(No Model.) 4 Sheets—Sheet 1.

P. H. BERRIGHIN.

STONE CUTTING MACHINE.

No. 559,252. Patented Apr. 28, 1896.

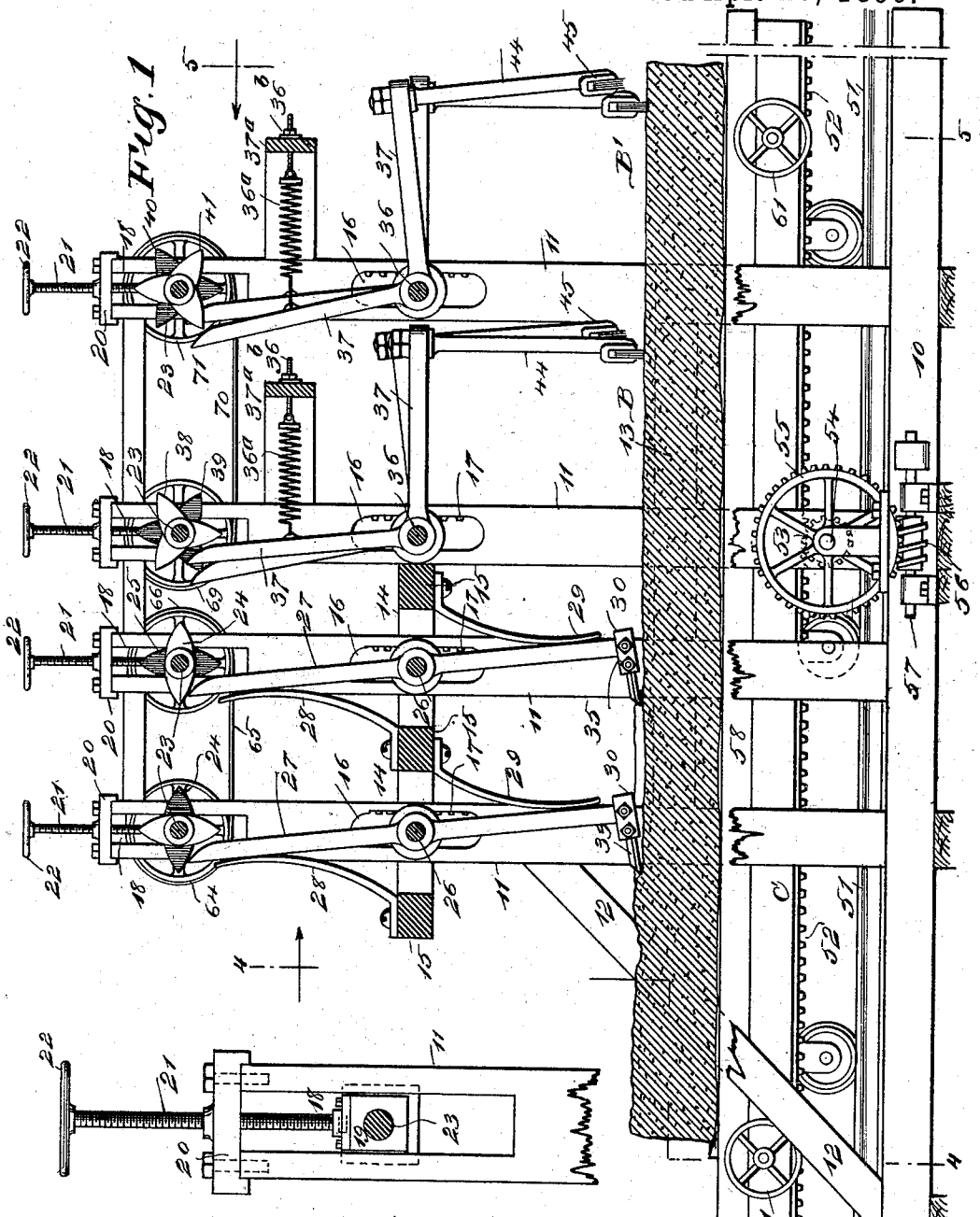

Fig. 1

Fig. 2

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STONE CUTTING MACHINE.

No. 559,252. Patented Apr. 28, 1896.

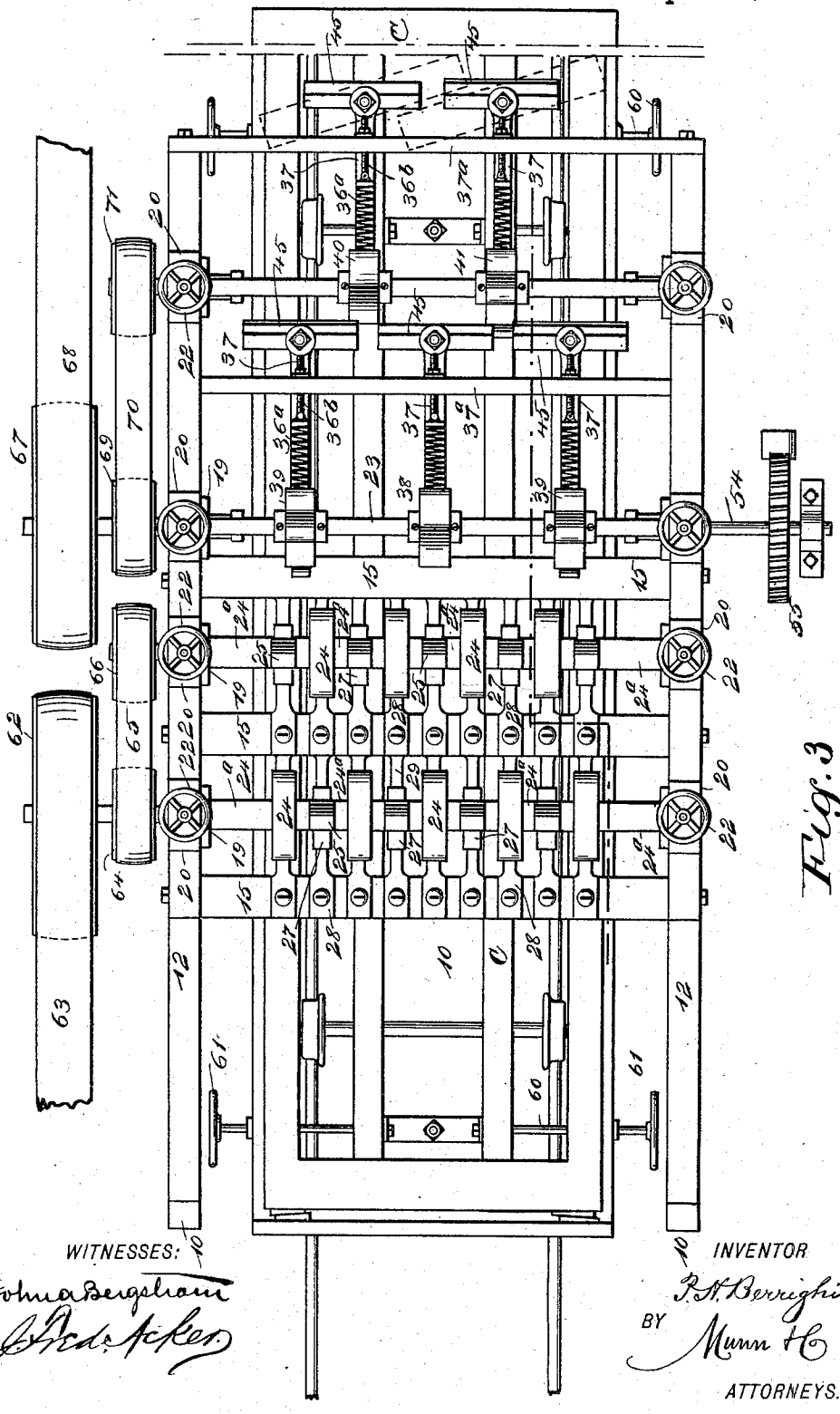

Fig. 3

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STONE CUTTING MACHINE.

No. 559,252. Patented Apr. 28, 1896.

Fig. 5

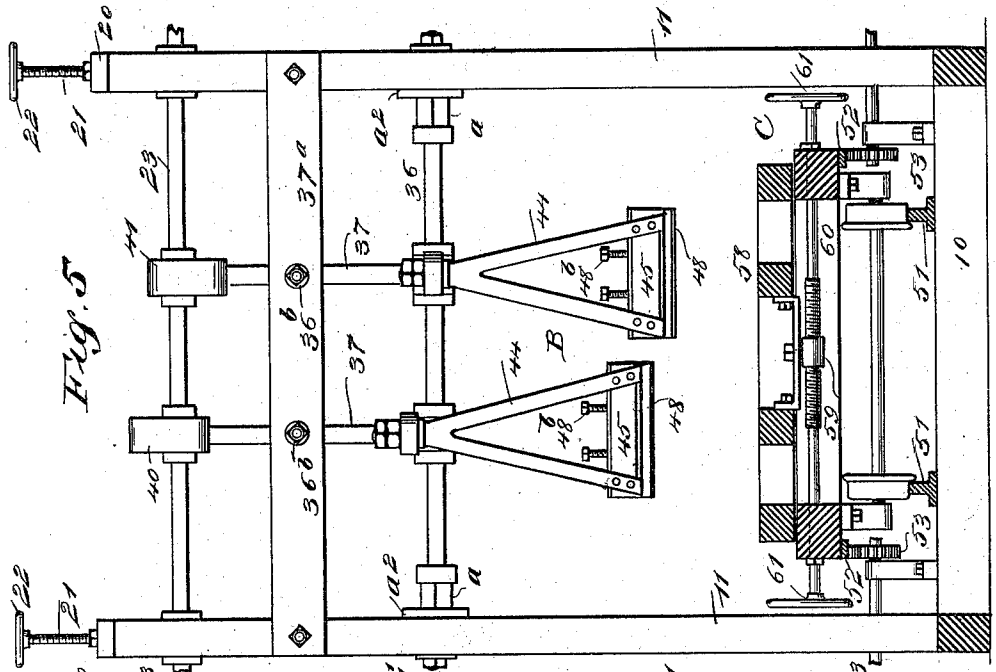
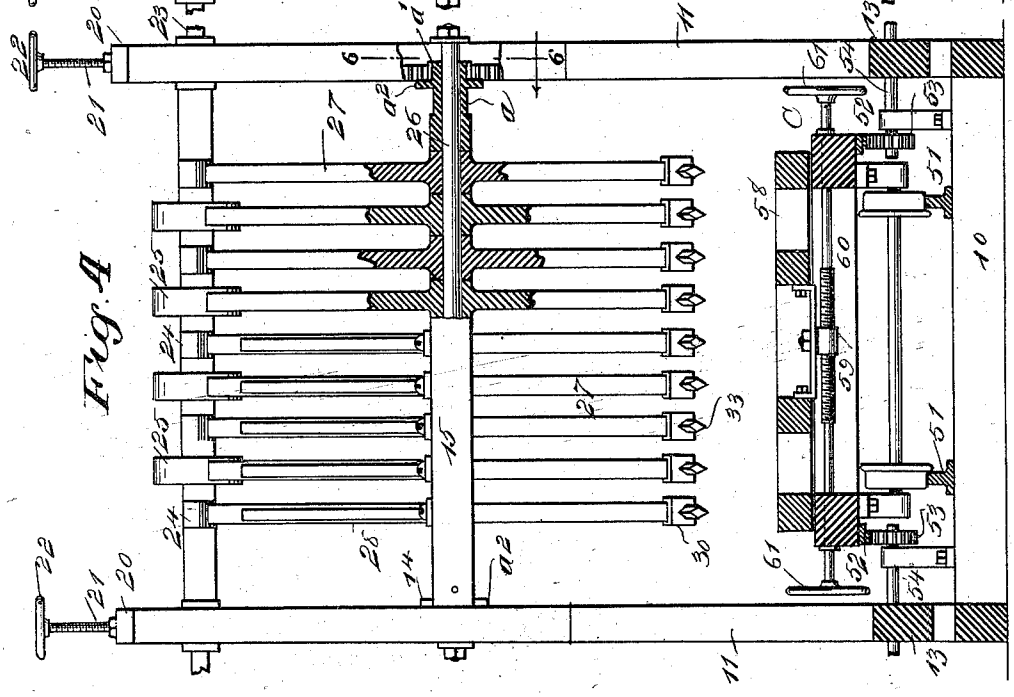


Fig. 4



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(No Model.)

4 Sheets—Sheet 4.

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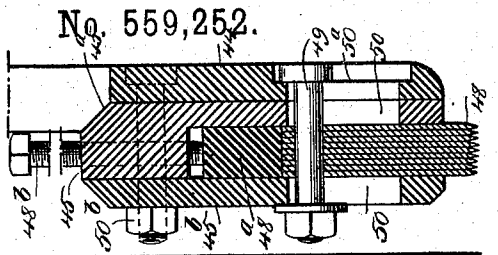
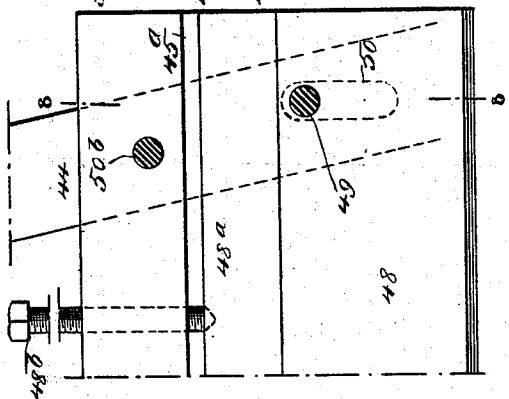
STONE CUTTING MACHINE.

No. 559,252. Patented Apr. 28, 1896.





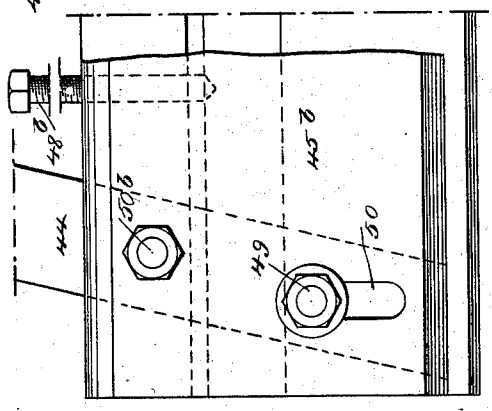


Fig. 8

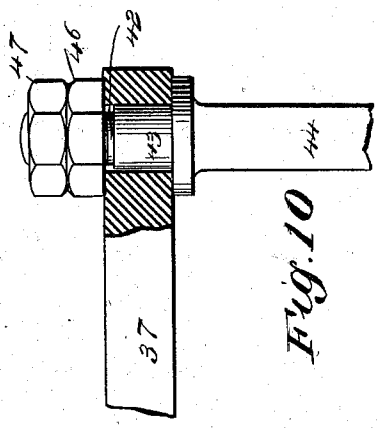
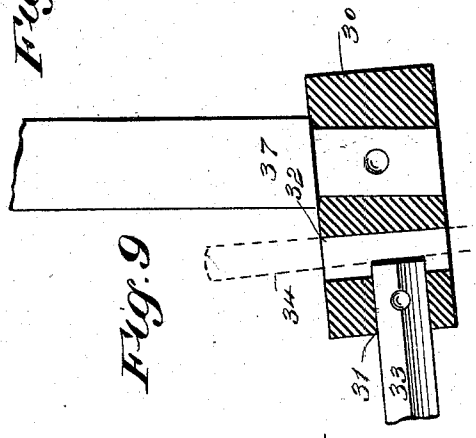


Fig. 10

Fig. 7

Fig. 9



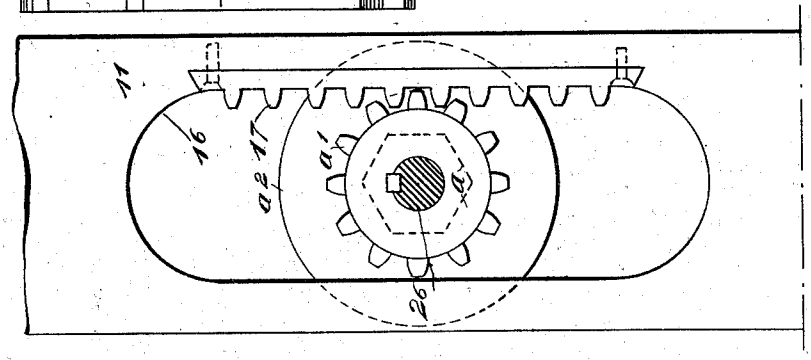


Fig. 6

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UNITED STATES PATENT OFFICE.

PETER H. BERRIGHIN, OF QUINCY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JAMES CRAIG AND JOHN RICHARDS, OF SAME PLACE.

STONE-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,252, dated April 28, 1896.

Application filed June 11, 1894. Serial No. 514,149. (No model.)

To all whom it may concern:

Be it known that I, PETER H. BERRIGHIN, of Quincy, in the county of Norfolk and State of Massachusetts, have invented a new and Improved Stone-Cutting Machine, of which the following is a full, clear, and exact description.

My invention relates to an improvement in stone-cutting machines; and it has for its object to provide such a machine which will be simple, durable, and economic, and whereby the action of the pointers or chisels will be automatically produced, and will correctly simulate the use of a chisel by hand, and likewise provide for the finishing of the roughened surface of the stone through the medium of peen and bush hammers, the said hammers being likewise automatically operated and made to follow upon the action of the chisels or pointers.

Another object of the invention is to provide a machine in which the devices carrying the chisels or pointers and the peen and bush hammers may be adjusted vertically in order that they may act properly upon blocks of any desired thickness, and likewise to provide a truck upon which the stone is to be mounted while being cut, the said truck being constructed in such a manner that it will be carried at a proper rate of speed beneath the chisels and other stone-cutting devices employed, and whereby the body of the truck may be shifted sidewise to bring the block properly beneath the stone-cutting tools used.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a central vertical section through the machine. Fig. 2 is a detail view of the adjusting device for what may be termed the "trip-shafts." Fig. 3 is a plan view of the machine. Fig. 4 is a section through the base of the machine and its truck, the said section being taken on the line 4 4 of Fig. 1, the forward set of chisels or pointers being illustrated partly in elevation and partly in section. Fig. 5 is a sectional and partial rear end view of the machine, the section being taken, essentially, on the line 5 5 of Fig. 1. Fig. 6 is a detail section, enlarged, taken, essentially, on the line 6 6 of Fig. 4. Fig. 7 is a partial side elevation and partial vertical section of one of the peen-hammers. Fig. 8 is a section taken transversely through the hammer on the line 8 8 of Fig. 7. Fig. 9 is a detail sectional view of the socket adapted to receive a pointer or chisel, and Fig. 10 is a detail sectional view illustrating the manner in which the shanks connected with the peen and bush hammers are adjustably attached to their carrying-arms.

The frame of the machine comprises a base 10, of any approved form from which uprights or standards 11 are projected at each side, located at predetermined intervals apart, and the end uprights or standards are provided with braces 12, when required, connecting them with the base. Lower cross-bars 13 are also used to brace the various standards, being located between and attached to them, as shown in dotted lines in Fig. 1. Side bars 14 are likewise employed to connect, for example, the three forward standards at a point near their centers, and one of the cross-bars is made to extend forwardly beyond the forward standard. The outer ends of the forward side bars 14 are connected by a forward cross-bar 15, and like bars connect the several side bars between the standards in connection with which they are used.

Each standard is provided with a longitudinal opening 16 at or near its center, and one side wall of each opening is provided with a rack 17, as is shown in detail in Fig. 6. At the upper end of each standard a longitudinal recess 18 is made, and each recess forms a slideway for a box 19, (illustrated in detail in Fig. 2,) and the recessed upper end of each standard is covered by a cap 20, having a threaded aperture made therein, through which a threaded adjusting shaft or screw 21 is made to pass, having a swivel connection with the box located in the standard in which the screw is located, and each adjusting screw or shaft is provided at its upper or outer end with a hand-wheel 22 or like device, whereby the boxes 19 may be raised or lowered, as oc-

casion may require. Each of the transversely-alining boxes of the machine journal the ends of a "trip" or "cam" shaft 23, so called because each of said shafts is adapted to carry between the standards a series of trip-cams, which cams are illustrated as being substantially elliptical in form, and the cams are alternately placed in reverse directions, one cam being located at a right angle to an adjoining cam, as shown best in Figs. 1 and 3.

The elliptical form of cams above described is located only upon the shafts contained in the forward standards 11, and the cams upon these two shafts are likewise alternately arranged—that is to say, when a cam on the forward shaft is in a vertical position the correspondingly-located cam upon the other shaft will be in a horizontal position. The cams are designated, therefore, respectively, as 24 and 25, and when the cams 24 are in horizontal position the cams 25 will be in a vertical position. The cams upon the trip or cam shafts are separated through the medium of collars 24^a of suitable size.

A shaft 26 is made to extend through the central slots 16 in the first two standards, and these shafts are adapted to remain stationary, except when they are to be adjusted. Therefore, as shown in Fig. 4, these shafts are clamped or otherwise suitably attached to the standards, the attachment being made in such manner that the shafts may be loosened when occasion may demand.

Each shaft at each end is provided with a sleeve a, which may be secured to the shaft 26 or may be loosely mounted thereon, and each sleeve a forms virtually a hub for a pinion a', the pinions being adapted to mesh with the racks 17, as shown in Figs. 4 and 6, and each sleeve or hub of a pinion is provided with a collar a^2, capable of engagement with the inner face of the standard 11, near which it is located, and that portion of the sleeve or hub a back of the collar is rendered square or polygonal, as shown in Fig. 6, in order that the sleeve may be turned by means of a wrench or like tool. Therefore when the shaft is loosened and a wrench is applied to the hub the shaft may be raised or lowered, according to the position required for the parts which the shaft is adapted to carry.

Each shaft 26 has loosely mounted upon it a series of arms 27, the arms being fulcrumed upon the shaft preferably at a central point, and the various arms are provided with hubs, as shown in Fig. 4, in order that they may be spaced a proper distance apart. The upper end of each arm is beveled from the back upwardly and forwardly, and each arm is adapted for engagement with a cam upon the cam-shaft, located over the shaft upon which said arms are mounted.

The arms are held normally in engagement with the cams at their upper ends by means of two springs 28 and 29, one spring, 28, having a bearing against the front upper portion of an arm, being secured to the upper portion of one of the cross-bars 15, as shown in Fig. 1, while the other spring, 29, exerts constant pressure upon the rear lower portion of the arm and is attached to the under surface of one of the said cross-bars 15, as shown in the same figure. Each arm 27 has attached to its lower end a shoe 30, and the said shoe extends forwardly and in a downwardly direction from the arm, as shown in Fig. 9. Each shoe 30 is provided with a socket 31 in its forward end, and an opening 32 is made vertically therein, intersecting the said socket 31.

The pointer 33, chisel, or equivalent tool employed for chiseling or pointing the surface of the stone is located in the socket 31, extending into the opening 32, and the chisel or pointer may be set forward as occasion may demand—as, for example, when it becomes worn to any extent—by inserting a wedge 34 in the opening 32, as shown in Fig. 9, and driving the wedge downward. The tool is secured in the head preferably through the medium of a set-screw 35, which is loosened when the wedge is brought into action.

The chisels are so located in the heads 30 that they will strike the stone at an acute angle or strike a cylindrical surface tangentially. In fact the tools are held upon the stone while in cutting operation at substantially the same angle at which they would be held by hand when stone is so cut by means of a mallet or hammer and chisel. If anything, the chisel is held with its head end closer to the stone than ordinarily. Thus it will be observed that when the cam or trip shafts 23 are revolved the cams upon each shaft will alternately act to force the upper end of the chisel-carrying arm in a forwardly direction, placing both springs 28 and 29 of said arms under tension, and the moment that the cam releases itself from the chisel-arms thus brought into action the springs 28 and 29 exert their force to restore the arms to their normal position, and will thus cause the chisels or pointers to plow or equivalently cut material from the surface of the stone upon which they are to act, and by reason of the series of cams upon the two shafts 23 having alternate arrangement with respect to each other the forward set of chisels will cut furrows in the stone at predetermined intervals apart, the surface between the furrows being cut away to an equal depth by the chisels or pointers carried by the second set of arms. The force of the blow given by the tools upon the stone is readily regulated by adjusting the shaft carrying the cams, the shaft being raised to give a lighter blow and lowered when heavier blows are desired.

A shaft 36, corresponding in every particular to the shafts 26, is correspondingly located in each of the two rear standards 11 of the frame, and the shafts 36 are adapted to carry two or more angle-arms 37, which arms at the intersection of their members are fulcrumed upon the said shafts. The upper members

of these arms at their upper rear ends are curved in an upwardly and forwardly direction, and the upper member of each arm 37 is adapted to be engaged by a trefoil cam 38, as this is the form of cams located upon the trip-shafts 23 of the rear standards 11, and the trefoil cams of each shaft are arranged oppositely to one another, the arrangement being such that a member of one cam will be in alinement with about the central portion of the space between two members of the next cam, and the series of trefoil cams upon each of the two rear trip-shafts are placed in alternate arrangement with each other.

The vertical members of the angle-arms 37 are held in engagement with the trefoil cams through the medium of springs 36^a, one of which springs is attached to the rear face of each vertical member of each of the said angular arms, and the rear end of each spring is connected by a tension device 36^b with a bracket 37^a, as illustrated in Fig. 1, one of the said brackets being located at the rear of each of the two standards 11 of the rear set.

Any desired number of cams may be located upon each of the rear shafts 23, and in order to designate between the cams upon the forward shaft of the two rear ones, said cams will be designated as 38 and 39, and they are three in number, while the cams upon the rearmost of the rear set of trip-shafts 23 are designated as 40 and 41, and are two in number, as shown in Fig. 3. The arms 37, mounted upon the forward of the two shafts 36, are adapted to carry, respectively, a peen-hammer B. To that end the rear extremity of the lower or horizontal member of each of the said arms 37 is provided with an opening 42 to receive a reduced and rounded upper end surface 43 of a bifurcated shank 44, which shank is attached to or is formed integral with an elongated socket 45, constituting the head of the hammer, and the extreme upper end of each shank 44 is threaded to receive a lock-nut 46 and jam-nut 47, as is likewise shown in Fig. 10. The peen-blades 48, which are held in the head 45 through the medium of clamping-screws 49 or their equivalents, are provided with cutting edges at both their upper and their lower sides, each cutting-surface being oppositely beveled, so that when the blades assembled in the heads, as shown in Fig. 8, become dulled at their lower edges they may be removed and reversed, bringing their upper and still sharpened edges into action.

The head 45 is shown in detail in Figs. 7 and 8 and comprises two sections 45^a and 45^b. The section 45^a is provided with a wide rib integral with its inner face at its upper end, and the section 45^b, which is in the nature of a plate, rests against the outer face of this rib. The blades 48 bear against a gib 48^a at their upper ends, and the blades, together with the gib, are placed between the two members of the head, the gib being below the flange thereof, and the lower portions of the blades extend below the lower edge of the head. Adjusting-screws 48^b are located in the flanged portion of the head and have bearing against the gib 48^a, and through the medium of these adjusting-screws the blades may be carried downward as far as may be found necessary, or to compensate for wear. Both members of the head are provided with oppositely-located vertical slots 50, and the clamping-bolts 49 are passed through these slots and through an opening, just made to neatly receive them, produced in the blades. The clamping-bolts also pass through slots 50^a, made in the members of the shanks 44, the clamping-bolts serving as an attaching medium between the shank and the head; but another set of bolts 50^b are passed through the solid portion of the head and through the said members of the shank, as is also shown in Fig. 8. It will thus be observed that by loosening the clamping-bolts 49 the adjusting-bolts 48^b may be successfully operated.

The adjustable connection between the peen-carrying arms 37 and the shanks of the peen-hammers is provided in order that the said hammers may be made to extend diagonally or transversely, or even longitudinally, if necessary, over the face of the stone.

The rearmost set of angle-arms 37 are similarly formed to the forward set and are adapted to carry bush-hammers B′, and these hammers are connected with the arms in the same manner as the peen-hammers and differ from them only in that their blades are greater in number for the same area and are much thinner and finer in quality.

Tracks 51 are laid upon the base of the frame, adapted to receive the wheels of the truck C, and this truck is moved longitudinally beneath the stone-cutting devices of the frame through the medium of a rack 52, which may be formed upon the under side of one or both side pieces of the truck, engaged by pinions 53, mounted upon shafts 54, and each of the said shafts may be revolved through the medium of a worm-wheel 55, meshing with a worm 56, (shown in Fig. 1,) and located upon a shaft 57, to be driven by the driving-shaft from which power is to be conveyed to the machine proper, so that the truck and the stone carried thereby will be fed forward in a proportionate manner as the upper surface of the stone is acted upon.

The truck is provided with a bed 58, which directly receives the stone, and this bed is capable of lateral movement in order that the stone may be adjusted sidewise. To that end the bed 58 is provided near each end with an interiorly-threaded sleeve 59, receiving a threaded portion of a shaft 60, one of which is located near each end of the truck, and they are operated through the medium of hand-wheels 61, or their equivalents, located at the outer ends of the shafts, as shown in Figs. 1 and 4. The machine is driven by projecting outward the forward trip-shaft 23 a sufficient distance to receive the driving-pul-

ley 62, connected by a belt 63 with a driving-shaft, and the said forward shaft 23 is likewise provided at the same end with a smaller pulley 64, connected by a belt 65 with a like pulley 66 on the next rear shaft, and the two rear trip or cam shafts 23 are driven in like manner, the forward of the two being provided with a driving-pulley 67, connected with the main driving-shaft by a belt 68, and a smaller pulley 69, connected by a belt 70 with a like pulley 71, located upon the rearmost of the said shafts 23.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a stone-cutting machine, a frame, a shaft adjustably carried by the frame, tool-carrying arms fulcrumed near their centers upon the said shaft, a head provided with a socket, attached to the lower end of each arm, the said sockets being adapted to receive a stone-cutting instrument, capable of striking the stone at an angle less than a right angle, springs having bearing against said arms at opposite sides of their top and bottom portions, a shaft journaled in the frame, and cams of essentially elliptical construction, alternately placed in opposite positions and adapted for trip connection with the said tool-carrying arms, as and for the purpose set forth.

2. In a stone-cutting machine, a frame, a shaft adjustably carried by the frame, tool-carrying arms fulcrumed near their centers upon the said shaft, a head provided with a socket attached to the lower end of each arm, said sockets being adapted to receive a stone-cutting instrument, capable of striking the stone at an angle less than a right angle, springs having bearing against said arms at opposite sides of their top and bottom portions, a shaft journaled in the frame, cams of essentially elliptical construction alternately placed in opposite positions and adapted for trip engagement with the said tool-carrying arms, and means, substantially as described, for adjusting the cam-shafts, thereby regulating the throw of the arms, substantially as set forth.

3. In a stone-cutting machine, the combination, with a frame, a front and a rear shaft carried by the frame, tool-carrying arms journaled upon each of the said shafts, terminating at their lower ends in heads adapted to receive each a stone-cutting tool, and tension devices applied to the said arms at opposite sides of their top and bottom portions, of a shaft located above each set of arms and adjustable relative thereto, means for rotating the said shafts, cams having elliptical faces, located upon each of the revolving shafts, the cams upon each shaft being alternately in opposite arrangement, and corresponding cams on both shafts being likewise oppositely arranged, the cams being adapted for trip engagement with the said arms, as and for the purpose specified.

4. In a stone-cutting machine, the combination, with a frame, fixed shafts journaled in the frame, and means, substantially as described, for vertically adjusting these shafts, and tool-carrying arms mounted upon each of the said shafts, provided with tool-carrying sockets at their lower ends, of shafts journaled adjacent to the upper end of each set of arms, means for revolving the said upper shafts, cams of essentially elliptical shape located upon each revoluble shaft, the cams being alternately oppositely arranged and corresponding cams on both of the shafts being likewise oppositely arranged, tension devices whereby the arms are held in engagement with the cams, and forced, when tripped and released, to return to their normal position, and adjusting devices connected with the bearings of the cam-shaft, as and for the purpose set forth.

5. In a stone-cutting machine, the combination with the frame provided with vertical slots in its sides and having a rack arranged at one side of each slot, of a shaft extending through said slots, arms journaled loosely upon said shaft and carrying tools at their lower ends, pinions carried by said shaft and meshing with said racks for the purpose specified, and means for tripping the tool-carrying arms, substantially as shown and described.

6. In a stone-cutting machine, the combination with a frame provided with standards at opposite sides thereof, each standard having a longitudinal opening or slot formed at or near its center, a longitudinal recess forming a slideway located at the upper end of each standard, a rack located at one side of each central opening and an adjustable bearing arranged in the said slideways, of a shaft provided with pinions meshing with the said racks, tool-carrying arms fulcrumed on the said shaft, a shaft located above the tool-carrying arms, and journaled in the adjustable bearings, the said shaft being provided with cams adapted for trip connection with the said tool-carrying arms, means substantially as shown and described for raising and lowering the bearings carrying the cam-shaft, a tension device connected with the tool-carrying arms and means for rotating the cam-shaft, as and for the purpose set forth.

7. In a stone-cutting machine, the combination with the frame provided with vertical slots and having a rack arranged at one side of each slot, a shaft extending through said slots, pinions carried by the said shaft and meshing with the said racks, angle-arms fulcrumed upon said shaft, and means for adjustably attaching stone-cutting tools to the lower ends of the said arms, of a shaft located adjacent to the upper ends of the said arms, means for revolving the said shaft, cams lo-

cated upon the said shaft and arranged substantially as shown and described, and tension devices whereby the upper portion of the arms are held normally in engagement with the cams, as and for the purpose set forth.

8. In a stone-cutting machine, a socket-head provided with a bifurcated shank having a reduced and rounded upper end for adjustable engagement with an operating mechanism the said socket-head comprising a section having a flange or rib integral with its inner face at the upper end and a second section resting against the outer face of the said flange, the said sections being provided with oppositely-located vertical slots, a series of blades removably held in the said head, clamping-bolts passing through the said blades and the vertical slots, and means for adjusting the said blades, as and for the purpose specified.

9. In a stone-cutting machine, the combination with a reciprocating arm provided with an opening at its end, and a device for reciprocating the said arm, of a stone-cutting tool, the same consisting of a socket-head, blades provided with cutting edges, held in series within the said head, a shank having a bifurcated lower end for attachment to the said head and having a rounded upper end adapted to enter the opening in the end of the reciprocating arm and turn therein, the extreme upper end of the said shank being threaded to receive a nut, whereby the shank is held in the adjusted position, as and for the purpose specified.

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