No. 642,310. Patented Jan. 30, 1900.

F. A. ERRINGTON.

AUTOMATICALLY OPENING OR CLOSING DIE.

(Application filed Nov. 17, 1898.)

(No Model.)

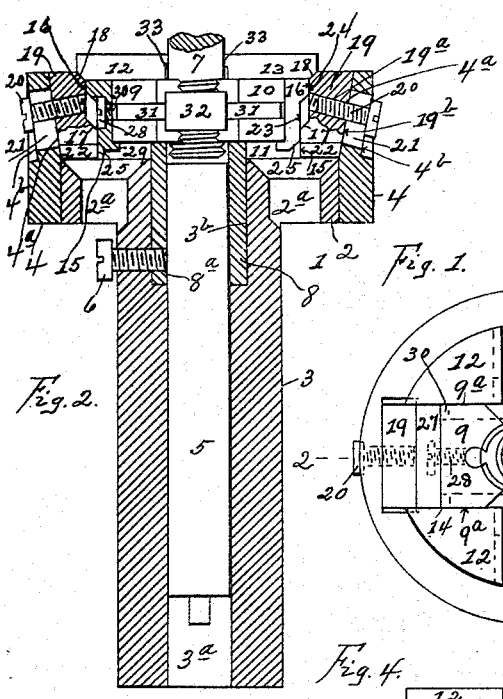


Fig. 1.

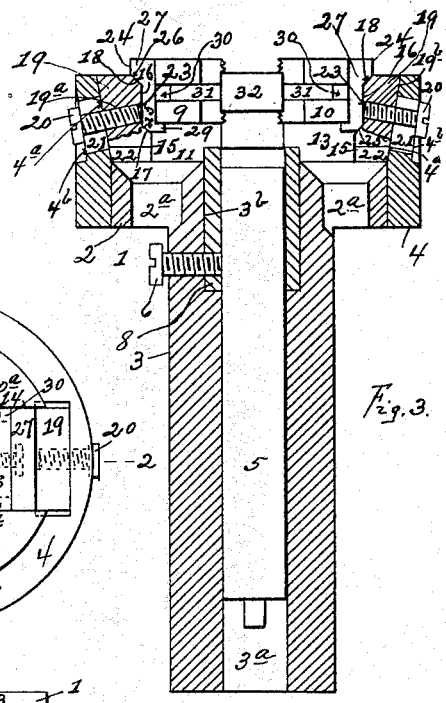
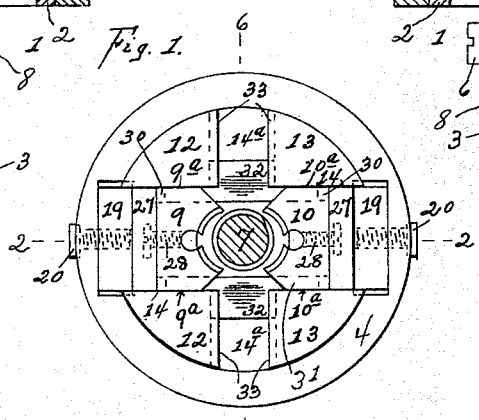


Fig. 3.

Fig. 2.



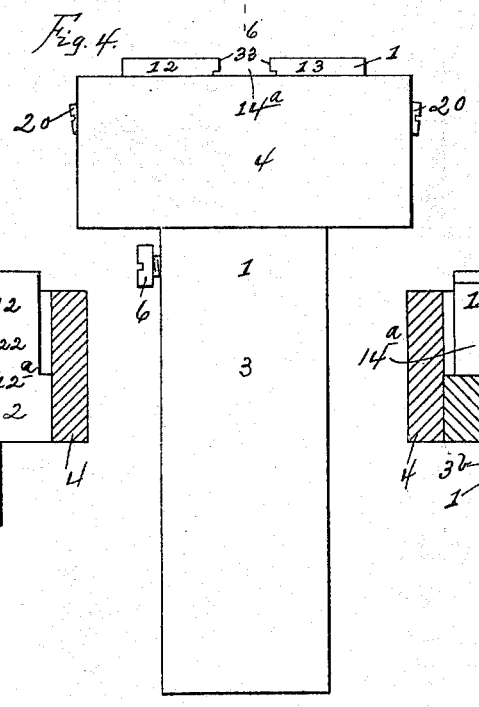


Fig. 4.

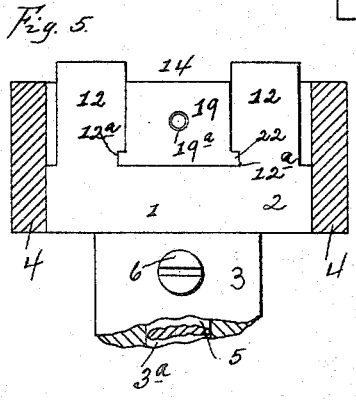


Fig. 5.

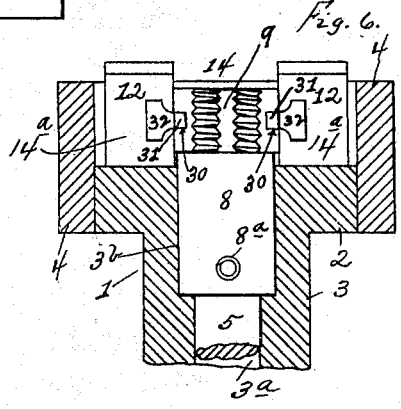


Fig. 6.

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FRANKLIN A. ERRINGTON, OF NEW YORK, N. Y.

AUTOMATICALLY OPENING OR CLOSING DIE.

SPECIFICATION forming part of Letters Patent No. 642,310, dated January 30, 1900.

Application filed November 17, 1898. Serial No. 696,743. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN ALFRED ERRINGTON, a citizen of the United States, residing in New York city, borough of Richmond, (Stapleton P. O.,) State of New York, have invented certain new and useful Improvements in Automatically Opening or Closing Dies, of which the following is a specification.

My improvements relate to thread-cutting tools the dies of which are adapted to have sufficient axial and lateral movement independently of their supporting-body to close and open by coaction with the work or article upon which they cut threads; and the object of my invention is to provide a simple, practical, and efficient tool of the character described, wherein when the work is pressed against the cutting-dies, or vica versa, they will close to the operative position, and when threads are cut upon the work and the axial movement of the work into the body is arrested the continued rotation of the dies or of the work will cause the dies to move outwardly axially of the supporting-body during operation, cutting their way along the work until the external thrust-faces of the dies thus automatically pass out of engagement with the internal thrust-faces of the supporting-body, whereupon said dies will automatically expand laterally of the supporting-body to permit the separation of the work and dies without stopping or changing the direction of rotation of the rotative member; and the invention consists in the novel details of improvement and the combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is an end view of a device embodying my invention, showing the parts in the open position, affording clearance between the dies for the removal of the work. Fig. 2 is a section on the line 2 2 in Fig. 1, the dies being shown in the closed or cutting position, the work and dies being mostly in full lines. Fig. 3 is a similar view, the dies being in the inoperative or open position, the work being removed. Fig. 4 is a side elevation of Fig. 1, looking in the same direction as Fig. 2. Fig. 5 is a detail view looking from the left in Fig. 4, the side walls of the adjusting-ring being shown in section; and Fig. 6 is a section on the line 6 6 in Fig. 1.

Similar numerals of reference indicate corresponding parts in the several views.

1 indicates, in general, the supporting-body of the device, which is adapted for connection with either the turret or the live spindle of a lathe or similar machine. The body comprises a head or plate 2 and a shank 3 for connection with a driving or supporting part. An adjusting ring or sleeve 4 surrounds the head 2 and is preferably arranged to have movement in and out along the same. The parts 2 and 4 may be held rigidly together in different positions by suitable means, but preferably as hereinafter set forth. By preference the head 2 has one or more openings 2^a for the escape of chips or cuttings. The shank 3 is preferably provided with an axial bore 3^a, opening through the head 2, and in this bore is located an axially-adjustable stop or plug 5, which may be held in an adjusted position by a screw 6, threaded in the shank 3 and adapted to bear on said stop. This stop acts to limit the distance that the work 7 can pass into the device. Concentric with the bore 3^a is an abutment 8, that projects from the face of head 2 to engage the inner faces of cutting-dies 9 10, so as to limit the inward movement of the latter, whereby they are arrested in the thread-cutting position and whereby also a clearance or space 11 is provided in which chips or cuttings may collect in their passage to the openings 2^a and, furthermore, to prevent said chips or cuttings from interfering with the proper inward movement of the dies. I have shown the abutment 8 in the form of a piece of tubing located in a counterbore 3^b at the entrance to bore 3^a, the screw 6 passing through said sleeve 8 by aperture 8^a to fasten said sleeve to shank 3.

The dies 9 10, whose cutting-teeth may be of usual or suitable construction, are provided with parallel sides 9^a 10^a, respectively, (see Fig. 1,) which dies lie between pairs of abutments or jaws 12 12 and 13 13, carried by body 1, (see Figs. 1 and 5,) whereby said dies are guided in their movement axially and laterally of the body 1. Said abutments or jaws 12 12 13 13 also connect the dies to rotate in unison with said body 1. The jaws 12 12 13

13 have side walls parallel to the walls 9^a 10^a of the dies 9 10. (See Fig. 1.) The jaws 12 12 13 13 are longer than the thickness of the dies 9 10, so that the latter can have axial movement along the former. Said jaws 12 12 13 13 have ways 14 14^a between them, the dies lying in the way or chamber 14 and the way 14^a being for a purpose hereinafter explained. While the projections or jaws 12 12 13 13 may be in separate pieces properly secured to the head 2, I preferably form them integral with said head and form the ways 14 14^a at right angles between them. The dies are preferably so arranged that the cutting faces or teeth will be concentric with bore 3^a when in the operative position. By preference the periphery of head or plate 2 is circular, so that the ring 4 may encircle said head and its jaws 12 12 13 13, said ring strengthening said jaws.

The main purpose of my invention is to cause the dies 9 10 to contract or approach each other to the operative or cutting position and to expand or move away from each other to the inoperative or work receiving and releasing position. I provide means whereby this opening and closing of the dies can be effected by and during their movement axially of the body and for this purpose have shown the body 1 as provided with internal thrust-faces 15 16, provided with associate cam-faces 17 18, the opposed internal thrust-faces 15 being nearer together than the opposed internal thrust-faces 16, (see Figs. 2 and 3,) or, in other words, the planes of the inner internal thrust-faces 15 are within the planes of the outer internal thrust-faces 16. Thus the opposed internal thrust-faces 15 16 and their associate cam-faces 17 18 provide a die-chamber divided into sections or portions of different diameters, the outer portion of said chamber being of greater diameter than the inner portion thereof. I preferably form the faces 15 16 17 18 upon adjusting-blocks 19 instead of integral with body 1, (see Fig. 5,) as it is desirable that said blocks be adjustable toward and from each other independent of said body; also, by this means said internal thrust-faces 15 16 may be parallel with each other and with the axis of body 1 in all positions when adjusted, and for this purpose the ring 4 and blocks 19 are adjustably connected together by screws 20, which pass through slots 21 in ring 4 and into threaded apertures 19^a in blocks 19, (see Figs. 2 and 3,) the inner faces of the heads of said screws 20 thus providing abutments to coact with the outer surface of ring 4, as hereinafter explained. By this means the ring 4 can be adjusted axially of the body and held in any desired position thereupon. In order to hold the blocks 19 from moving axially of the body 1, I have shown said blocks as provided on opposite sides with flanges 22, that lie in grooves or undercut recesses 12^a in the abutments or jaws 12 and similarly in the abutments or jaws 13, (see Fig. 5,) whereby said blocks may have movement laterally of the body 1 to regulate the working diameter of the die-chamber 14 to adjust the distance between the cutting edges of the dies. In order to give the blocks 19 movement both toward and from each other, I have shown the outer faces of said blocks beveled or tapered from the inner end of said blocks outwardly, as at 19^b, and the opposed wall of the ring 4 correspondingly beveled or tapered at 4^a, whereby as the ring 4 is moved axially outwardly (the screws 20 being suitably slacked) the blocks 19 will be moved inwardly toward each other to decrease the diameter of the die-chamber, and when the ring 4 is moved inwardly of the body 1 I preferably arrange the parts so that the blocks 19 will thereupon be moved away from each other to increase the diameter of the die-chamber, and this last effect is secured in the following novel manner: The outer wall of the ring 4 where it coacts with the inner faces of the heads of the screws 20 is beveled or tapered at 4^b parallel to the inner tapered face 4^a. The ring 4 thus has external and internal tapered faces and the blocks 19 have external opposed faces 19^b and the inner face of the head of screws 20, so that when the ring 4 is moved axially of the body the blocks 19 will be moved laterally toward and from each other, respectively, as the ring 4 is moved outwardly or inwardly of the body 1.

The dies 9 10 are to bear against the opposed thrust-faces 15 16 of the die-chamber when the dies are in the closed or working position, as shown in Fig. 2, and to cause the dies 9 10 to move laterally of the die-chamber during their axial movement therein I have shown said dies as provided at their inner ends with cutting-faces and at their opposite ends with external thrust-faces 23 24, lying in different planes, the planes of the inner external thrust-faces 23 being within the planes of the outer external thrust-faces 24 to enable the die thrust-faces 23 24 to bear simultaneously upon the internal thrust-faces 15 16 during operation, and at the inner end of the face 23 of the dies I have preferably provided cam-faces 25 to coact with the cam-faces 17 of the blocks 19, and between the thrust-faces 23 24 of the dies I have provided cam-faces 26 to coact with the block cam-faces 18. It is obvious that in providing both the blocks and the dies with coacting cam-faces that are correspondingly beveled I do so to secure a more permanent set of cam-faces; but only one of said sets of cam-faces, as 17 18, need be beveled, and the thrust-faces 23 24 could terminate in straight edges and still coact with the cam-faces 17 18 to move the dies 9 10 laterally. When the dies 9 10 are pushed inwardly of the body 1, the thrust-faces 23 24 of said dies will bear against the body thrust-faces 15 16 of the blocks 19, as shown in Fig. 2, and said dies will be in their closed or working position to cut threads on work 7. From this it will be seen that each of the

dies 9 10 has two external thrust-faces, which keep the die in proper alinement and prevent tilting of the die while moving independently axially of its supporting-body 1 2. When the dies are moved outwardly, their inner external thrust-faces 23 will oppose the outer external thrust-faces 16 of blocks 19, as shown in Fig. 3, and as the distance between the faces 16 is greater than between the faces 15 the dies will expand or move apart rather than continue to cut threads on work 7, and the work 7 can be withdrawn. (See Fig. 3.) The beveled faces 17 18 coact with the faces 25 26 to move the dies 9 10 laterally toward each other when said dies are moved axially inwardly of the die-chamber. The arrangement is such that when the dies are in the position shown in Fig. 3 and they are next pressed against the work, or vice versa, the cam-faces of said dies and blocks 19 will move said dies laterally toward each other to the working position, (shown in Fig. 2,) whereupon threads will be cut upon the work as the dies or the work rotate. When the work reaches the stop 5, its axial movement into the device will be arrested, and the continued rotation of the device (or work) will cause the dies to wind outwardly on the threads cut upon the work independently of the internal body thrust-faces and continue cutting threads therein while moving outwardly until the inner and outer external thrust-faces 23 24 of the dies pass out of engagement with the inner and outer internal thrust-faces 15 16 of the blocks 19, whereupon the dies will expand automatically and the work can be withdrawn without stopping the rotation of the moving member or reversing the direction of rotation thereof. When the device is rotated and the work held from rotation, it is preferable to have a cam provided for each die to move it laterally; but when the device is stationary and the work rotates I may utilize gravity to assist in closing the dies, the upper die dropping sufficiently to engage the advancing work to be threaded, the pressure of the work against the upper die moving both dies inwardly in unison, in which case the bottom die only will require a cam to raise it over the shoulder or shoulders from the outer to the inner portions of the die-chamber. By preference I form the faces 23 24 25 26 of the dies 9 10 upon die-blocks 27, which are shown detachably connected with the dies, for which purpose I have shown screws 28 passing through apertures in said blocks and meshing with threads in tapped holes in the dies 9 10. (See Figs. 1 and 2.) The blocks 27 are each shown provided with a projection or lip 29 to prevent the independent rotation of the die-block upon the die, and thereby loosening the screws 28. The screws 28 can be loosened and the dies 9 10 reversed thereupon when the outer cutting-teeth become worn, so that the inner teeth can become the outer ones.

The outward axial movement of the dies along the abutments or jaws 12 12 13 13 is preferably limited to retain the dies within the die-chamber, and at the same time the dies are to be held in line with each other and yet allowed lateral movement independent of each other. For this purpose I have shown the outer walls 9^a 10^a of the dies 9 10 as provided with grooves 30, which aline, Figs. 1 and 3, and in which are located slip pieces or bars 31, whereby said dies may slide along said bars, Figs. 1, 3, and 6, and at the central portions of said bars I have preferably shown alining pieces or enlargements 32, which lie in the way 14^a between the adjacent abutments or jaws 12 13, Fig. 1, whereby said enlargements may slide axially in and out along said abutments or jaws to guide the dies 9 10.

33 are lips at the outer ends of the abutments 12 13, which overhang the recess or way 14^a and act as stops to the alining-pieces 32 to limit their outward movement. By this means the dies 9 10 are connected together to move axially of body 1 in unison, whereby their cutting edges are held in proper relative position, and yet said dies can have independent lateral movement toward and from each other, and the enlargements 32 and the stops 33 limit the outward movement of said dies and hold their cutting edges in axial alinement with the bore 3^a.

By means of the lateral adjustment of the blocks 19 the cutting diameter of the dies can be adjusted within certain limits, and the adjustment of the stop 5 determines the length of the thread cut upon the work, although this length may be varied by other means that arrest the advance of the work into the device.

Having now described my invention, what I claim is—

1. The combination with a supporting-body provided with adjusting-blocks having internal thrust-faces, means to adjust said blocks relatively to each other laterally of said body, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, substantially as described.

2. The combination with a supporting-body provided with adjusting-blocks having internal thrust-faces, means to adjust said blocks relatively to each other laterally of said body and means to hold said blocks from movement axially thereof, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of

said body during operation independently of said internal thrust-faces, substantially as described.

3. The combination with a supporting-body provided with adjusting-blocks having internal thrust-faces and being adjustable relatively to each other laterally of said body, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and a ring movable along said body and adapted to adjust said blocks laterally thereof, substantially as described.

4. The combination with a supporting-body provided with adjusting-blocks having internal thrust-faces and being adjustable relatively to each other laterally of said body, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, one of said thrust-faces being provided with an associate cam-face to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

5. The combination with a body provided with adjusting-blocks having inner and outer internal thrust-faces, the planes of said inner thrust-faces lying within the planes of said outer thrust-faces, and means to adjust said blocks relatively to each other laterally of said body, of a plurality of dies provided at their ends opposite their cutting-faces with inner and outer external thrust-faces that respectively bear simultaneously upon said inner and outer internal thrust-faces during operation, said dies being connected with said body to rotate in unison therewith and movable laterally thereof independently of said blocks, substantially as described.

6. The combination with a body provided with adjusting-blocks having inner and outer internal thrust-faces, the planes of said inner thrust-faces lying within the planes of said outer thrust-faces, and said planes being parallel with each other and with the axis of said body, and means to adjust said blocks relatively to each other laterally of said body, of a plurality of dies provided at their ends opposite their cutting-faces with inner and outer external thrust-faces to respectively bear simultaneously upon said inner and outer internal thrust-faces during operation, said dies being connected with said body to rotate in unison therewith and movable laterally thereof independently of said blocks, substantially as described.

7. The combination with a supporting-body provided with internal thrust-faces, of a plurality of independent dies connected with said body to rotate in unison therewith and movable laterally thereof and having die-blocks secured to their ends opposite their cutting-faces, said die-blocks being provided with external thrust-faces that bear against said internal thrust-faces during operation and being movable axially of said body during operation independently of said internal thrust-faces, substantially as described.

8. The combination with a supporting-body provided with internal thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and having their ends opposite their cutting-faces centrally secured to die-blocks, said blocks being provided with external thrust-faces that bear against said internal thrust-faces during operation and being movable axially of said body during operation independently of said internal thrust-faces, the abutting surfaces of said dies and blocks corresponding with each other on both sides of the center of their connection to render said dies reversible upon said blocks, substantially as described.

9. The combination with a supporting-body provided with internal thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and having their ends opposite their cutting-faces centrally secured to die-blocks, said blocks being provided with external thrust-faces that bear against said internal thrust-faces during operation, the abutting surfaces of said dies and blocks corresponding with each other on both sides of the center of their connection to render said dies reversible upon said blocks, each of said blocks and its associate die being held from independent movement with relation to each other by one having a projection to engage the other thereof, substantially as described.

10. The combination with a supporting-body provided with abutments having a chamber between them whose end walls provide internal thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable between said abutments axially of said chamber during operation independently of said internal thrust-faces, substantially as described.

11. The combination with a supporting-body provided with abutments having a chamber between them, adjusting-blocks provided with internal thrust-faces and connected with said abutments so as to permit said blocks to move laterally of said chamber and to hold said blocks from moving axially thereof, means to adjust said blocks laterally of said body, of a plurality of dies connected with

said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable between said abutments axially of said chamber during operation independently of said internal thrust-faces, substantially as described.

12. The combination with a supporting-body provided with internal thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and said dies being connected together to move axially of said body in unison and laterally thereof independently by a slip-piece, and means to aline said slip-piece with the axis of said body, substantially as described.

13. The combination with a supporting-body provided with internal thrust-faces and having abutments with intersecting ways therebetween, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and situated in one of said ways and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and a slip-piece connecting said dies together to move in unison axially of said body and laterally thereof independently, said slip-piece being provided with an alining-piece situated in and movable along the other of said ways, substantially as described.

14. The combination with a supporting-body provided with internal thrust-faces, and having abutments with intersecting ways therebetween, a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and situated in one of said ways and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and a slip-piece connecting said dies together to move in unison axially of said body and laterally thereof independently, said slip-piece being provided with an alining-piece situated in and movable along the other of said ways, one of said ways being provided with an overhanging flange to limit the outward movement of said dies axially of said body, substantially as described.

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