(No Model.) 2 Sheets—Sheet 1.

L. KOPACEK & F. VUTECH.

BORING MACHINE.

No. 454,654. Patented June 23, 1891.

Fig. 1.

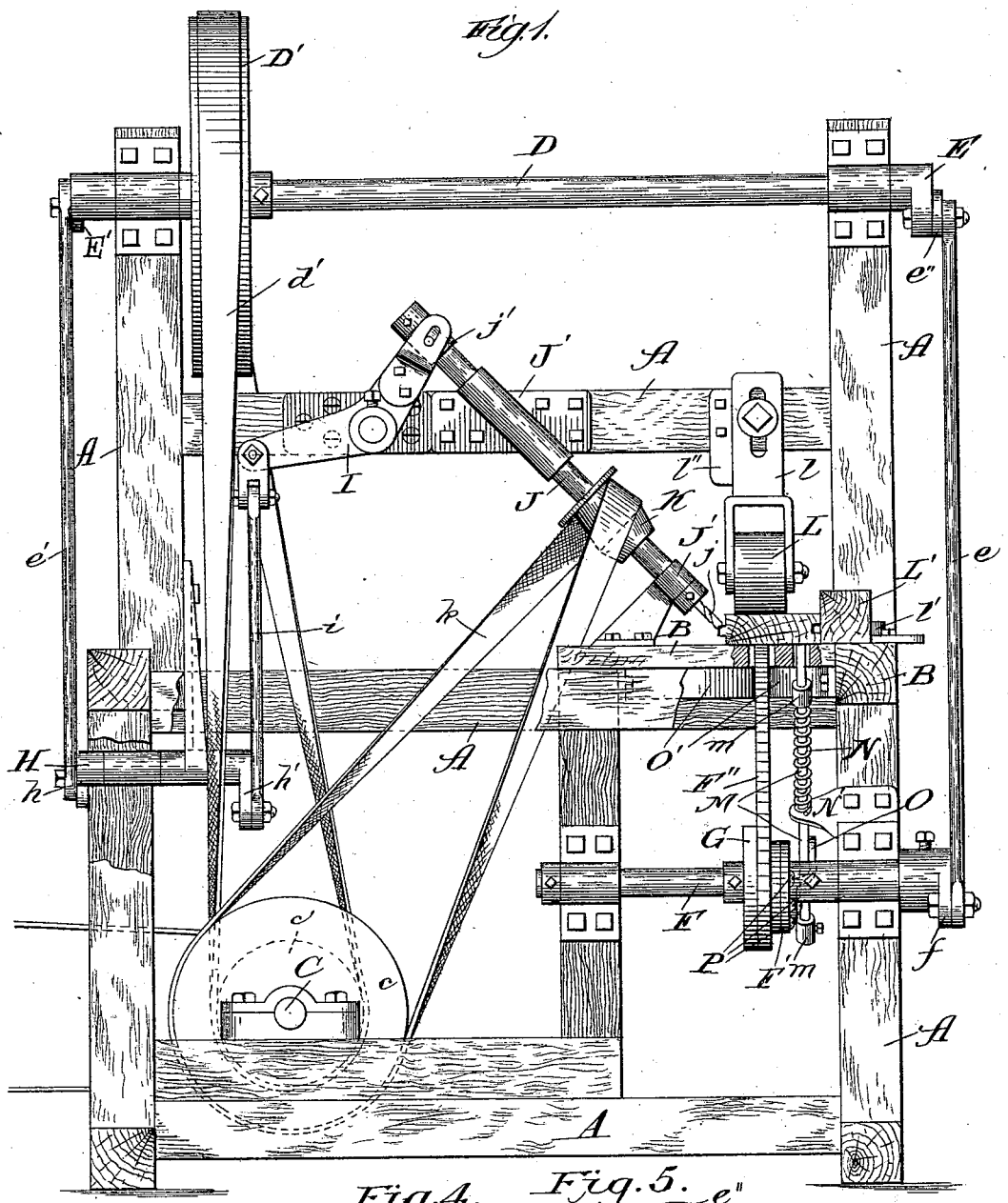


Fig. 4.

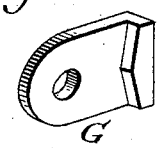
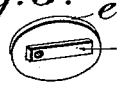


Fig. 5.



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Clifford N. White.

Inventors:
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(No Model.) 2 Sheets—Sheet 2.

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BORING MACHINE.

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Fig. 2.

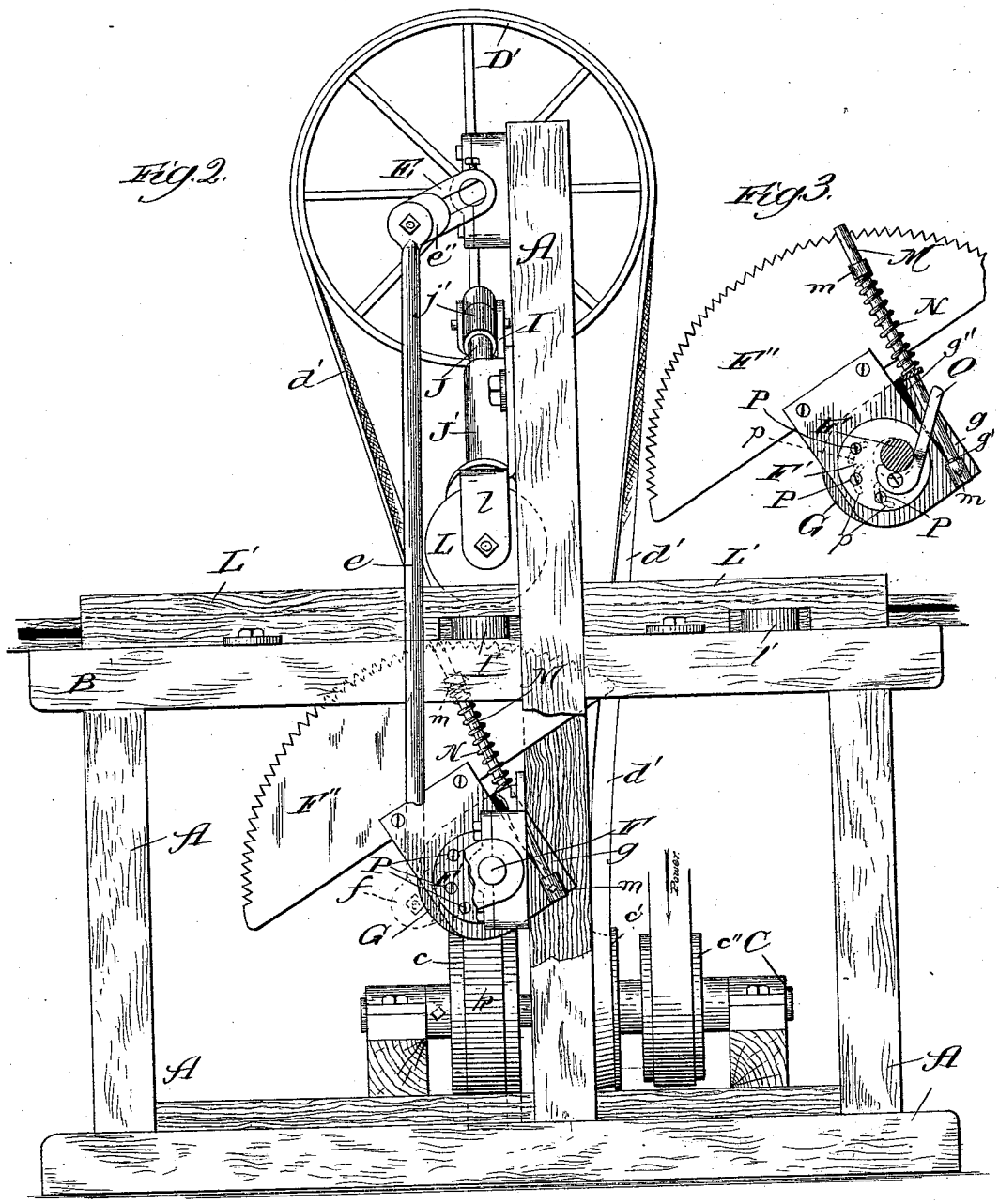

Fig. 3.

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UNITED STATES PATENT OFFICE.

LOUIS KOPACEK AND FRANK VUTECH, OF CHICAGO, ILLINOIS.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 454,654, dated June 23, 1891.

Application filed September 26, 1890. Serial No. 366,252. (No model.)

To all whom it may concern:

Be it known that we, LOUIS KOPACEK and FRANK VUTECH, citizens of the United States, residing at Chicago, Cook county, Illinois, have invented a new and useful Improvement in Boring-Machines, of which the following is a specification.

The object of our invention is to provide a machine for drilling or boring holes in the edges of matched flooring, through which the nails are afterward driven to fasten the boards in place, the object of drilling these holes being to avoid any splitting of the boards, such as may occur when undrilled boards are used; and the invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a front elevation of our improved machine, a portion of the frame-work being broken away to more clearly show the parts. Fig. 2 is a side elevation thereof; Fig. 3, a side elevation of a portion of the device shown in Fig. 2; Fig. 4, a detail view of the crank-plate, and Fig. 5 a similar view of the bar *e''*.

A is the frame-work of the machine; B the table; C, the driving-shaft; *c c' c''*, pulleys on such shaft; D, another shaft; D', a wheel or pulley mounted on such shaft; *d'*, a belt passing over this wheel and the pulley *c'*; E E', cranks on the shaft D; *e e'*, links attached to such cranks, respectively; F, a feed-shaft; *f*, a crank thereon attached to the link *e*; F', an eccentric mounted on this shaft; F'', a feed connected to this eccentric; G, a double-beveled crank arm or plate attached to the shaft F; H, a rock-shaft; *h*, a crank thereon attached to the links *e'*; *h'*, a crank at the other end of the shaft H; I, a bell-crank lever; *i*, a link connecting such lever with the crank *h'*; J, a drill-stock; *j*, the drill; J', bearings for such stock; *j'*, a collar on such drill-stock; K, a pulley attached to the stock; *k*, a belt passing over this pulley and the pulley *c*; L, a roller supported in bearings *l*; L', an adjustable gage or guide; *l'*, rollers therein; M, a sliding stop; *m*, collars thereon; N, a spring; N', a bearing, and O an arm attached to the eccentric or the shaft.

In making our improved machine we first construct a frame A of any suitable material and dimensions, and preferably in the form shown in the drawings, though any other form may be used that will afford a support for the parts and operate in the manner desired. This frame is provided with a table B, preferably made of wood and of suitable dimensions to receive the boards to be bored. Over this table we place a suitable roller L, the purpose of which is to hold the board down against the table, and which, as shown in the drawings, is supported in a bearing *l*, which is adjustable vertically. A brace *l''* is preferably provided to prevent this roller from being moved sidewise when the drill is withdrawn. A gage L', laterally adjustable and provided with suitable rollers *l'*, is placed at one side of the feed-table.

At a point preferably in the lower part of the machine a shaft C is provided, supported in suitable journals and carrying three pulleys *c c' c''*, power being supplied to the machine by means of a belt passing over the last of these pulleys.

A shaft D is supported in suitable journals at a point preferably near the upper part of the machine, as shown. To this shaft is attached a pulley or wheel D', the pulley and shaft being revolved by means of a belt *d'*, passing over this pulley and the pulley *c'* on the shaft C. It should be understood that, if desired, the construction of these parts may be reversed and the driving-pulley *c''* placed upon the shaft D, the operation being in no wise affected by this change.

A shaft F is placed at suitable distance beneath the feed-table at the right-hand side of the machine, provided with a crank *f*. This crank is connected by means of a suitable link *e* with a similar crank E upon the shaft D, these two cranks being so proportioned that as the shaft D revolves the crank E will revolve with it; but the shaft F will merely rock up and down, communicating a rocking motion to the feed-shaft. To this feed-shaft is secured an eccentric F' of any suitable dimensions and connected by suitable means with a segmental feed F''. This feed is preferably made in two parts, one mounted upon a shaft and the other in the shape of a segment and provided with suitable teeth, being fastened into the first part by means of bolts or in any other suitable manner that will allow it to be removed when necessary for re-

pairs or any other purpose or allow of its being adjusted up and down.

In order to connect the eccentric and the feed together, I attach to the former screws P, which pass through the eccentric and enter slots *p* in the feed. These slots are not described from the center of the shaft F as a center, or, in other words, are not concentric with such shaft, so that as the eccentric is revolved in one direction or the other the screws traveling in these slots tend to raise or lower the feed according as they travel toward the end of the slot which is nearer the shaft or toward the other end. To state it differently, the screws are concentric with the shaft, but the slots are set somewhat at an angle thereto, so that as the screws travel toward the ends of the slots nearest the shaft it will be obvious that something must yield, and since the screws and metal surrounding the slots are both rigid and the feed is mounted loosely upon the shaft it is evident that the feed will be raised as the eccentric revolves in one direction and lowered as it revolves in the other. When these screws reach the end of the slots, they assist the crank-arm G in turning the feed, as hereinafter described. This crank-arm and the eccentric are so relatively adjusted that when the shaft F revolves toward the right the feed is first raised by the eccentric, and then moved by the eccentric and the crank-arm G toward the right, and when the shaft revolves toward the left the feed is first lowered, disengaging it from the board, and then lowered also toward the left.

We next attach to the shaft what we term a "double-beveled crank arm or plate" G, the construction of which is shown more particularly in Fig. 4. It consists of a plate of suitable material bolted to the shaft extending back of the feed and provided with a flange *g*, which, as shown, is double beveled upon the side next to the feed. The lower bevel, Fig. 3, is lettered *g'* and the upper bevel *g''*. If, with the parts in the position shown in Fig. 2, the shaft D be revolved toward the right, it will by its connections revolve the crank *f* and rock the feed-shaft in the same direction. As this shaft is rocked the feed is first raised by means of its engagement with the ecentric until its teeth extend a short distance above the surface of the table. The motion of the shaft continuing, the lower portion of the flange *g* on the crank-arm G presses against the end of the feed and rocks it toward the right. These movements occur during a half-revolution of the shaft D. As this shaft continues to revolve the crank-arm *f* will be depressed and tend by means of the eccentric to lower the feed, so that its teeth no longer extend above the table. The upper part of the flange *g* will then bear against the feed above the shaft and rock it backward into the position shown in Fig. 2. As shown in the drawings, springs O' are provided, bearing against each side of the feed for the purpose of steadying it.

The rock-shaft H is next constructed and supported in suitable bearings, preferably at the left-hand side of the machine, provided, as shown, with a crank at either end, the crank *h* being connected by means of a link *e'* with the crank E', the crank *h'* by means of a similar link with one end of a bell-crank lever I, pivoted upon of the cross-bars of the machine. A drill-stock J is then provided and supported at the desired angle to the feed-table in bearings J', attached to the table and a cross-bar of the machine. Loosely mounted near one end of this drill-stock is a collar *j'*, provided with lugs or pins, which pass through slots in the forked end of the bell-crank lever, as shown in Fig. 1.

Attached to the drill-stock is a pulley K, over which passes a belt connecting this pulley with the pulley *c*. This portion of the device operates as follows: The drill-stock and drill are constantly revolved by means of their connection with the driving-shaft. As the shaft D revolves the shaft H is rocked up and down and a rocking motion imparted to the bell-crank lever I, by means whereof the drill-stock and drill are alternately advanced toward the table and retracted therefrom.

We lastly construct a stop M, which consists of a bar provided with collars *m m* and sliding in a support N', attached to the side of the machine. Upon the stop between this support and the upper collar *m* is placed a suitable spring, which forces the stop through the aperture in the table. As the shaft F rocks to the right, an arm O, attached either to this shaft or to the eccentric, strikes against the lower collar *m* and forces the stop down. The parts are so adjusted that when the drill is down this stop will be forced upward by the spring and will prevent any board from being introduced into the machine until the drill is retracted or raised, when the arm O depresses the stop and allows the board to be put in.

The machine being constructed and put together as above described operates as follows: The parts being substantially in the position shown in Fig. 2, a board is inserted under the roller L, its edge resting against the gage L'. Power is then applied to the driving-shaft, and the feed, being already slightly raised until its teeth bear against the under side of the board, moves toward the right, carrying along the board. When the feed reaches the end of its stroke, it is lowered, disengaging it from the board, and moved backward. As it moves backward the drill, which is properly adjusted for this purpose, is advanced toward the board, which being disengaged from the feed remains stationary and drills a hole in it. The drill is then retracted and the board moved forward again by means of the feed a predetermined distance, when the feed returns again and another hole is bored by the drill, and so on. In order to determine the distance between these holes, the link *e* is adjustably connected to the crank-arm E, which arm is slotted, as shown

in the drawings, so that the link may be fastened in any part of this slot, thereby lengthening or shortening the crank-arm *f*, and accordingly increasing or decreasing the distance between these holes. The link *e* is not attached directly to the arm E, but is attached to one end of a bar *e''*, which has a lug or extension *e'''* on the other side engaging with the groove in the arm E. The bar is also provided with a hole through which the bolt that holds the parts together passes, this hole running through the bar near one end thereof, as appears in Fig. 5. When the parts are fastened together, this bar is inserted in the crank-arm in one position, as shown, with the end having the hole nearest the outer end of the crank-arm. The bolt is then passed through the arm, the bar, and the link, fastening the parts together, giving one length of throw. If now it be desired to decrease the throw of the crank, the bolt is taken out, the parts separated, and the bar, being removed, is turned around and replaced in the slot in the crank with the hole in the bar, in this case nearer the shaft than in the position in which it was placed, as above described. The parts being then fastened together again, it will be seen that the throw of the crank is diminished by the difference between the two positions which the hole in the bar assumes, according as it is placed in the slot in the crank in one way or the other.

We claim—

1. In a boring-machine, the combination of a feed-shaft F, means for rocking the same, an eccentric F', affixed thereto, a segmental feed F'', attached to the eccentric, and a double-beveled crank-arm fixed to the shaft, whereby as the shaft is rocked back and forth the eccentric raises the feed before the crank-arm moves it forward and lowers the feed before the arm moves it back, substantially as described.

2. In a boring-machine, the combination of a shaft D, means for revolving the same, a rocking feed-shaft F, connected to the shaft D, a segmental feed mounted on the feed-shaft, a reciprocating drill-stock operated by the shaft D, the relative adjustment of the parts being such that as the feed moves forward the drill-stock is retracted and as the feed moves back the drill-stock is advanced, substantially as described.

3. In a boring-machine, the combination of a shaft D, means for revolving the same, a rock-shaft H, operated by the shaft D, a bell-crank lever I, connected thereto, a drill-stock attached to such lever, a feed-shaft operated by the shaft D, a segmental feed attached to an eccentric mounted upon the feed-shaft, and a double-beveled crank-arm fixed to the feed-shaft, whereby as the driving-shaft is revolved the feed is raised and rocked forward, while the drill-stock is retracted and then lowered and moved back while such stock is advanced, substantially as described.

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