(No Model.)

N. NELSON.

PUNCHING APPARATUS.

No. 455,289. Patented June 30, 1891.

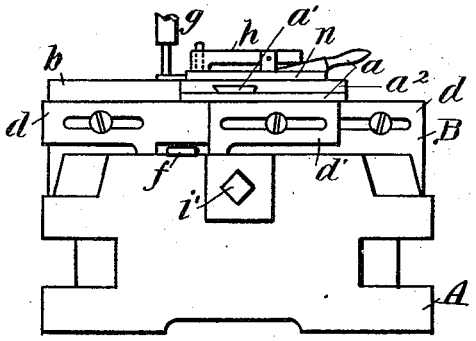


Fig.1.

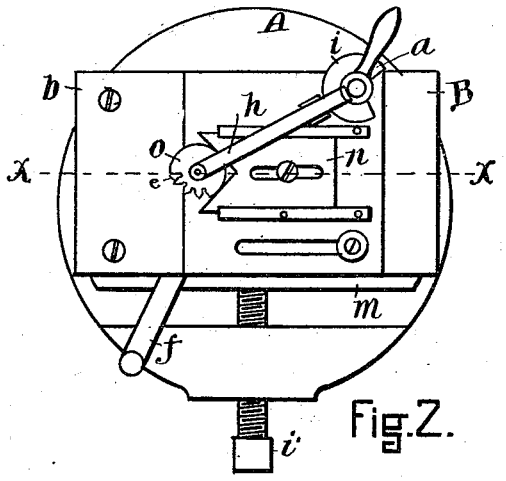


Fig.2.

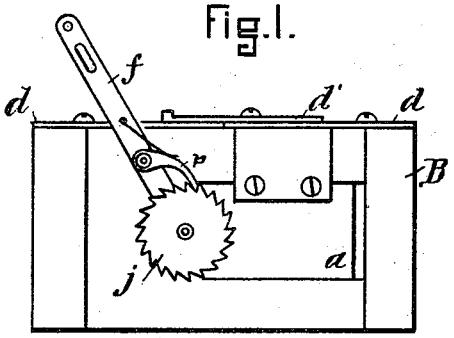
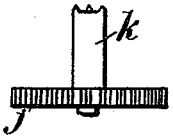


Fig.3.

Fig.5.



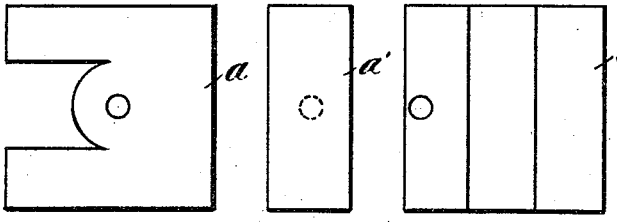


Fig.6. Fig.7. Fig.8.

Fig.9.

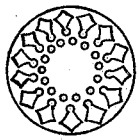
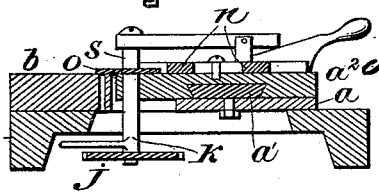


Fig.10.

Fig.4.



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PUNCHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 455,289, dated June 30, 1891.

Application filed November 29, 1890. Serial No. 372,993. (No model.)

To all whom it may concern:

Be it known that I, NELS NELSON, of Attleborough, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Punching Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention consists of an attachment to punching-machines for the purpose of producing circular or composite ornamental punched work for jewelry and other articles, and is intended to provide a way for doing fine work that it would in many cases be impossible to produce with the usual punches and way of operating them, and in many cases obviate the necessity for large costly punches and dies.

It is fully illustrated in the accompanying drawings, making part of this specification.

Figure 1 is a front elevation of the die-table and its devices held in a die-dish of the ordinary structure. Fig. 2 is a top or plan view of the same shown in Fig. 1. Fig. 3 is a view showing the under side of the die-table and the parts that revolve the work. Fig. 4 shows a vertical section of the devices for holding the work and the table, taken on line $x\,x$, Fig. 2. Fig. 5 is a separate view of the arbor k and ratchet-wheel j. Fig. 6 is a top view of the plate a separately. Fig. 7 is a top view of the swivel-plate a'. Fig. 8 is a view of the under side of plate a^2. Figs. 9 and 10 show specimens of designs that may be made with the invention.

This apparatus consists of a frame or open table B, which is supported at each end on legs or cross-pieces to raise it sufficiently to receive operating mechanism underneath between it and the die-dish A, in which the table is held when in use on the press by means of a set-screw in the usual way of holding dies for punching. A die-plate b, having the proper opening for the end of the punch, is fastened on one end of the table B on its top by means of screws, and a work-plate a is arranged on the other part of the table to slide to and from the die-plate b. A swivel-plate a' is placed on top of the plate a. It has a pivot in its center, which fits into a hole made in the plate a and has a screw-nut fitted on the lower end of this pivot, which can be screwed up so as to hold the plate a' from turning when it is required to be stationary. By swinging the plate a' on this pivot, so that it will not lay quite square across the table, the plate a^2 in sliding on it will move diagonally across the table, and, combined with the other motions of the plates, will vary the regular circular order of the figures punched, as may be desired. The sides of the plate a' are beveled under to receive the inner edges of a recess in another plate a^2, which is placed on top of the two plates a a' and can be made to slide on them in whatever direction the swivel-plate a' may be set, that plate serving as a guide for it. The plate a has a large recess cut in its front edge (see Fig. 6) to allow the arbor k to pass below it and to admit of the necessary side motion to the arbor k when the plate a^2 is moved sidewise. In simpler forms of the apparatus the swivel-plate a' may be dispensed with and the plate a^2 be made to slide sidewise square across the table b on plate a, or both plates a and a^2 can be made in one piece with only a motion to and from the plate b on the table B. The die-plate b has the opening e made in it for the punch g to pass into in punching the work. The punch g is operated vertically over this opening in any of the ways usual in punching-presses. The plate a^2 is provided with a small vertical arbor k, held in a bearing in the plate, so that it can turn freely. A ratchet-wheel j is made fast on the lower end of the arbor k, and a lever-arm f is hung on the arbor just above the ratchet-wheel, so as to swing freely horizontally, and is provided with a pawl p, pivoted to it, in position to catch its free end in the teeth of the wheel j and turn it in one direction when the arm f is moved, the pawl being held up against the wheel by a light spring, Fig. 3.

The upper end of the arbor k, which projects slightly above the plate a^2, is made square to enter a similar shaped hole in the center of the piece of work to be punched, or if it is

not desirable to have a hole through the work the end of the arbor may have two or more small sharp points made on it, as seen in Fig. 5, to enter the work sufficiently to insure its rotating with the arbor when the latter is turned by the arm *f*. An arm *h* is provided for the purpose of holding the piece of work *o* down on the end of the arbor *k*. This arm is held on a pivot in a stud extending up from the plate a^2, and a horizontal cam *i*, pivoted to the plate a^2, extends in under the rear end of the arm *h* to press that end of it up and its front end down on the work, which it does by means of a curved inclined rise on its face, that when the cam is turned by the handle with which it is provided will raise the end of the arm *h* with the effect mentioned. By turning the cam back, so that a thin portion of the cam will come under the end of the arm, the front end can be raised to allow the piece punched to be taken out and another piece to be put in.

The front end of the arm *h* is provided with a small circular presser *s*, that turns very easily in the arm *h* to lessen the friction of turning the piece being punched, which might otherwise prevent the points (if such are used) from moving the work properly. A plate *n* is held in slides on the top of the plate a^2 to facilitate the placing the pieces of work in proper position on the arbor. This chuck-plate *n* has a V-shaped recess cut in its front edge and is set so that circular pieces of different sizes can be centered on the arbor by setting the chuck-plate to or from the arbor, and it is provided with a screw passing through a slot and screwing in the plate a^2 to hold it in place when set for any particular size of work. A gage-plate *d* is movably held on the side of the table B by means of a screw near each end passing through slots in the plate and screwing into the table, and the lower side of the plate *d* is extended down under the side of the table and made fast to the under side of the plate *a*, (see Fig. 3,) so that it will move with that plate. The plate *d* has a portion cut out of its lower edge where it comes over the lever-arm *f* to allow that arm to swing; but the plate extends down at the front edge of the recess, so as to limit the motion of the arm in that direction, while its motion in the other direction is regulated by a shorter plate *d'*, adjustably attached to the plate *d* by means of screws passing through slots in it and screwing into the plate *d*. It will readily be seen that by setting the plate *d'* on the plate *d* the space allowed for the arm *f* to move can be lengthened or shortened to take any desired number of teeth on the ratchet-wheel. Larger or smaller wheels can be put on the arbor, so that any number of teeth can be obtained to divide evenly for the number of openings to be punched in a circle. A connection can be made between the arm *f* and the punch-operating mechanism to operate it automatically as the punch rises and descends.

In operation the piece of metal *o* to be punched is pushed back into the V-shaped recess in the chuck-plate *n*, which has previously been set to center that size of pieces of work accurately on the arbor, and the arm *h* is pressed forcibly down on it by turning the cam *i* by its handle, so as to bring the thick part of the cam under the rear end of the arm, which, by raising that end of the arm, depresses the front end, as has been explained. Then the punch *g*, which may be operated by a screw or lever or any of the devices used for that purpose, is brought down through the work *o* and raised again, making an opening in the piece, as usual. Then the arm *f*, which has been resting against the inner edge of the plate *d*, is moved over against the end of the guide-plate *d'*, turning the arbor *k* and work *o* a certain distance, according to the number of teeth of the wheel *j* the gages have been set for the arm *f* to take, when a second opening is made by bringing the punch *g* down again, as just described. By repeating these motions a series of openings can be made around the circle. If the arm *f* is brought back against the edge of the plate *d* to give the pawl a new start on the ratchet-wheel when the punch *g* is down in the work, there will be no liability of moving the arbor *k* backward in so doing. In this way ornamental designs can be worked in detail that it would otherwise be impossible to produce, because of the extreme fineness of the parts of the punch required and the closeness of the work that would make it impossible to get the metal out whole from between the parts of the punch. Many styles of work can be executed on this apparatus with endless combinations of parts, of designs, and variations in position, with the side and turning motion of the swivel-plate by means of simple punches that would require costly dies to produce in the usual way.

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

1. The adjustable plate a^2, provided with an arbor and mechanism to turn said arbor intermittently, substantially as described, in combination with the die-plate *b*, chuck-plate *n*, and table B, substantially as and for the purpose set forth.

2. The adjustable plate a^2, provided with an arbor and mechanism to turn said arbor intermittently, substantially as set forth, in combination with gage-plates *d d'*, die-plate *b*, and table B, substantially as described.

3. The adjustable plate a^2, provided with an arbor and means to turn said arbor intermittently, substantially as specified, in combination with the arm *h*, cam *i*, die-plate *b*, and table B.

4. A device for holding work to be punched, consisting of a plate arranged to be moved

longitudinally and laterally with regard to a die-plate and provided with means for turning said work intermittently around a center, in combination with a die-plate, substantially as and for the purpose set forth.

5. A device for holding work to be punched, consisting of a plate to be moved longitudinally, laterally, and in a circular direction with regard to a die-plate, and provided with means for turning said work intermittently around a center, in combination with a die-plate, substantially as and for the purpose set forth.

6. The arm *h*, with presser *s*, in combination with the cam *i*, plate a^2, arbor *k*, die-plate *b*, and table B, substantially as described.

7. The combination of the arbor *k* with ratchet-wheel *j*, arm *f*, pawl *p*, plate a^2, die-plate *b*, and table B, substantially as specified.

8. The work-holding table composed of the plates *a*, *a'*, and a^2, substantially as described, in combination with arbor *k*, means for turning said arbor, die-plate *b*, and table B, as specified.

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