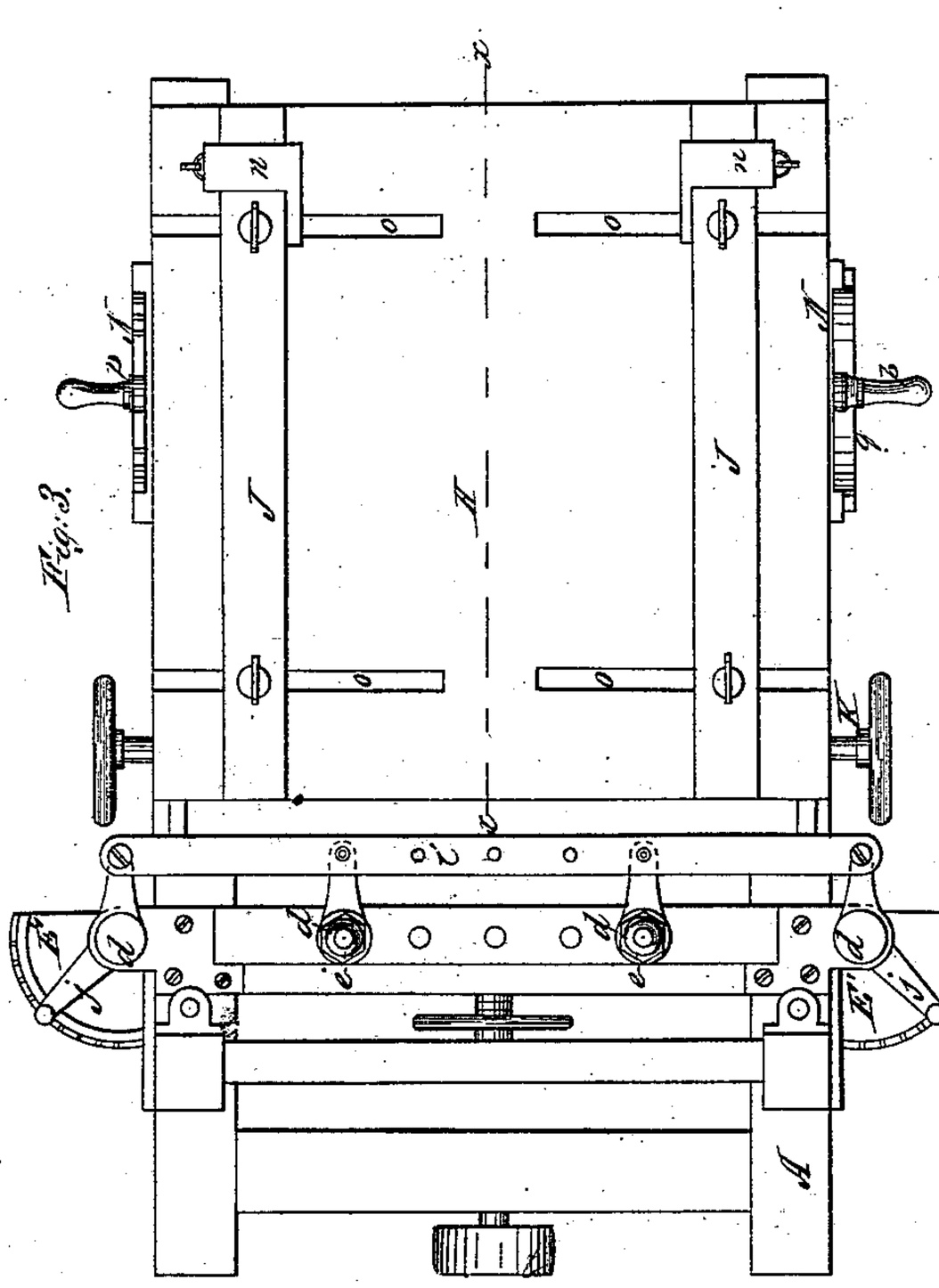


Fig. 3.

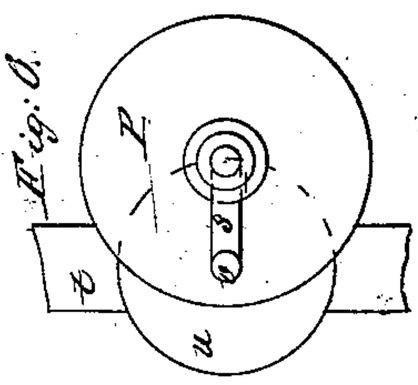


Fig. 6.

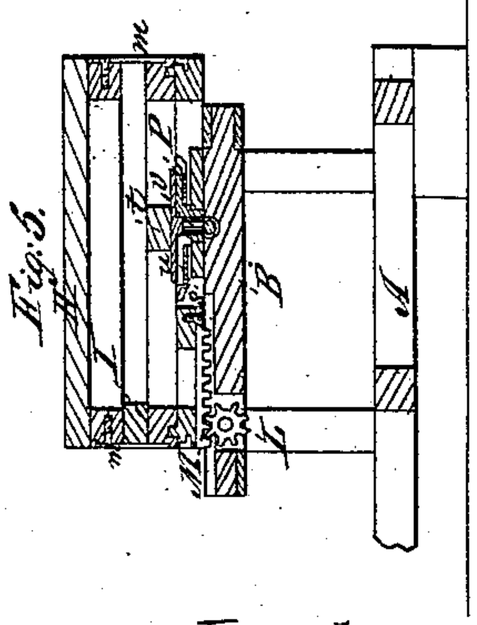


Fig. 5.

Witnesses:

G. H. Smith
J. F. Sheaker

Inventor:

Charles F. Kuhnle
by J. C. Sheaker
Atty

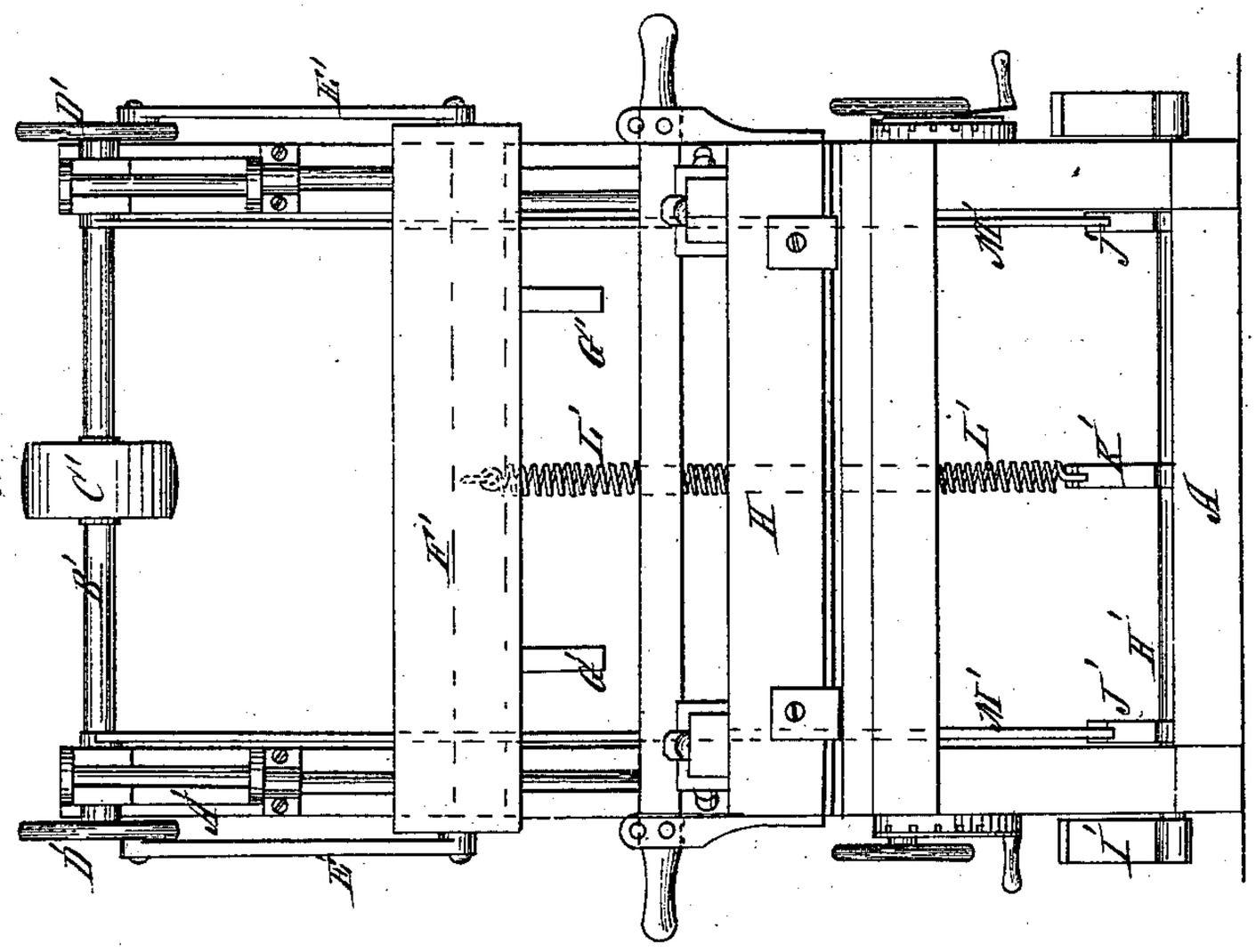
Sheet 3 - 3 Sheets.

C. F. Kuhnle,

Doretailing Machine,

No. 84,884, Patented Dec. 15, 1868.

Fig: 10.



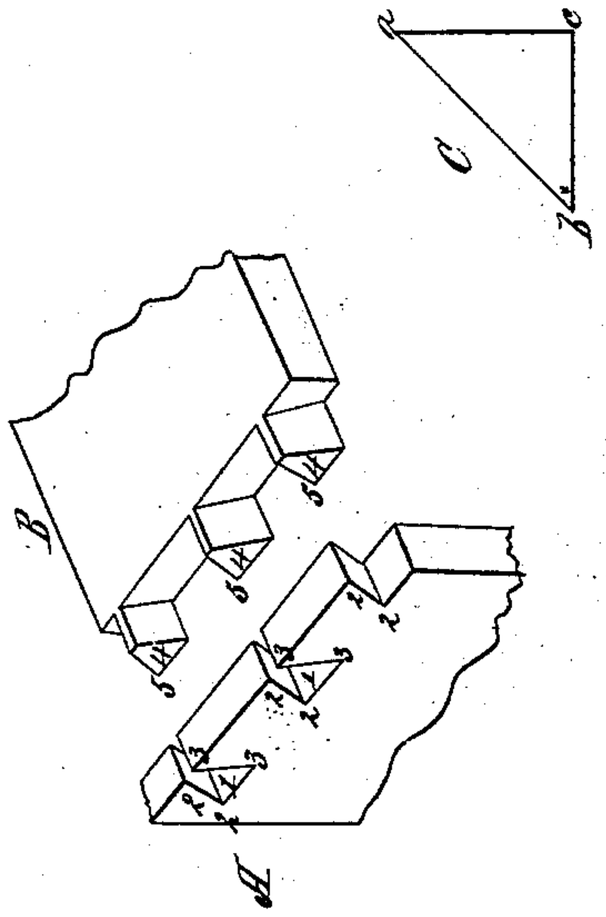


Fig: 9.

Witnesses.
G. H. Smith
J. C. Thaker

Inventor:
Charles F. Kuhnle
by J. C. Thaker
Atty.

United States Patent Office.

CHARLES F. KUHNLE, OF WASHINGTON, DISTRICT OF COLUMBIA

Letters Patent No. 84,884, *dated December* 15, 1868.

IMPROVEMENT IN DOVETAILING-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 I, CHARLES F. KUHNLE, of Washington, in the county of Washington, and District of Columbia, have invented a new and useful Improvement in Dovetailing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and the letters of reference marked thereon, like letters designating like parts in all the figures.

Figure 1 is a side elevation.

Figure 2 is an end elevation.

Figure 3 is a plain view.

Figure 4 is a bottom view.

Figure 5 is a vertical section of a portion of the frame and carriage, taken in the line *x x* of fig. 3.

Figures 6, 7, and 8 are diagrams, showing the various positions of the slotted bevel-gear wheel.

Figure 9 is a side elevation of that portion of the machine which mortises the dovetails.

Figure 10 is an end elevation of the same.

The nature of my invention consists in the peculiar construction and arrangement of machinery by which the tenons and mortises are made for dovetailing.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The entire operation is divided into two parts, first, the sawing, and, second, the mortising; and the operation of the saws and their connections will be first described.

In the drawings—

A represents the base of the frame of the machine.

B, the elevated portion of the frame upon which the carriage slides.

C, the upright portion of the frame to which the frame D is attached.

To the frame D are attached the saw-frame and its driving-mechanism.

a represents a rod, secured to the upright frame C, and *b*, eyes on the frame D, said rods passing through the eyes *b*, by which means the frame D and the saw-frame E slide freely on the rod *a*.

In the upper and lower cross-piece of the saw-frame E are several holes, through which the saw-stirrups, *c*, pass, so that any desired number of saws may be used, or the location of each may be changed when desired.

On each stirrup is an arm, *d*, those on the upper stirrups being placed on the upper cross-piece, and those on the lower stirrups being placed on the lower cross-piece of the saw-frame.

The portion of the stirrup inside of the arm *d* is square, and the hole in the arm corresponds in shape, so that when the arm is turned, the stirrups turn likewise.

On the portion of the stirrups outside the arms is a screw-thread, on which is a nut, *e*, by which the saw can be tightened when desired.

Screwed to the outside of the uprights C is an arm, *f*; on one end of which is an eye, *g*, in which are rods, *h h*. These rods are placed outside the frame D, and are journalled at the top and bottom of the same.

On the top and bottom of the rods *h h* are arms, *d d*, corresponding to those on the stirrups *c*.

At the outer ends, and above the arms *d*, are placed connecting-bars, *i i*, which are pivoted to said arms.

The arms are turned by means of levers, *j j*, which are on the rods *h h*, and as the rod *h* is turned by means of the arms *d* and connecting-bars *i i*, each arm, and, consequently, the saws, retain the same relative position to each other.

Secured to the under side of the arm *f* is a horizontal plate E′, in the edge of which are notches, and on the under side of the outer end of the levers *j j* is a projection, *k*, which fits into the notches in the plate E′, and holds the levers, saws, &c., in their proper positions.

On each side of the machine is a plate, E′, but as it is not desirable to have projections, *k*, hold on both plates, a piece, *l*, is placed on top of one of the plates E′, thick enough to raise the levers *j j* above the notches, as seen in fig. 2. The object of this is, that the position of the saws can be changed from one side of the machine.

The carriage on which the lumber is placed is composed of three parts, F, G, H. The lower part, F, moves lengthwise the machine, on a track on the top of the frame B, and the inside part, G, moves transversely across the machine, on a track on the top of the lower part, F.

The parts G and H are connected together by standards, *m m*, which are fastened to each end of the inside portion of the carriage. Between the upper ends of the standards *m m* is placed the upper part of the carriage, which is pivoted to standards *m*, which leaves space between it and the portion G.

At the front end of the carriage, between these two parts, is placed a piece, I, which keeps the upper portion horizontal. When in this position, the cut made by the saws is at right angles to the top of the carriage.

J *n* represent gauges, which hold the lumber in its position to be operated upon. The long ones, J, are adjusted by set-screws, which pass through into sliding blocks inside of the grooves *o o*, in the top of the carriage.

Extending through the frame B, and across the machine, is a shaft, K, on each end of which is a wheel or crank.

On this shaft, in the centre of the machine, is a pinion, L, which gears into a rack, M, which is secured to F of the carriage, as seen in fig. 5.

On each side of the frame B is secured a semicircular plate, N, with its outer edge turned up, in which are notches for the projection on the inside of the lever *p* to fit into.

On one of these plates is secured a piece, *q*, which is

placed there for the same reasons that the piece *l* is put on the plate E′.

The levers *p p* are on the ends of the shaft *r*, which extend across the machine through the frame B.

On this shaft is a bevel-wheel O, which gears into the bevel-gear wheel P, as seen in fig. 4.

On the under side or face of the wheel P is a circular shoulder, which fits into a corresponding-shaped recess in the centre-piece of the frame B, as seen in fig. 5.

In the wheel P is a slot, *s*, on the bottom of the cross-piece *f*.

In the carriage is secured a circular plate, *u*, in the centre of which is a pin, *v*, which fits into the slot *s*.

The frame for the other part of the machine for mortising is constructed in nearly the same manner as that heretofore described.

Near the tops of the uprights, at the ends of the machine, are boxes, A′, in which slides the driving-shaft B′, on the centre of which is a driving-pulley, C′, and on each end is an eccentric, D′, to which are attached pitmen E′ E′, and secured between the lower ends of them is a cross-piece, F, on the under side of which are placed the chisels G′ G′.

On the top of the base-piece of the frame, and in front of the uprights, is a shaft, H′, which extends across the machine, and on the outer ends of which are treadles, I′ I′.

On the shaft H′ are three arms, J′, J′, and K′, the latter being in the centre of the machine, and the others near the uprights of the frame.

The arm K′ is connected to a cross-piece on the uprights by a spiral spring, L′, and the arms J′ J′ to the driving-shaft B′ by bars or rods, M′ M′.

The material is secured on top of the carriage by means of guides and clamps.

The operation of the machine is as follows:

When it is desired to cut the sides of the tenon, the saws are moved to the desired angle by means of the levers *j j* and their connections. By means of the levers *q q* and bevel-gear *o* the slotted-gear wheel P is turned to the proper position. Motion is then given to the shaft K and pinion L, which gear into the rack M, in the carriage F, and move the carriage F forward, while the upper parts, G and H, of the carriage move obliquely forward toward the saws, the direction being on a line with the slots *s* in the bevel-gear P. This oblique motion of the carriage is caused by the pin *v*, of the plate *w* on the bottom of the carriage, following in the slots *s*, which may be turned to any angle, as seen in figs. 6, 7, and 8.

When the sides of the mortises are to be cut, the saws are set on a line with the centre of the machine, and the slots *s*, in the bevel-gear P, in the same direction. The block I is then removed, and the carriage can be tilted to any desired angle, and then moved directly forward.

In fig. 2, three positions of the carriage are shown, one by black lines, one by red lines, and the third by blue lines.

When the saws have done their work, as above described, the material is placed on the carriage, to complete the operation, by mortising, the feed being the same as in the former operation. When the carriage moves forward by means of the treadles I′ and the bars M′, the chisels are drawn down, and power being applied to the pulley C′, gives a reciprocating motion to the chisels. When the treadles are released from pressure, the spiral spring L forces the frame and chisels up to their former position.

In the drawings, the two pieces to be put together are represented by diagrams A, B. A represents the board, in which 1′ represents the mortises to receive the tenons, marked 4 in diagram B.

To saw the sides of the mortises 2 2, 3 3, the board lies horizontally upon the carriage H, and the saws are adjusted obliquely to the right or left, according to the side of the mortise to be cut.

To make the tenons, 4, in the diagram B, the board is placed on the carriage H and the block I removed, and the said carriage tilted to one side, (the slot *s*, in the gear-wheel P, being on a line with forward movement of the carriage,) and moved forward. One side of the tenon being thus cut, the carriage is run back, and then tilted to the other side, and the other side of the tenon cut by the same operation.

As the board in diagram B is presented to the saws obliquely, the distance of the cuts, as from 5 to 5, would be greater than the distance of the cuts 2 to 2, in diagram A, where the board is presented horizontally to the saws; consequently, the tenons and mortises will not fit together. To avoid this, two sets of saws are used. The saws in one are closer together than in the other; those used for sawing the tenons in diagram B to be closer together than those used to saw the mortises in diagram A. To determine this difference of distance, a right-angled triangle is used, as in diagram C, where the angle *a b c* is made of the same number of degrees as the angle at which the dovetails are to be cut. Then, in the right-angled triangle, the base *b c* is to the hypothenuse *a b* as the distance of the saws to cut the tenons in diagram B is to the distance of the saws used to cut the mortises in diagram A. For instance, if the dovetails were to be cut at an angle of forty-five degrees, and if the distance of mortise or tenons were equal to the square root of 2, then the saws to cut the mortises would be distant from each other $\sqrt{2}$, and those to cut the tenons, by 1. Thus we need two sets of saws to make one kind of dovetails, three sets of saws for two kinds of dovetailings, and so on, that any number of sets will cut as many different kinds of dovetails, less one. The distance from centre to centre of the chisels is the same as the saws that are used for cutting the mortises. In all cases the carriage has to be run back before the adjustment for the oblique cut can be made. To change the saws, the frame has to be removed.

Having thus fully described my invention,

What I claim, and desire to secure by Letters Patent, is—

1. The combination of carriage and the slotted gear-wheel, P, substantially in the manner and for the purpose specified.

2. The combination of the adjustment-plates N and the slotted-gear wheel P, substantially in the manner and for the purpose specified.

3. The combination of the adjustment-plates E′, the levers *j*, rods *h* connecting-bars *i*, and stirrups *c*, substantially in the manner and for the purpose specified.

4. The combination of the carriage H, in which both an oblique and straight feed can be obtained, and the chisels G, when operated substantially in the manner and for the purpose specified.

5. The construction and arrangement of the rocking adjustable carriage H, and carriage G, which moves transversely, and the carriage F, moving lengthwise of the machine, all as and for the purpose set forth.

CHAS. F. KUHNLE.

Witnesses:

G. A. C. SMITH,

J. G. THEAKER.