2 Sheets—Sheet 1.

I. SCOVILLE.

Nut and Washer Machine.

No. 39,590. Patented Aug. 18, 1863.

Fig: 1.

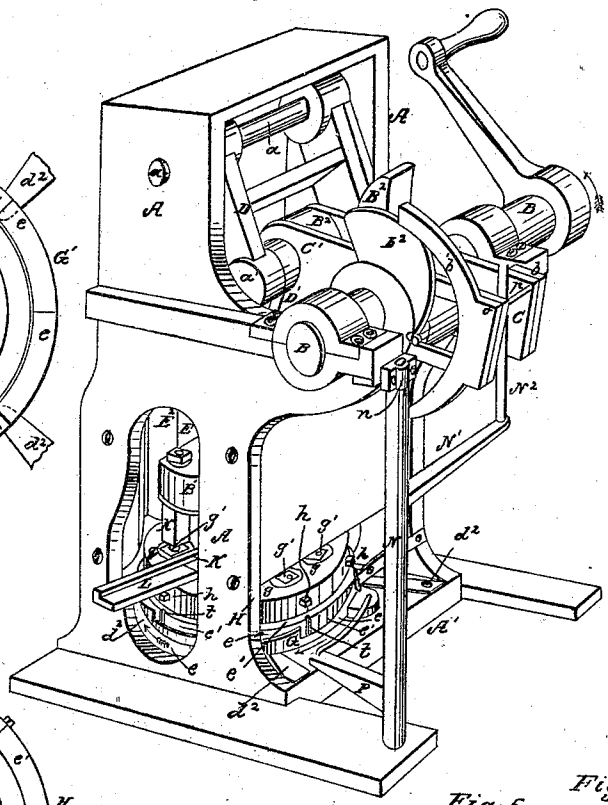


Fig: 2.

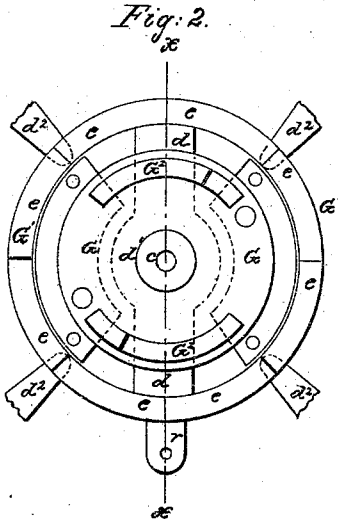


Fig: 3.

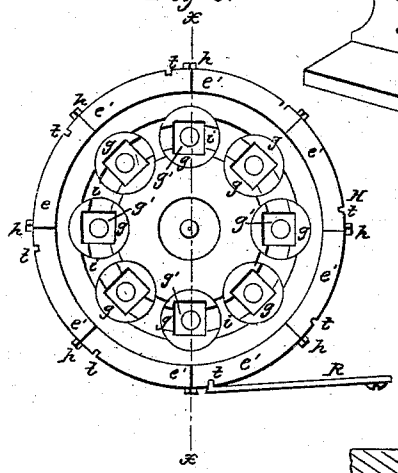


Fig: 4.

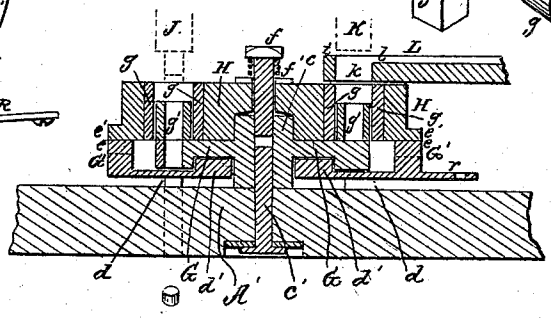
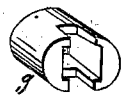


Fig: 5

Fig: 6.



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2 Sheets—Sheet 2.

I. SCOVILLE.

Nut and Washer Machine.

No. 39,590. Patented Aug. 18, 1863.

Fig: 7.

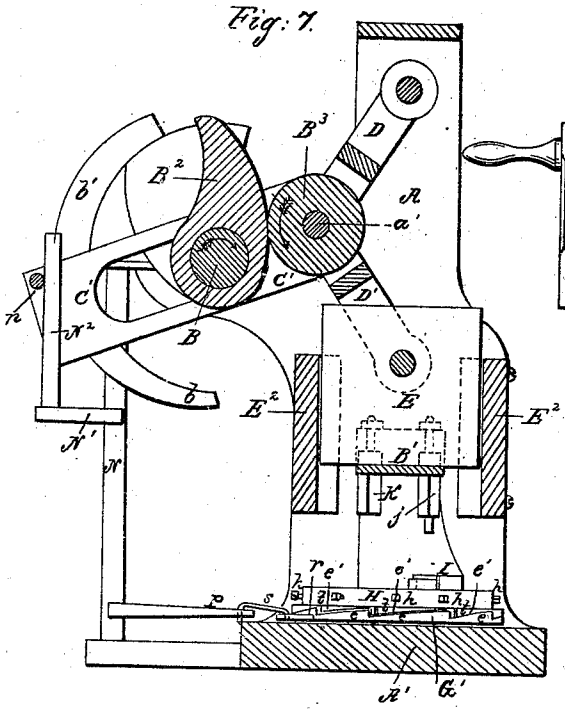


Fig: 8.

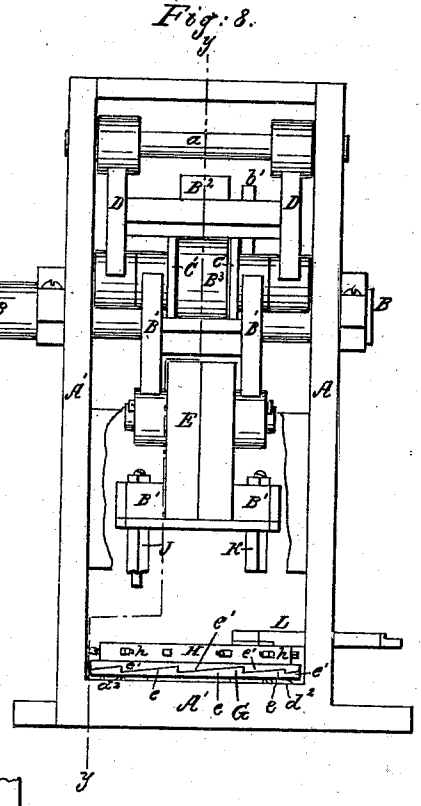


Fig: 9.

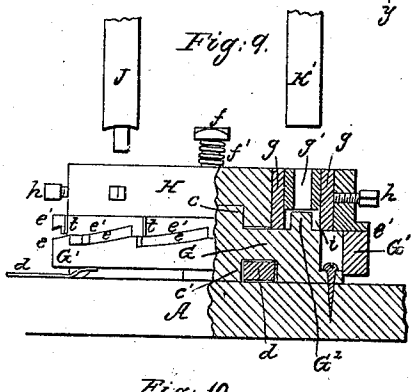
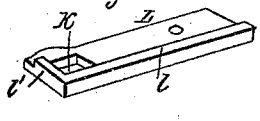


Fig: 10.



Witnesses:
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Inventor:
Ives Scoville
by his Attys
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UNITED STATES PATENT OFFICE.

IVES SCOVILLE, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN MACHINES FOR MAKING NUTS AND WASHERS.

Specification forming part of Letters Patent No. **39,590**, dated August 18, 1863.

To all whom it may concern:

Be it known that I, IVES SCOVILLE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machinery for Making Nuts and Washers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my improved machine. Fig. 2 is a top view of the bed-plates, seen by removing the upper or revolving die-plate. Fig. 3 is a bottom view of the revolving die-plate. Fig. 4 is a vertical diametrical section through the base of the machine, bed-plate, and the revolving die carrying plate, taken in the plane indicated by red line *x x* in Figs. 2 and 3, respectively. Figs. 5 and 6 show the punching-die and die-holder. Fig. 7, Sheet 2, is a longitudinal section through the machine, taken in the vertical plane indicated by the red line *y y* in Fig. 8. Fig. 8 is an end elevation of the machine with a portion of one of the guideways removed. Fig. 9 is a half-sectional view of the revolving die-carrier, bed-plate, and yielding-ring. Fig. 10 is a perspective view of the guide-table for holding the strip of metal and presenting the same to the cutting-die.

Similar letters of reference indicate corresponding parts in the several figures.

My invention relates to certain new and useful improvements on that class of machines for making nuts and washers in which the forming-dies are arranged within a horizontal revolving die-carrier and concentrically with its axis.

It consists in a die-carrier which has given to it, by means hereinafter described, a vertical as well as a revolving motion, for the purpose of discharging the finished nuts, as will be hereinafter described.

It further consists in cutting out the blank nuts upon an independent stationary die-table arranged over the revolving die-carrier for the purpose of making said blanks smaller than the "pockets" which receive them, and which retain them during the subsequent operations of swaging and punching, as will be hereinafter described; also, in arranging below the revolving die-carrier a stationary cam-plate for operating the punching-dies and discharging the finished nuts, as will be hereinafter described; also, in a novel arrangement of devices for giving a positive intermitting movement to the die-carrier so as to successively bring the pockets, which receive the blanks after they are cut from the bar, directly under the punches, as will be hereinafter described; also, in combining with toggle-levers and a reciprocating yoke a rock-shaft carrying an arm which is connected to and actuates the yielding driving-ring, giving to it a uniformly reciprocating movement, and thereby transmitting an intermitting revolving motion to the die-carrier, as will be hereinafterdescribed.

It finally consists in punching or perforating the blanks confined within the pockets, and then swaging and compressing the blank nuts by means of a single tool working in a box having a movable perforated bottom, as will be hereinafter described.

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

The frame which contains and supports the machinery hereinafter to be described consists of two uprights, A A, and a base-plate, A′. The motive power is communicated to the main driving-shaft B by any convenient means, and this shaft, which has a rotary motion, transmits a reciprocating motion to the punch-stock B′, through the medium of a large cam, B^2, and double yoke-plates C C′, and the toggle-jointed levers D D D′ D′. (Shown in Figs. 1, 7, and 8.) The toggles D D D′ D′ are supported at the upper ends by means of the transverse bearing-rod *a*, and at their lower ends they are pivoted to the guide-block E. The cam B^2 extends the toggles and gives the downward or acting stroke to the punches, and the yokes C C′ draw the middle joints of the toggles outward and elevate the punches. These two operations take place at each revolution of the main shaft B. The surface of the cam B^2 acts upon a large friction-roller, B^3, which has its bearings upon the transverse toggle-rod *a′*, and the yoke-plates C C′ are provided with segments *b b′*, which are acted upon by segments b^2 on the main driving-shaft B. These constitute the principal driving parts of the machine, and give to the guide-block E, to the bottom of which the punch-head B′ is secured, a verti-

cal reciprocating motion between the two V-grooved guides E^2 E^2.

Upon the bed-plate A′ rests the mechanism for receiving the blank nuts after they are severed from the bar, and holding these blanks during the operation of the punches upon them. These devices consist of a stationary circular cam-carrying disk, G, having two hubs, *c c′*, projecting centrally from its upper and lower surfaces, respectively. (Shown in Figs. 4 and 9.) These hubs are tapped for receiving the screw-bolt c^2, which confines the disk G down on the bed-plate A′ and holds it rigidly thereon. Surrounding the cam-plate G is a yielding ring, G′, which is attached to the lower hub, *c′*, by means of the two radial arms *d d* and circular collar *d′*, and which is held in position by and supported upon four springs, d^2 d^2, that project up from the bed-plate A′. These springs support the ring G′ above the surface of the bed-plate, leaving a space between the two—ring and plate—as shown in Figs. 4, 7, 8, and 9, for allowing the ring G′ to be depressed, as will be hereinafter described. The upper surface of ring G′ is made up of regular inclined planes, all of an equal length and height. The length of each of these planes *e e* is equal to the amount of motion it is desired to give to the die-carrying plate H at every full rotation of the main shaft B. These inclined planes *e e* are shown clearly in Fig. 2, and they correspond in length and height to similar inclined planes, *e′ e′*, which are formed on the lower circumferential edge of the die-plate H, as shown in Fig. 3. The die-carrying plate H has a central depression formed into its lower surface, which receives the hub *c* on the stationary cam-disk G. This allows the inclined planes to come together, and also allows the flat bottom surface of the disk H to rest upon the surface of the disk G, as shown in Fig. 4. When the two disks are together, the upper one resting upon the lower one, G, and the yielding ring G′, the screw *f* is used to secure the upper disk, H, to the hub *c* of the lower stationary disk, G, and the helical spring *f′*, which is interposed between the head of the screw *f* and disk H, keeps this disk down in its place, and, with the aid of the four springs d^2, keeps the surfaces of the ring G′ and disk H together. The holding-down screw *f* allows the upper disk, H, to revolve freely around its stem, and this motion is imparted to this disk by means of the vertical surfaces of the inclined planes *e e* of the ring G′ acting against the corresponding vertical surfaces on the disk H, when the ring G′ is oscillated, as will be hereinafter shown. The disk H is bored out to receive the cylindrical pocket portions *g g g*, which are confined in their places by means of the set-screws *h h*. The number of these pocket portions *g g* is equal to the number of inclined planes *e′ e′* on the lower surface of the disk H, and the axes of these pockets are all arranged in a circle concentric with the axis of their disk. Each pocket *g* has a square hole through it of the size of the nuts to be formed therein.

The drawings represent a machine adapted for making square nuts; but when round washers are to be made in this machine the square pocket-cylinders are removed, and a suitable kind introduced in their places. This change does not alter the principle of the invention, nor affect the operation of the machine in any particular. The upper ends of the pocket cylinders *g g* are flush with the surface of the disk H, and their lower ends are grooved so as to correspond with the annular groove *i*, which is made in the bottom of the disk H, as shown in Fig. 3, for the reception of the two cams G^2 G^2 that project up from the upper surface of the stationary disk G, as shown in Fig. 2. Each pocket *g* receives a cubical punching-die, *g′*, which, while it exactly fits the recess in the pocket, is allowed to move up and down therein, and each one of these punching-dies has a hole vertically through its center to allow of the escape downward of the circular piece which is punched from the blank nut. The dies *g′* are elevated at a proper time for discharging the finished nuts by one or the other of the cams G^2 G^2, and between these cams, on the solid flat surface of the stationary disk G, the punching and swaging of the nuts are performed. The perforations through the disk G (shown in Fig. 2) are continued through the bed-plate A′, and arranged in such a relation to the punch that the scraps punched out of the blanks by this punch will escape from the machine. The cams G^2 G^2 are of a sufficient height to thrust the upper ends of the dies *g′ g′* up to a level with the surface of the die plate H, so that the finished nuts will be readily discharged from the pockets. The head B′, which is secured to the follower or guide-block E, carries two sets of punches, J J′, and two sets of shears or cutters, K K′. This arrangement doubles the work of the machine, and balances the guide-block by more uniformly distributing the resistance on the punches and cutters over its surface. Then, by employing two or more sets of cutters and punches in conjunction with the horizontal die-carrying disk H, I diminish the friction on the guide-block E, and make the machine run easier and with increased efficiency. One set of tools, J K, is arranged on one side of the horizontal head B′, and the other set, J′ K′, on the other side, and both sets of tools are arranged directly over the pockets *g g g g*, in the disk H, so that the four tools will operate simultaneously upon the blank nuts and upon the rods from which the blanks are cut. The vertical stocks J J′ are square rods, having reduced punching projections on their lower ends, and square or other shaped shoulders for compressing or swaging the blanks subsequent to the operation of punching the holes through the blanks. The reduced cylindrical punching ends are of sufficient length to perforate the nuts and pass into the holes in the

dies g' g', so that just before the shoulders of these punches commence to press the nuts the ends of the punches will be within the die-boxes g g. The punches will thus be held firmly and guided down to the work of swaging the nuts.

The shears or cutters K K′ consist of square rods somewhat smaller than the pockets g g, and having flat cutting ends, as shown in Fig. 9 of the drawings. These cutters do not enter the pockets, but perform their work upon a stationary die, which is independent of the revolving die-carrier H, and merely introduce the blanks which they cut into the pockets, to be finished by the subsequent operations of the punches. This die is formed on the inner end of a long horizontal table, L, by punching a square piece out of this table slightly smaller than the pockets, leaving a square hole, k, through the table, through which hole the cutting-punch passes. The longitudinal ledge l on the table L serves as a guide for the rod from which the blanks are cut, and the transverse ledge l' serves as a stop for said rod. The table L is secured to the frame A and overhangs the pockets in the die carrying disk H, as clearly shown in Figs. 1 and 4 of the drawings.

In this machine two tables L will be used, one for each cutting-tool; but I have shown but one table in the drawings, the other being arranged on the opposite side of the machine precisely as the table L is arranged.

The cutters and punches are all secured into the head B′ by any suitable means which will allow of their removal at pleasure. This cutter-head B′ should be rigidly attached to the guide-block E, so that the tools will not be liable to wabble; and the guide-block or follower E should be so nicely balanced and guided in its vertical V-grooves that the cutters, as well as the punches, will have a free vertical movement up and down.

I have stated that the die-carrying disk H received its circular motion from the oscillating ring G′ by the action of the vertical surfaces of the inclined planes e e' upon each other. The ring G′ receives its oscillating motion from the vertical rock-shaft N, Figs. 1 and 7, the upper end of which has its bearings in a box, n, and its lower end is stepped in the bed of the machine. This shaft has two arms projecting from it at right angles. The upper arm, N′, has a vertical rod, N^2, projecting up from its outer end, parallel with the shaft N, which rod is acted upon by the transverse rod p of the yoke-plates C C′ and the cam B^2, respectively, which give to rod N^2 a vibrating motion. The lower arm, P, is connected to the projecting ear r of ring G′ by means of a pan, s. (Shown in Figs. 1 and 7.) The rock-shaft will, by these means, communicate an oscillating motion to the ring G′, which will in turn transmit a rotating motion to the disk H, as above described. In these movements it will be necessary that the parts be properly timed, so that they will operate harmoniously and bring the pockets in succession directly under the tools. The spring latch-piece R, (shown in Figs. 1 and 3,) secured to the frame A at one end and bearing against the circumference of the disk H at its other end, is intended to retain this die-plate H in position during the downward stroke of the punching and stamping or cutting tools. The nosing on the end of the latch R catches into the notches t t, which are made in the circumference of the disk H, and prevents this disk from revolving backward, in consequence of the friction occasioned by the inclined planes e e' acting upon each other in the movement of the ring G′.

The operation of my machine is as follows: Motion is communicated to the driving-shaft B from any convenient prime mover, and this shaft is rotated in the direction of the arrows indicated in Figs. 1 and 7. The cam B^2 acts upon the middle joints of the toggles D D D′ D′, extends these joints, and forces the follower E downward and brings the tools J J′ K K′ into operation. During this descending stroke of the follower E the transverse rod p of the yokes C C′ acts upon the arm P to draw the ring G′ back, in the direction of the arrows indicated in Fig. 1, the distance of one notch, (or of the length of one inclined plane, e,) the spring-latch R holding the disk H and preventing it from moving with the ring. When the tools have performed their work, the next operation is to elevate them, which is done by the segment b^2 acting upon the segment b' on the yoke C C′ and contracting the toggles, as represented in Fig. 7. During this operation the cam B^2 operates upon the rod N^2, thrusts this rod outward, and causes the arm P to move the ring G′, and with it the disk H, a sufficient distance to bring new pockets g under the tools J J′ K K′. These operations are repeated at every full revolution of the main shaft B, bringing the pockets g g in succession directly under the tools.

The operation of the tools J J′ K K′ is as follows: A bar of metal from which the nuts are to be cut is entered upon the table L and pressed forward against the stop-ledge l', over the cutting-die k. The square end of the cutter J descends, cuts off a square piece, and pushes this piece into one of the pockets g, which is directly under the die k. In the upward motion of the tools the die-plate H is carried forward and presents a new pocket g, to receive another piece of iron. The next downward stroke of the tools punches and presses the blank into shape, and in this way, after the first blank is cut, the punching and cutting take place at every descending stroke of the tools. After the punching and swaging tools have performed their work, either one of the cams G^2 raises the cubical block g' in the pockets g to a level with the surface of the die-plate H, and thrusts out the nuts, which are then removed from the die-plate in any suitable manner.

I wish it to be distinctly understood that in

my machine the severing of the blanks from the rod is not performed on the face of the die-carrying disk H. These blanks are produced on the end of the table L, and made slightly smaller than the recesses in the pockets *g*, so that the blanks will drop loosely into the pockets and afterward be swaged out, compressed, and perforated by the single tool K or K′. Then the cams G^2 act upon the blocks *g′* and push the finished nuts out of the pockets.

This machine is not merely a double machine, performing two similar operations at one and the same time; but the office which the secondary cutter and punch perform is not only to produce the nuts, but it will be seen that they balance the head B′, and also the bed-plates and die-plates, so that the machine will work easily and perfectly true. This is more especially necessary from the fact that the punches as well as the cutters must work truly in order to work at all, and if the resistance was all upon one side of the machine, which would be the case if only one set of tools were used, there would necessarily be a rapid wearing away on one side of the guide E, and in a short time the tools would be inclined out of their perpendicular position.

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

1. In a machine for making perforated nuts or washers, combining a stationary bed, G, with one or more cams, G^2, on its working-face, a rotating die-carrying disk, and a horizontally-oscillating and vertically-sliding ring, G′, substantially as and for the purpose set forth.

2. In a machine for making perforated nuts or washers, providing the groove *i*, in and around the under side of the die carrying disk H, substantially as and for the purpose set forth.

3. Punching nuts or washers upon the top of perforated sliding die-boxes *g′*, and within inclosing and supporting walls of the dies of the rotating disk, substantially as and for the purpose set forth.

4. Both swaging and punching nuts or washers at one operation upon the top of perforated sliding die-boxes *g′* of a rotating disk, H, while the metal out of which the nut is formed is inclosed by the walls of the die, substantially as and for the purpose set forth.

5. The combination, in a machine which makes perforated nuts or washers, of two perforated disks, G H, in such manner that the die-boxes *g′* are supported upon the disk G or its cams at all times, and throughout their entire circuit, and at the same time provision is made for the free discharge of the pieces punched out of the nuts or washers, substantially as described.

6. In a machine which makes perforated nuts or washers, constructing the bed G with a hub, in combination with the fitting of the bed and the die-carrying disk together by means of a screw or screws and a spring, substantially as and for the purpose set forth.

7. Fitting the ring G′ to the bed G and upon springs, substantially as and for the purpose set forth.

8. Constructing the die-carrying disk of a machine which makes perforated nuts or washers with inclines *e′* and notches *t*, in combination with the constructing of the ring G′ with inclines *e*, substantially as and for the purpose set forth.

9. The combination, in a machine which makes perforated nuts or washers, of a rock-shaft, N, retaining-catch R, inclines *e e′*, and notches *t*, substantially as and for the purpose set forth.

10. The combination, in a machine which makes perforated nuts or washers, of the rock-shaft N, retaining catch R, notches *t*, inclines *e e′*, cams G^2, and movable perforated die-boxes *g′*, substantially as and for the purpose set forth.

11. The combination, in a machine which makes perforated nuts or washers, of the flat or plain end cutting-tool K, and a table, L, which has a stationary inclosed guiding and cutting die formed in it, substantially as and for the purpose set forth.

12. In a machine which makes perforated nuts or washers, the table L, with its die *k* constructed in it, arranged over the die-carrying disk H, and in the relation described to the pockets *g*, and so that it forms an independent or auxiliary die, and an inclosing-guide for truly delivering the blanks into the pockets, substantially as set forth.

13. A stationary die-table, L, with ledges *l l′* and guide-die *k*, for use in connection with machines which make perforated nuts or washers, substantially as set forth.

14. Producing the blanks from a strip of metal within an inclosed auxiliary die, and immediately delivering them therefrom into the pockets *g*, substantially as and for the purpose set forth.

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Witnesses:

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