(No Model.) 4 Sheets—Sheet 1.

G. EMMETT & W. E. JAQUES.

AUTOMATIC CARVING MACHINE.

No. 554,917. Patented Feb. 18, 1896.

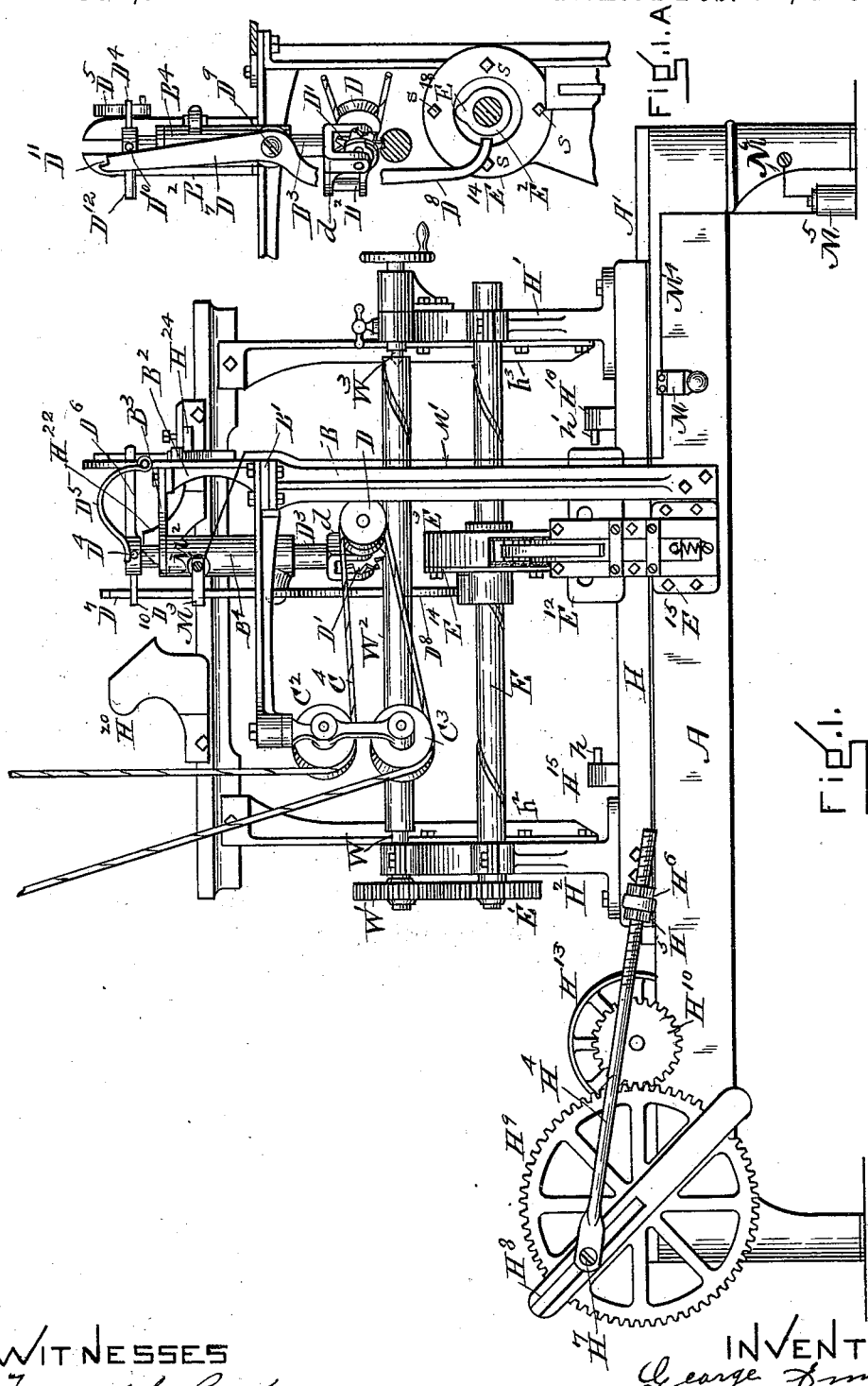

Fig. 1.

Fig. 1.A

WITNESSES

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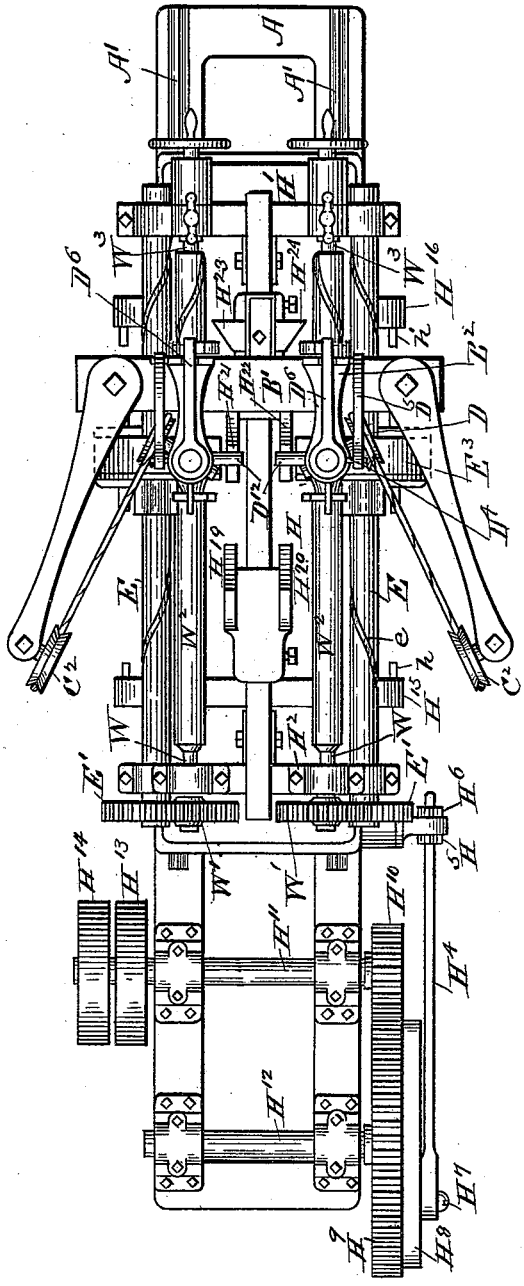

Fig. 2.

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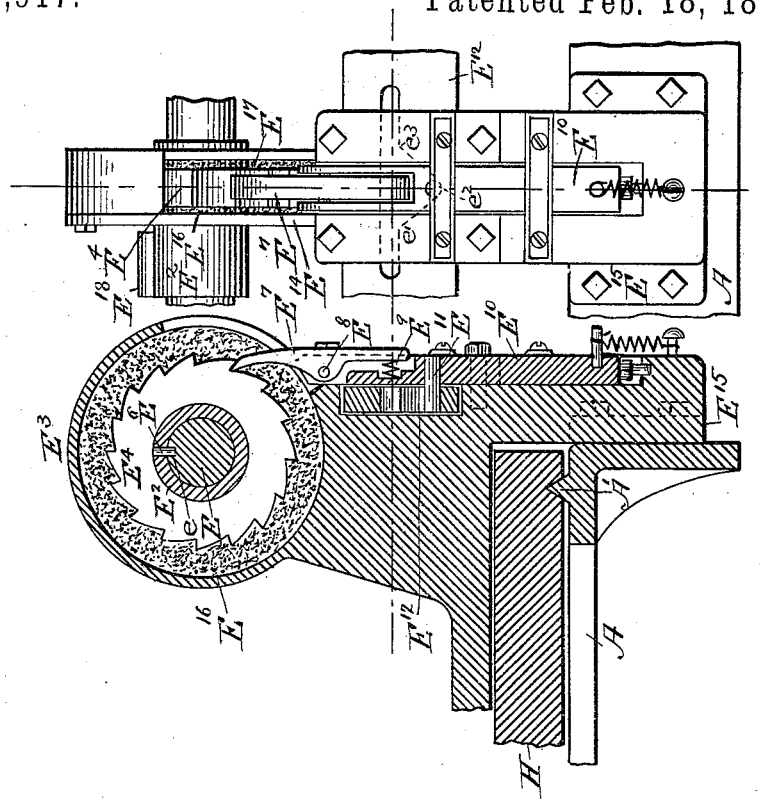

Fig. 5.

Fig. 4.

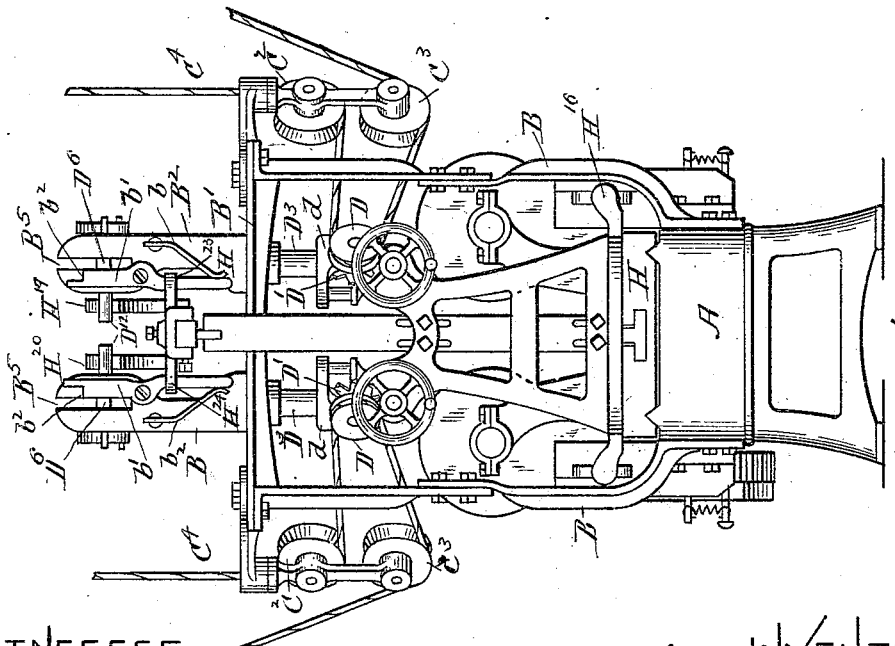

Fig. 3.

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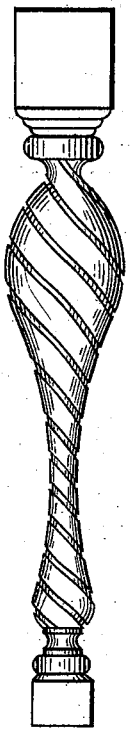

Fig. 8.

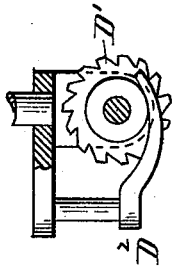

Fig. 9.

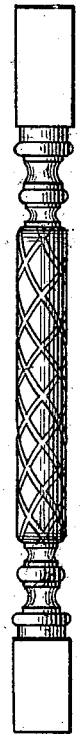

Fig. 7.

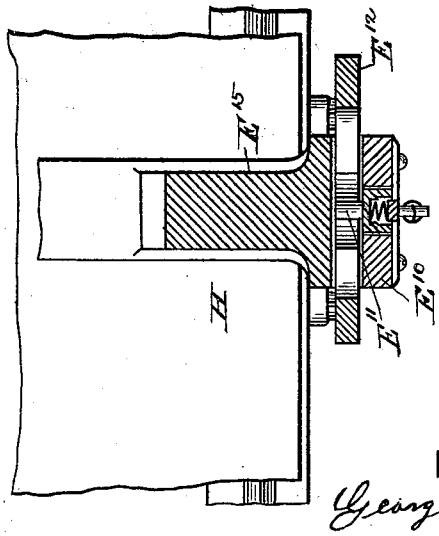

Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE EMMETT AND WILLIAM E. JAQUES, OF ATTLEBOROUGH, MASSACHUSETTS.

AUTOMATIC CARVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 554,917, dated February 18, 1896.

Application filed August 6, 1895. Serial No. 558,382. (No model.)

To all whom it may concern:

Be it known that we, GEORGE EMMETT and WILLIAM E. JAQUES, of Attleborough, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Automatic Carving-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

Our invention relates to that class of machines that have some of the characteristics of both molding-machines and turning-lathes, the object being to construct a machine that shall be to a large extent automatic and adapted to form by the aid of simple models or guiding-pieces very complicated and highly-ornamental work. This object we attain by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a side elevation of our machine. Fig. 1^A is a view showing parts in end elevation. Fig. 2 is a plan of the entire machine. Fig. 3 is an end elevation of the machine. Fig. 4 is a view enlarged, partly in end elevation and partly in vertical section, showing details. Fig. 5 shows in side elevation the same parts that are shown in Fig. 4. Fig. 6 is a section taken on line *x x* of Figs. 4 and 5. Figs. 7 and 8 show samples of the work done by our machine; Fig. 9 a detail of cutter-wheel and gage.

In the drawings, A represents the bed of the machine, and A′ A′ ways upon which moving bed or carriage H slides. The carriage H has two standards H^2 and H′, (see Figs. 1 and 2,) which may be called respectively the "head" and "tail" stocks. The head-stock H^2 is provided with housings, one upon each side, adapted to act as a bearing for one end of the model E. The model-pieces E E may be connected by any suitable means to the wheels E′ E′, so that the said wheels will be forced to rotate as the model rotates. The opposite end of the models E E are journaled in the bearings made in the tail-stock H′ and are free to turn in them.

W^2 W^2 represent the pieces upon which the ornamental work is to be done and are attached at one end to the mandrel W by the usual cat's-paw device, the said mandrel being driven by the gear-wheel W′, which engages with the gear-wheel E′ on the end of the model E. The rear ends of the pieces W^2 are held by centers W^3 in the tail-stock H′.

It will be observed that in this machine the parts are practically duplicated, there being two models and two pieces being ornamented; but it is not necessary that the models be alike, although the work is going on simultaneously.

In working the model E is forced to rotate, as will be explained hereinafter, and in rotating will cause the gear-wheel E′ to rotate, which in turn will, acting through the wheel W′ and cat's-paw, cause the work-piece W^2 to rotate. If the two gears E′ and W′ are of the same size then the work W^2 will rotate with the same rapidity as the model E. By making the gear-wheels E′ and W′ of different sizes any desired relative rapidity of rotation between the model and the worked piece may be maintained by combinations of gears such as are used in the ordinary screw-cutting lathe, and an infinite variety of relative motions may be attained, so that a very great variety of kinds of ornamentations may be made even from the same model.

The carriage H (see Fig. 1) is made to slide back and forth on the ways A′ A′ by the pitman H^4, which is adjustably attached to it by the screw-nuts H^5 H^6. The crank end of the pitman is connected by an adjustable wrist-pin H^7 to the slotted cross-arm H^8 connected to the gear-wheel H^9 on the shaft H^{12}, said gear-wheel being driven by the gear-wheel H^{10} on the shaft H^{11}. The shaft H^{11} has upon it fast and loose pulleys H^{13} H^{14}, through which motion is imparted to this part of the machine by a suitable belt. By moving the wrist-pin H^7 in the slot in the cross-bar H^8 the distance that the carriage H will move can be regulated. By adjusting the nuts H^5 H^6 on the pitman H^4 the limiting-points of the back-and-forth movement of the carriage H may be determined.

We will now describe the means used for giving a rotary motion to the models E.

A strong bracket-piece E^{15} is attached to the bed A of the machine. (See Fig. 1.) To this bracket-piece E^{15} the parts that give motion to the model E are connected, and are fully illustrated in Figs. 4, 5, and 6.

E^4 is a ratchet-wheel connected to a hub E^2,

the said hub E^2 being hollow and adapted to receive the model E. The said model is made with a spiral groove *e*, (see Fig. 1,) in which a pin E^6, Fig. 4, traverses. As the ratchet-wheel E^4 and its hub E^2 are mounted on the fixed bracket-piece E^{15} and are frictionally held from rotating, it is evident that as the carriage H carries the model E forth and back through the hub E^2 the said model must rotate from the action of the pin E^6 in the spiral slot *e*.

To hold the ratchet-wheel E^4 from freely turning in either direction we place between it and the walls of the case E^3 in which it is placed a packing of rubber or some other suitable material which exerts a frictional stress upon it, and thus prevents it from turning in either direction unless acted upon by some positive mechanism—like the sliding pawl E^7, for instance. To regulate the amount of friction to be imposed on the ratchet-wheel E^4 one side, E^{14}, of the casing E^3 is adjustably attached by screws *s s*, so that it may be forced firmly against the packing E^{16}, and thus any desired amount of friction may be brought to bear on to the ratchet-wheel E^4, which is between the packings E^{16} and E^{17}.

The sliding pawl E^7 is made to move in an upward direction at the end of each movement of the carriage H, so as to rotate the ratchet-wheel one notch. This movement of the sliding pawl is effected by the following described mechanism: The pawl E^7 is pivoted to an upright E^{10}, that slides in the bracket E^{15} by the pivot E^8, and is also held by the spiral spring E^9. The upright E^{10} has a pin E^{11} projecting from it, which is adapted to engage with the double-wedge cam-piece E^{12}. The cam-piece has an opening or slot (indicated by dotted lines e' e^2 e^3, Fig. 5) and is made to slide so as to cause the wedge part e^2 e' to act on the pin E^{11}, and through it cause the upright E^{10} to move upward and force the pawl E^7 against a notch of the ratchet-wheel E^4, forcing it to rotate to the extent of one notch. Motion is given to the cam-piece E^{12} by the pins *h h'* on the cross-bars H^{15} H^{16} on the carriage H. (See Figs. 1 and 2.) These bars H^{15} and H^{16} being attached to the carriage H, move with it, and at the end of each stroke of the said carriage it alternately comes in contact with an end of the cam-piece H^{12}, causing it to slide and act upon the pin E^{11}, thus forcing the upright E^{10} and its pawl E^7 to move upward.

The reason for causing the model or pattern to make a part rotation at each movement of the carriage is that by this arrangement but a single groove may be made in the pattern; but this single groove in the pattern is reproduced many times in the work-piece, the number of grooves in the work-piece being determined by the number of teeth on the ratchet-wheel E^4.

We will now describe the parts connected with the molding or cutting mechanism.

B represents standards attached to the sides of the fixed bed A of the machine, and are connected at their tops by a cross-piece B', which extends across the top of the machine and forms a base for the attachment of the parts that serve to hold the cutting mechanism, said cutting mechanism being in duplicate.

B^2 B^2 are standards attached to the cross-piece B' and have extended from them arms B^3, which in turn support quill-pieces B^4 which form a guide and holder for the vertically-adjustable cutter-hangers D^3. A cutter D' is journaled in the lower end of each of the cutter-hangers and driven by belt C^4, which passes under the guiding-pulleys C^3 C^2 onto the wheel D, which is attached to the same shaft that the cutter D' is. The upper end of the cutter-hanger D^3 is provided with a pin D^4 upon which the end of a spring D^5 rests. The action of the spring D^5 is to force the cutter down onto the work-piece W^2. The cutter-hanger also has an arm D^6 extending horizontally as shown, its end being adapted to move freely up and down in slot B^5, made in the upper end of the standard B^2. (See Figs. 2, 3, and 1^A.) The function of the arm D^6 is to prevent the cutter-hanger from turning and allowing the cutter-wheel from setting out of place. The lower part, *d*, of the cutter-hanger may be turned on its vertical axis so as to adjust the plane of the cutter to any position required to meet the line of the desired cut or ornamentation. The depth of cut of the cutter-wheel D' is regulated by the adjustable gage D^2. (See Figs. 1^A and 9.)

For the purpose of raising the cutters out of contact with the piece W^2 (that is to be ornamented) when the cutters reach the end of it, we have adjustable cam-pieces H^{19} H^{20}, (see Figs. 1 and 2,) which, acting on the arms D^{12} that extend from the cutter-hangers, lift the said cutter-hangers and the cutters out of contact with the piece W^2, so that no more cutting is done. In lifting the cutter-hangers out of the working position, the arms D^6 D^6 are raised so high the spring-latches *b' b'* are thrown by the springs *b b* inward, so as to cause the said arms D^6 D^6 to be caught on the shoulders b^2 b^2 and held up until the work-piece W^2 has been carried back to the starting-point; then the horizontal cam-pieces H^{25} H^{23}, Fig. 2, will come in contact with the levers *b' b'* and throw their upper ends away from the arms D^6 D^6, and thus allow the cutter-hangers to drop until their projections D^{12} D^{12} fall on to the flat top of the cam-pieces H^{21} H^{22}. Now, as the carriage carries the piece W^2, the projections D^{12} of the cutter-hangers slide off from the flat top of the cam-pieces H^{21} H^{22}, and the inclines of the said cam-pieces will allow the cutter-hangers to drop so that the cutters assume a working position, and the work will go on until the whole length of the work-piece W^2 has been passed over; then the cam-piece H^{19} H^{20} will again lift the cutters out of the working position and the above described operations

will be repeated. The horizontal cam-pieces H^{23} H^{24} are made adjustable in and out, so that they will strike the levers b' b' at the right part of the movement of the carriage.

We have a device for stopping the action of the cutters as soon as the machine has acted once around the work-piece. This device consists of a projection E^{18}, Fig. 1^A, on the hub E^2 of the ratchet-wheel E^4 and the parts which it operates, which we will now describe: D^7 D^8 is a lever pivoted at D^9 and having a shoulder D^{11} at its upper end, said shoulder being adapted to catch the pin D^{10} that projects from the upper end of the cutter-hanger. When the carriage makes its last movement to the fixed cams H^{20}—that is, after it (the carriage) has moved back and forth a sufficient number of times to have caused the ratchet-wheel E^{14} to make a complete rotation, thereby causing the model to make a complete rotation—then the boss E^{18} will come in contact with the lower end of the lever D^7 D^8 and cause the shoulder D^{11} to pass under the pin D^{10}, and thus prevent the cutter-hanger from again descending to allow the cutter to work, it being understood that the cam-piece H^{20} lifts the cutter-hanger sufficiently high to admit of the shoulder D^{11} to slip under it.

When it is desired to have the cutters work while the work-pieces W^2 are moving in either direction, the spring-latches b' b', Fig. 3, may be omitted or thrown out of working position. When the machine is thus arranged, the fixed cam-pieces H^{19} H^{20} and H^{21} H^{22} may be made all alike and simply act to lift the cutter up as they pass off from the end of the work at the end of the stroke of the carriage, then (as the work starts back) to drop the cutters into working position.

The work-pieces W^2 shown in the machine are simple cylinders; but any forms, however irregular, as shown in Figs. 7 and 8, may be worked. The cross-section may be circular or octagonal, oval or fluted. The gage D^2, Fig. 9, may be of the shape shown, or it may be modified to suit the work to be done. It is equally obvious that the shape of the cutters may be changed to suit the work to be done.

The side standards B B, (see Fig. 3,) to which the cross-bar B′ is attached, which in turn supports the cutting mechanism, are made so as to be adjustable as to height, so that the cutters and their connected parts may be raised and lowered.

The standards h^3 h^2, attached to the head and tail stocks H′ H^2, are also adjustable as to height, so that the cam-pieces H^{19} H^{20} and H^{23} H^{24} and their connected parts may be raised or lowered to correspond with the position of the cutters.

For notification of the workman that the machine has accomplished its work we have an electric bell M, Fig. 1. This bell is operated by a battery M^5. The circuit passes from the battery through the wire M^6 to the frame of the machine and through the frame to the lever D^7 D^8, (see Figs. 1 and 1^A,) said lever D^7 D^8 acting as a circuit-closer by coming in contact with the spring M^3 when acted upon by the cam E^{18}, (the function of which has been described,) the circuit being from the spring M^3 through the boss M^2, which is insulated from the frame of the machine, through wire M′ to bell M and thence through wire M^4 back to battery.

The spring-contact M^3 is so located that when the lever D^7 is forced over by the cam E^{18} (to stop the working of the cutters) an electric contact is made and the bell is sounded.

We claim—

1. In an automatic carving-machine the combination of a sliding carriage and means for operating the same, a head and tail stock mounted upon said carriage, adapted to hold a rotating model, and a work-piece mechanically connected to said model whereby the two rotate in a fixed relation to each other; a hollow hub adjustably held in a stationary bracket-piece, said hub having a pin E^6 adapted to engage with a groove made in the said model and thus control its rotation during the movement of the carriage, substantially as and for the purpose set forth.

2. In an automatic carving-machine the combination of a sliding carriage, a stationary bracket having mounted upon it a hollow hub having a pin E^6 as described, a ratchet-wheel attached to said hollow hub, and mechanism by which said ratchet-wheel and hub are made to make a part rotation at each back-and-forth motion of the said carriage, substantially as and for the purpose set forth.

3. In an automatic carving-machine the combination of a ratchet-wheel mounted in a stationary bracket and having a hollow hub, said hub having a pin engaging with a groove in a model as described, friction-packings E^{16} E^{17} adapted to bear upon the ratchet-wheel with an adjustable pressure, and means for regulating the said pressure, substantially as and for the purpose set forth.

4. In an automatic carving-machine the combination of the ratchet-wheel, E^4, the sliding pawl, E^7, mounted in the stationary bracket, E^{15}, and the double-wedge cam-piece E^{12}; with the cross-bars H^{15} H^{16} of the sliding carriage H substantially as and for the purpose set forth.

5. In an automatic carving-machine, the combination of a cutter-wheel, an adjustable cutter-wheel hanger mounted in a stationary frame and adapted to slide up and down; an arm D^{12} extending from said hanger and adapted to engage with a moving cam-piece H^{20} attached to the sliding carriage H and the said moving cam-piece, substantially as and for the purpose set forth.

6. In an automatic carving-machine, the combination of a cutter-wheel, a cutter-hanger having an arm D^6, and a spring-latch b' adapted to engage with the said arm; with the moving cam-piece H^{24} mounted upon the sliding

carriage H and the cam-piece H^{20}, substantially as and for the purpose set forth.

7. In an automatic carving-machine the combination of the ratchet-wheel E^4 having a cam-boss E^{18} a lever D^7 D^8 adapted to engage with a pin D^{10} on the cutter-hanger D^3, and the said cutter-hanger D^3, and the cam-piece H^{20}, all operating together substantially as and for the purpose set forth.

8. In an automatic carving-machine the combination of a ratchet-wheel E^4 having a cam-boss E^{18} adapted to operate the lever D^7 D^8, and the lever D^7 D^8; with the electric contact-spring M^3, an electric bell M and an energized electric circuit, substantially as and for the purpose set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 6th day of July, A. D. 1895.

GEORGE EMMETT.
WILLIAM E. JAQUES.

Witnesses:
FRANK G. PARKER,
WILLIAM H. PARRY.