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(54) Title: A UNIVERSAL KEY MAKING DEVICE

(57) Abstract: The invention relates to a single key making device that is capable of clamping and cutting any of a group of keys from a plurality of the main classes of keys which includes any two or more cylinder keys, bit keys, laser keys, and special multi-angled keys.

TECHNICAL FIELD

This invention generally relates to methods and apparatus for key making. More particularly, the invention is a universal key making machine that makes the 4 popular types of keys (the "main keys') in the world on a single machine.

BACKGROUND OF THE INVENTION

For hundreds of years prior to 1844 nearly all locks used a skeleton type key, which is also called a bit or double bit key. These keys are still popular in many parts of the world. The machine that makes bit keys uses a flat cutting wheel to cut the square notches typical in these keys and the machine has not changed in principle for hundreds of years except for being powered by an electric motor when that became available.

In 1844, Linus Yale Sr. patented a new lock based on movable pins that held the bolt in place until they were raised by a small flat key with "v" shaped notches. By the middle of the 20th century this pin tumbler lock and its convenient small flat key were very popular and in fact became the world's standard for cars, homes and padlocks around the world. Often this key is referred to as a "Yale type key" or "blade key". It is the key that people around the world are most familiar with.

To duplicate a "Yale type key" it required a new kind of key making machine which used a "V" shaped trace cutting wheel to match the "v" shaped notches instead of the flat "slotting" wheel on a bit key machine that cut square notches. This resulted in two different machines to cut the two types of keys. This began a tradition of creating a new type of key cutting machine for each new type of lock.

In the late 1970 and the early 1980's a movement began, by European insurance companies and car manufacturers, to improve locking systems by creating new types of locks and their corresponding new types of keys because cars equipped with "Yale type" keys were being picked or by-passed and stolen in the west and shipped to a ready market in the formerly closed satellite countries of the USSR.

As car manufacturers installed these new types of locks in their cars, a corresponding proliferation of matching new key cutting machines where sold to locksmiths shops. These types of security keys also extended to the house and small lock market. In the end, a typical locksmith shops went from 2 different types of key cutting machines (bit keys and Yale type keys) in 1950 to 20 or more machines by the beginning of the 2002.

Each of these 20 machines can be more or less automatic, and/or they can cut by code or cut by trace cutting. However, there are 4 main basic classes of key machines which cut a particular class of key and no other class without changing cutting wheels or reconfiguring the fixturing mechanism on the machine. Regardless of how automatic a machine is or whether it makes keys by code or by trace cutting, it can make only one class or type of key and not the other three types.

The four main classes of keys are as follows:

1) ***Cylinder keys*** or V cut keys are keys cut on one side like a standard Yale or on two sides like a Ford automobile key. These keys use trace cutting wheels for trace cutting a key, as on Silca Bravo Super at:

http://www.silca.it/download/brochure/eng/KeyMachines/bravogbD01.pdf,

or

Silca Unocode key cutting machines for electronic code cutting at: http://www.silca.it/download/brochure/eng/KeyMachines/399gbD01.pdf, or these keys can be cut using a form cutting wheel, like on an Silca Formula X or HPC code cutting machines.

2) ***Bit keys***. Also called square notched, mortice keys, lever keys, or skeleton keys, and including double bit keys. To cut these keys you need a slotter wheel (or simply a slotter) like the Silca Tech 3 Europa at: http://www.silca.it/download/brochure/eng/KeyMachines/techgbD01.pdf.

3) Special multi angle keys, also called square notch with angle keys, include Tibbe, Abloy, Ford Chubb, and Ford FO 19 keys. These keys are made on machines such as the Silca Delta 2000 MC Multi Copy at: http://www.silca.it/download/brochure/eng/KeyMachines/delmcgbD01.pdf

4) Laser keys, also called side milled keys, end mill keys, or milled keys, including dimple keys which can be cut on the same machine by changing the cutting tool from a flat milling tool to a round tool that just plunges into the key to make a dimple as opposed to a winding groove like on Mercedes keys and tubular keys which use an end miller cutter and a different fixture. These types of machines use various end mill tools or dimple tools as on a Silca Quattrocode at: http://www.silca.it/download/brochure/eng/KeyMachines/4codegbD01.pdf.

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Alternative technology to the present invention is available in the form of the foregoing specialized key making machines, each with its own specialized cutting

wheels and fixtures. There has been, until now, no key cutting device that could cut any two of these classes of keys in a single machine. To alleviate this problem, and others which will become apparent from the disclosure which follows, the present invention conveniently provides a universal key making machine that makes the 4 popular types of keys (the "main keys') in the world on a single machine.

The citation of the foregoing publications is not an admission that any particular publication constitutes prior art, or that any publication alone or in conjunction with others, renders unpatentable any pending claim of the present application. None of the cited publications is believed to detract from the patentability of the claimed invention.

ADVANTAGES OF THIS INVENTION

The key machine art has taught us that each lock manufacturer has adopted one of 4 main basic types of locks and corresponding keys to open that lock. The types are: 1) Cylinder keys sometimes referred to as V cut keys, 2) Bit keys sometimes referred to as Square notched keys, 3) Special multi-angled keys sometimes referred to as Square notch with angle keys, and 4) Laser keys sometimes referred to as end milled keys.

Various lock manufacturers mass produce these 4 types of locks and at the same time mass produce a corresponding matching set of 2 or more original keys for each lock on a large, industrial, , high speed biting machine costing upwards of $100,000. These are dedicated machines that are set up to make not only that specific type of key, but also a single key profile and specific blank with a rubber handle for instance. These industrial machines typically produce an original, code cut key at the rate of 10 or more per minute.

After these locks and keys are put in the market place and sold to retail customers in such applications as cars, houses, offices, small locks, etc.. any additional duplicate keys needed by the customer have to be made on a smaller, key duplication machine that duplicates each individual key one at a time in 1 to 5 minutes. Various key machine manufacturers have built specific small key duplication machines for each of these 4 types of keys. Within each of these 4 types of key machines there are automatic options available that correspondingly cost more or less depending on how automatic the operation is. But, regardless of how automatic the machine is, it will still only cut the one type of key it was designed for. Another option, within the 4

types of key machines, is the ability to cut by code, which can also be more or less automatic with correspondingly higher and lower prices. But, regardless of such options, the machines still only cut the one type of key the machine was designed for. For example a # 4 End mill machine that is fully automatic and cuts by code is sold by the Silca division of ILCO UNICAN for over $20,000. But, a manual End Mill machine that cuts by code is only $5,000. While a manual End Mill machine that does not cut by code is only $2,000. But regardless of price or options, each machine only cuts its own type of key. So, for each of the 4 types of key machines, there are many options and a wide range of prices. But, each machine only makes it own type of key. Today 100's of thousands of these machines are found in locksmith shops and the like.

The advantage of the present invention is that it can automatically cut any two or more of the 4 types of keys without changing a cutting wheels, changing the fixturing (i.e. manner of clamping) or changing key cutting machines altogether.

The advantages of a universal, all in one machine is that it is an easy to use and replaces 20 or more models of key cutting machines that are difficult to learn because each has its own set of instructions. With the present invention, there is a one time learning process that covers all 4 types of keys.

Also, having many machines instead of one makes it difficult to maintain because each machine has to be calibrated periodically on an individual basis. With the present invention, a single machine is calibrated once, but makes all the 4 types of keys.

Also, Retail floor space is expensive and so another advantage is that this one machine replaces many machines using less of the valuable retail floor space.

These together with other objects of the invention, along with the various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

Still other advantages will be apparent from the disclosure that follows.

SUMMARY OF THE INVENTION

The invention relates to a single key making device with means for clamping any of a group of keys, and means for cutting any preselected key from the plurality of the main classes of keys, with the group of keys having a plurality of the main classes of keys and the main classes of keys.

A means for supporting one of any preselected key is provided, as well as a means for cutting and a means for clamping. The means for supporting is independently moveable relative to the means for cutting. Additionally, the means for supporting may be independently moveable relative to the means for clamping during the cutting procedure.

Additionally, the means for cutting of the present invention may further include means for cutting a multi-angled key which has a blade. The means for cutting a multi-angled key is free of the means for supporting the blade during the cutting procedure. Furthermore, the means for clamping includes means for clamping

a multi-angled key to be cut which is independently moveable relative to the means for cutting.

Furthermore, the means for clamping may further comprise means for clamping a mill cut key with a blade to be cut on both side. The means for cutting will includes means for cutting a mill cut key, and the means for clamping is independently moveable relative to the means for cutting. The blade can be cut on both sides without re-fixturing the mill cut key in the means for clamping.

There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject matter of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWING

Preferred embodiments of the invention are described hereinafter with reference to the accompanying drawing wherein:

Fig. 1 is a perspective view of the universal cutting device of the present invention showing the means for cutting any preselected key from a plurality of main classes of keys showing the means for cutting having a slotter, a circular cutting wheel and mill cutter with supporting anvils on each side of the circular cutting wheel, respectively supporting cuts on either side of the blade of the key, and with independently movable anvils supporting the laser key which is cut by the end mill cutter;

Fig. 2 is a detailed fragmentary perspective view of the universal cutting device of the present invention showing a laser key being supported by an anvil and having a groove cut therein by an end mill cutter;

Fig. 3 is a illustration of the use of a slotter to cut a blade of a multi-angled key for making cutting contact with the blade and the slotter at a plurality of discrete tangential locations;

Fig. 4 is a fragmentary perspective view showing a multi-angled key being positioned by the means for clamping to be cut by the slotter;

Fig. 5 is a fragmentary perspective view of the movable means for clamping;

Fig. 6 is a fragmentary perspective view of a bit key being positioned to be cut by the slotter;

Fig. 7 is a fragmentary perspective view of a cylinder key being positioned to be cut by the circular cutting wheel; and

Fig. 8 is a block diagram of the electronically related components of the key making device.

DETAILED DESCRIPTION OF THE INVENTION

The preferred embodiments depicted in the drawing comprise a single key making device with means for clamping any of a group of keys, and means for cutting any preselected key from the plurality of the main classes of keys, with the group of keys having a plurality of the main classes of keys and the main classes of keys including any two or more cylinder keys, bit keys, laser keys, and special multi-angled keys

Without departing from the generality of the invention disclosed herein and without limiting the scope of the invention, the discussion that follows, will refer to the invention as depicted in the drawing.

The preferred embodiments of the apparatus depicted in Figs. 1-8 of the drawing comprise a key making device comprising means for clamping 5 any of a group of keys, and means for cutting 4 any preselected key from the plurality of the main classes of keys. The group of keys has a plurality of the main classes of keys. The main classes of keys includes any two or more cylinder keys 18, bit keys 16, laser keys 14 and special multi-angled keys 12.

Preferably, the means for cutting 4 includes produces a control signal 22 indicative of a first cut from a first of one of any preselected key from the plurality of the main classes of keys, and cutting a first corresponding cut in another of the one of any preselected key from the plurality of the main classes of keys using the control signal 22 indicative of the first cut, as shown in Fig. 8.

The means for clamping 5 may comprise a clamp (or jaw) 6 have a pair of opposing jaws, as best seen in Fig. 5. The preselected key may have a blade 7 and the

opposing jaws operatively engage the blade 7 of any preselected key from the plurality of the main classes of keys.

Preferably, the means for cutting 4 comprises at least two of a slotter 1, a circular cutting wheel 2, and an end mill cutter 8.

The key making device of this important invention may further have means for supporting the blade 7 of a key, particularly the blade 7 of a laser key, during a cutting procedure. Uniquely, the means for supporting 9 is independently moveable relative to the means for cutting 4. Additionally, the means for supporting 9 may be independently moveable relative to the means for clamping 5 during the cutting procedure.

The means for cutting 4 of the present invention may further include means for cutting a multi-angled key which has a blade 7. The means for cutting a multi-angled key is free of the means for supporting 9 the blade during the cutting procedure. Furthermore, the means for clamping 5 includes means for clamping a multi-angled key to be cut which is independently moveable relative to the means for cutting 4.

Additionally, the means for clamping 5 may further comprise means for clamping a mill cut key with a blade 7 to be cut on both side. The means for cutting 4 will includes means for cutting a mill cut key, and the means for clamping 5 is independently moveable relative to the means for cutting 4. As can be appreciated when viewing Fig. 2, the blade 7 can be cut on both sides without re-fixturing the mill cut key in the means for clamping 5.

A preferred embodiment of the key making device comprises means for clamping 5 any of a group of keys, means for supporting the blade of any of the

cylinder keys 18, bit keys 16, and laser keys 14 during a cutting procedure, and means for cutting 4 the preselected key from the plurality of the main classes of keys. The group of keys has a plurality of the main classes of keys with each of the keys having a blade 7. The main classes of keys includes any two or more cylinder keys, bit keys, laser keys, and multi-angled keys.

The means for clamping 5 comprises a clamp 6have a pair of opposing jaws that operatively engage one of any preselected key from the plurality of the main classes of keys. The means for clamping 5 includes means for clamping a multi-angled key to be cut with the means for clamping a multi-angled key 12 being independently moveable relative to the means for cutting 4.

The means for clamping 5 further includes means for clamping a mill cut key with a blade 7 to be cut on both side and is independently moveable relative to the means for cutting 4. In this way, the blade 7 can be cut on both sides without re-fixturing the mill cut key in the means for clamping 5.

The means for supporting 9 the blade 7 of any of the cylinder keys, bit keys, and laser keys during a cutting procedure is independently moveable relative to the means for cutting 4, and independently moveable relative to the means for clamping 5 during the cutting procedure, as shown in Fig. 2. Additionally, the means for cutting 4 the preselected key from the plurality of the main classes of keys comprises at least two of a slotter 1, a circular cutting wheel 3, and an end mill cutter 8. The means for cutting 4 includes means for cutting a multi-angled key that is independent of means for supporting the blade during the cutting procedure, as shown in Fig. 4, and the means for cutting 4 includes means for cutting a mill cut key.

Preferably, the means for cutting 4 includes producing a control signal indicative of a first cut of a first of one of any preselected key from the plurality of the main classes of keys, and cutting a first complementary cut in another of the one of any preselected key from the plurality of the main classes of keys using the control signal indicative of the first cut.

Another embodiment of the key making device comprises means for cutting 4 a key having a blade 7, and means for supporting the blade during a cutting procedure. The means for supporting is independently moveable relative to the means for cutting 4, so that a blade 7 having a first area to be cut and a second area to be cut can be supported on a first side of the blade 7 by the means for supporting disposed in a first position while the first area of the blade 7 is being cut and on a second side of the blade by the means for supporting disposed in a second position while the second area is being cut, as shown in Figs. 1 and 2. It will be appreciated that the laser key can be cut with grooves on the top and bottom of the blade by the bottom and the top of the end mill cutter, respectively.

Additionally, the means for cutting 4 may include producing a control signal 22 indicative of a first cut of a first key, and cutting a first complementary cut in another of the first key using the control signal indicative of the first cut, as shown in Fig. 8.

Furthermore, the means for supporting 9 may comprise an anvil 2. Preferably, the anvil has a first surface transverse to a first contact surface of the means for cutting 4 and a second surface transverse to a second contact surface of the means for cutting 4. And the anvil may have a first surface normal to a first contact surface of the means

for cutting 4 and a second surface normal to a second contact surface of the means for cutting 4. In one preferred embodiment, as shown in Figs. 1-2, the anvil has a frame-like shape 2a with an inner contact surface 2b.

Another embodiment of the key making device comprises means for clamping 5 a key to be cut, with the key having a blade 7, and means for supporting 9 the blade 7. The means for supporting 9 is independently moveable relative to the means for clamping 5 during a cutting procedure. The key making device may further comprise means for cutting 4 that includes producing a control signal 22 indicative of a first cut of a first key, and cutting a first complementary cut in another of the first key using the control signal indicative of the first cut.

Additionally, the means for supporting may be independently moved into a position in which the blade 7 is supported prior to commencement of the cutting procedure.

Another embodiment of the key making device comprises means for cutting a multi-angled key and means for clamping 5 a multi-angled key to be cut. The multi-angled key has a blade 7. The means for cutting 4 is independent of means for supporting the blade during the cutting procedure. The means for clamping 5 is independently moveable relative to the means for cutting 4.

Preferably, the means for cutting 4 includes producing a control signal indicative of a first cut of a first multi-angled key, and cutting a first complementary cut in another of the first multi-angled key using the control signal indicative of the first cut.

As shown in Fig. 1, the means for cutting 4 may comprise a cutting wheel 3.

As shown in Figs. 1, 3-4 and 6, the means for cutting 4 may comprise a slotter 1. Each of a plurality of multi-angled cuts can be made to the blade 7 of the multi-angled key by making cutting contact between the blade 7 and the slotter at one of a plurality of discrete tangential locations along the periphery of the slotter 1, as illustrated in Fig. 3.

Referring to Fig. 2, another preferred embodiment of the key making device comprises means for clamping a mill cut key that has a blade 7 to be cut on both side, and means for cutting a mill cut key, where the means for clamping is independently moveable relative to the means for cutting 4, so that the blade 7 can be cut on both sides without re-fixturing the mill cut key in the means for clamping 5. Preferably, the means for cutting 4 includes producing a control signal indicative of a first cut of a first mill cut key, and cutting a first complementary cut in another of the first mill cut key using the control signal indicative of the first cut.

Additionally, the key making device may comprise an anvil (2, 2a) and the means for cutting 4 may include a cutting tool. The anvil 2a is independently moveable relative to both the means for clamping 5 and the cutting tool (i.e. the end mill cutter 8), as shown in Fig. 1.

While this invention has been described in connection with the best mode presently contemplated by the inventor for carrying out his invention, the preferred embodiments described and shown are for purposes of illustration only, and are not to be construed as constituting any limitations of the invention. Modifications will be

obvious to those skilled in the art, and all modifications that do not depart from the spirit of the invention are intended to be included within the scope of the appended claims. Those skilled in the art will appreciate that the conception upon which this disclosure is base, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scop of the present invention.

My invention resides not in any one of these features per se, but rather in the particular combinations of some or all of them herein disclosed and claimed and it is distinguished from the prior art in these particular combinations of some or all of its structures for the functions specified.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable

modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as being new and desired to be protected by Letters Patent of the United States is as follows:

1. A key making device comprising:

a. means for clamping any of a group of keys,

i. said group of keys having a plurality of the main classes of keys,

ii. said main classes of keys includes any two or more cylinder keys, bit keys, laser keys, and special multi-angled keys; and

b. means for cutting any preselected key from the plurality of the main classes of keys.

2. The key making device of claim 1, wherein the means for cutting includes producing a control signal indicative of a first cut from a first of one of any preselected key from the plurality of the main classes of keys, and cutting a first corresponding cut in another of said one of any preselected key from the plurality of the main classes of keys using the control signal indicative of the first cut.

3. The key making device of claim 1, wherein the means for clamping comprises a clamp having a pair of opposing jaws.

4. The key making device of claim 3, wherein the preselected key has a blade and wherein the opposing jaws operatively engage the blade of any preselected key from the plurality of the main classes of keys.

5. The key making device of claim 1, wherein the means for cutting comprises at least two of a slotter, a circular cutting wheel, and an end mill cutter.

6. The key making device of claim 1, further comprising means for supporting the blade during a cutting procedure that is independently moveable relative to the means for cutting.

7. The key making device of claim 6, wherein the means for supporting is independently moveable relative to the means for clamping during the cutting procedure.

8. The key making device of claim 1, wherein

a. the means for cutting includes means for cutting a multi-angled key,

i. said multi-angled key having a blade,

ii. said means for cutting a multi-angled key being independent of means for supporting the blade during the cutting procedure; and

b. the means for clamping includes means for clamping a multi-angled key to be cut,

i. said means for clamping a multi-angled key being independently moveable relative to the means for cutting.

9. The key making device of claim 1, wherein

a. the means for clamping includes means for clamping a mill cut key,

i. said mill cut key having a blade to be cut on both side; and

b. the means for cutting includes means for cutting a mill cut key,

i. said means for clamping being independently moveable relative to the means for cutting,

whereby, the blade can be cut on both sides without re-fixturing the mill cut key in the means for clamping.

10. A key making device comprising:

a. means for clamping any of a group of keys,

i. said group of keys having a plurality of the main classes of keys, with each of said keys having a blade,

ii. said main classes of keys includes any two or more cylinder keys, bit keys, laser keys, and multi-angled keys,

iii. said means for clamping comprises a clamp having a pair of opposing jaws and wherein the opposing jaws operatively engage one of any preselected key from the plurality of the main classes of keys,

iv. said means for clamping includes means for clamping a multi-angled key to be cut,

(1) said means for clamping a multi-angled key being independently moveable relative to the means for cutting,

v. said means for clamping includes means for clamping a mill cut key with a blade to be cut on both side,

(1) said means for clamping being independently moveable relative to the means for cutting,

whereby, the blade can be cut on both sides without re-fixturing the mill cut key in the means for clamping;

b. means for supporting the blade of any of the cylinder keys, bit keys, and laser keys during a cutting procedure is

i. independently moveable relative to the means for cutting, and

ii. independently moveable relative to the means for clamping during the cutting procedure; and

c. means for cutting the preselected key from the plurality of the main classes of keys,

i. said means for cutting comprises at least two of a slotter, a circular trace cutting wheel, and an end mill cutter,

(1) said the means for cutting includes means for cutting a multi-angled key that is independent

of means for supporting the blade during the cutting procedure, and

(2) said means for cutting includes means for cutting a mill cut key.

11. The key making device of claim 10, wherein the means for cutting includes producing a control signal indicative of a first cut of a first of one of any preselected key from the plurality of the main classes of keys, and cutting a first complementary cut in another of said one of any preselected key from the plurality of the main classes of keys using the control signal indicative of the first cut.

12. A key making device comprising:

a. means for cutting a key having a blade; and

b. means for supporting the blade during a cutting procedure,

i. said means for supporting being independently moveable relative to the means for cutting,

whereby, a blade having a first area to be cut and a second area to be cut can be supported on a first side of the blade by the means for supporting disposed in a first position while the first area of the blade is being cut and on a second side of the blade by the means for supporting disposed in a second position while the second area is being cut.

13. The key making device of claim 12, wherein the means for cutting includes producing a control signal indicative of a first cut of a first

key, and cutting a first complementary cut in another of said first key using the control signal indicative of the first cut.

14. The key making device of claim 12, wherein the means for supporting comprises an anvil.

15. The key making device of claim 14, wherein the anvil has a first surface transverse to a first contact surface of the means for cutting and a second surface transverse to a second contact surface of the means for cutting.

16. The key making device of claim 15, wherein the anvil has a first surface normal to a first contact surface of the means for cutting and a second surface normal to a second contact surface of the means for cutting.

17. The key making device of claim 16, wherein the anvil has a frame-like shape with an inner contact surface.

18. A key making device comprising:

a. means for clamping a key to be cut,

i. said key having a blade; and

b. means for supporting the blade,

i. said means for supporting being independently moveable relative to the means for clamping during a cutting procedure.

19. The key making device of claim 18, further comprising means for cutting that includes producing a control signal indicative of a first cut

of a first key, and cutting a first complementary cut in another of said first key using the control signal indicative of the first cut.

20. The key making device of claim 18, wherein the means for supporting is independently moved into a position in which the blade is supported prior to commencement of the cutting procedure.

21. A key making device comprising:

a. means for cutting a multi-angled key,

i. said multi-angled key having a blade,

ii. said means for cutting being independent of means for supporting the blade during the cutting procedure; and

b. means for clamping a multi-angled key to be cut,

i. said means for clamping being independently moveable relative to the means for cutting.

22. The key making device of claim 21, wherein the means for cutting includes producing a control signal indicative of a first cut of a first multi-angled key, and cutting a first complementary cut in another of said first multi-angled key using the control signal indicative of the first cut.

23. The key making device of claim 21, wherein the means for cutting comprises a cutting wheel.

24. The key making device of claim 23, wherein the cutting wheel is a slotter.

25. The key making device of claim 24, wherein each of a plurality of multi-angled cuts can be made to the blade of the multi-angled key by making cutting contact between the blade and the slotter at one of a plurality of discrete tangential locations along the periphery of the slotter.

26. A key making device comprising:

a. means for clamping a mill cut key,

i. said mill cut key having a blade to be cut on both side; and

b. means for cutting a mill cut key,

i. said means for clamping being independently moveable relative to the means for cutting,

whereby, the blade can be cut on both sides without re-fixturing the mill cut key in the means for clamping.

27. The key making device of claim 26, wherein the means for cutting includes producing a control signal indicative of a first cut of a first mill cut key, and cutting a first complementary cut in another of said first mill cut key using the control signal indicative of the first cut.

28. The key making device of claim 26, further comprising an anvil and wherein the means for cutting includes a cutting tool, said anvil being independently moveable relative to both the means for clamping and the cutting tool.

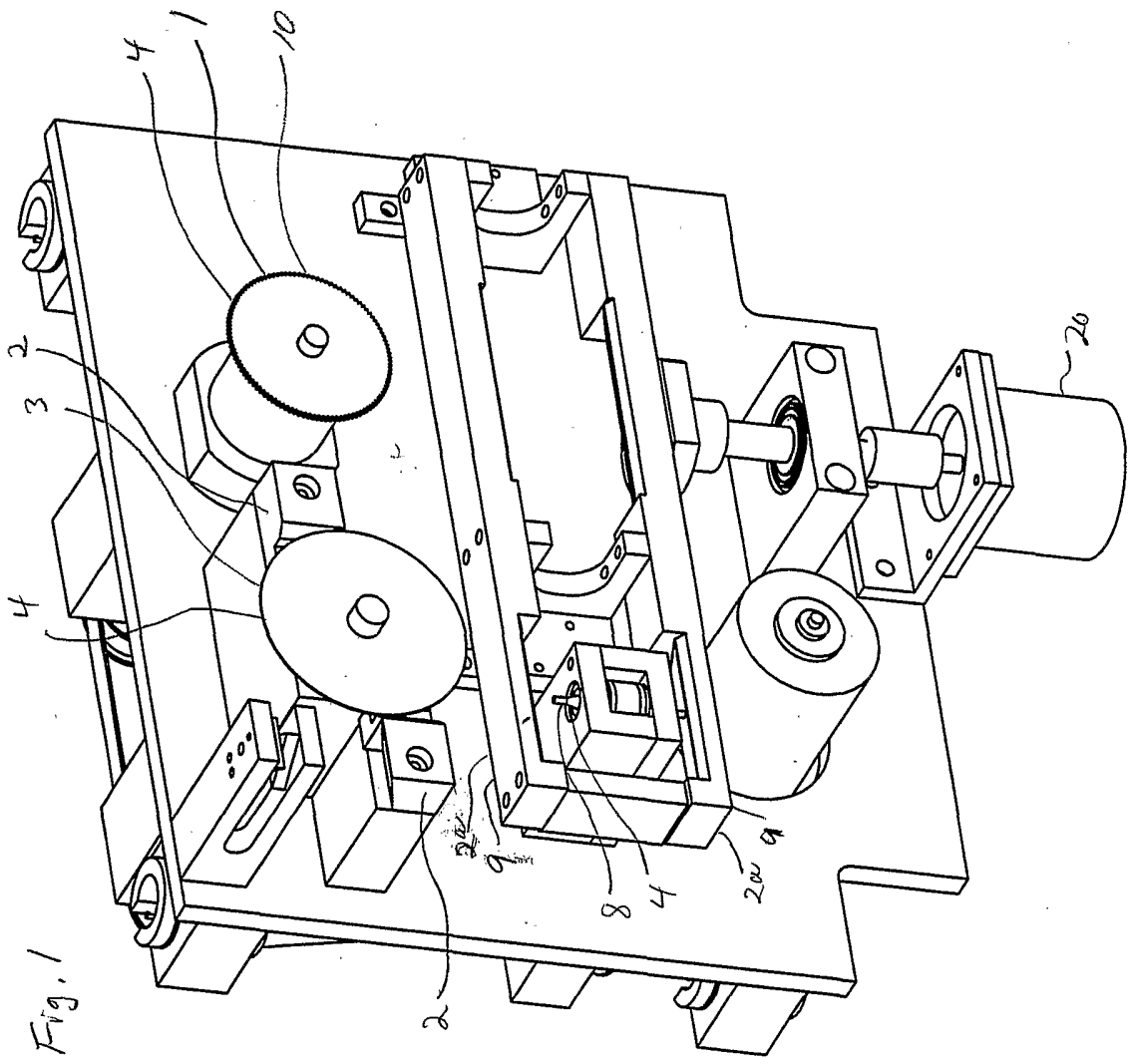


Fig. 1

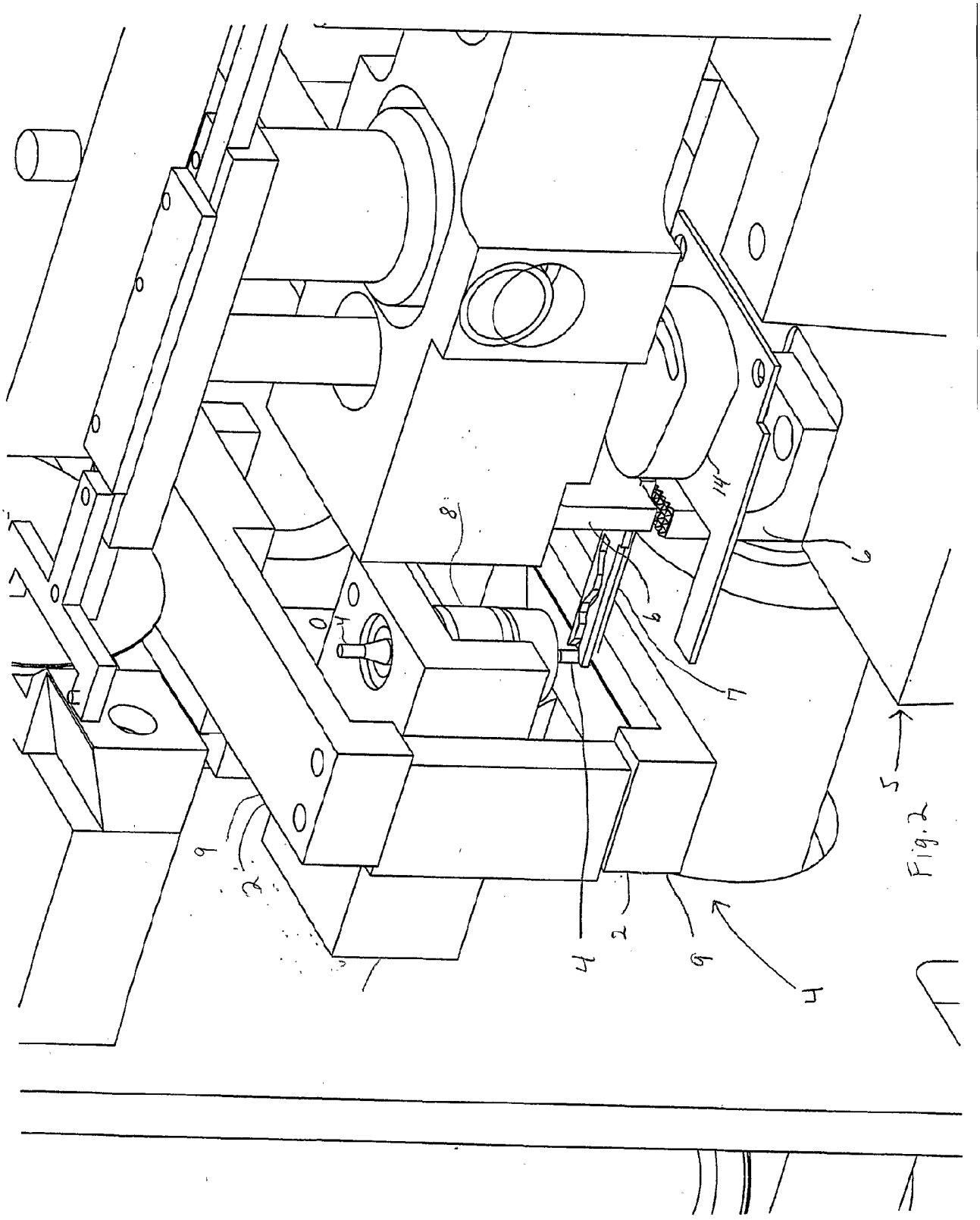


Fig. 2

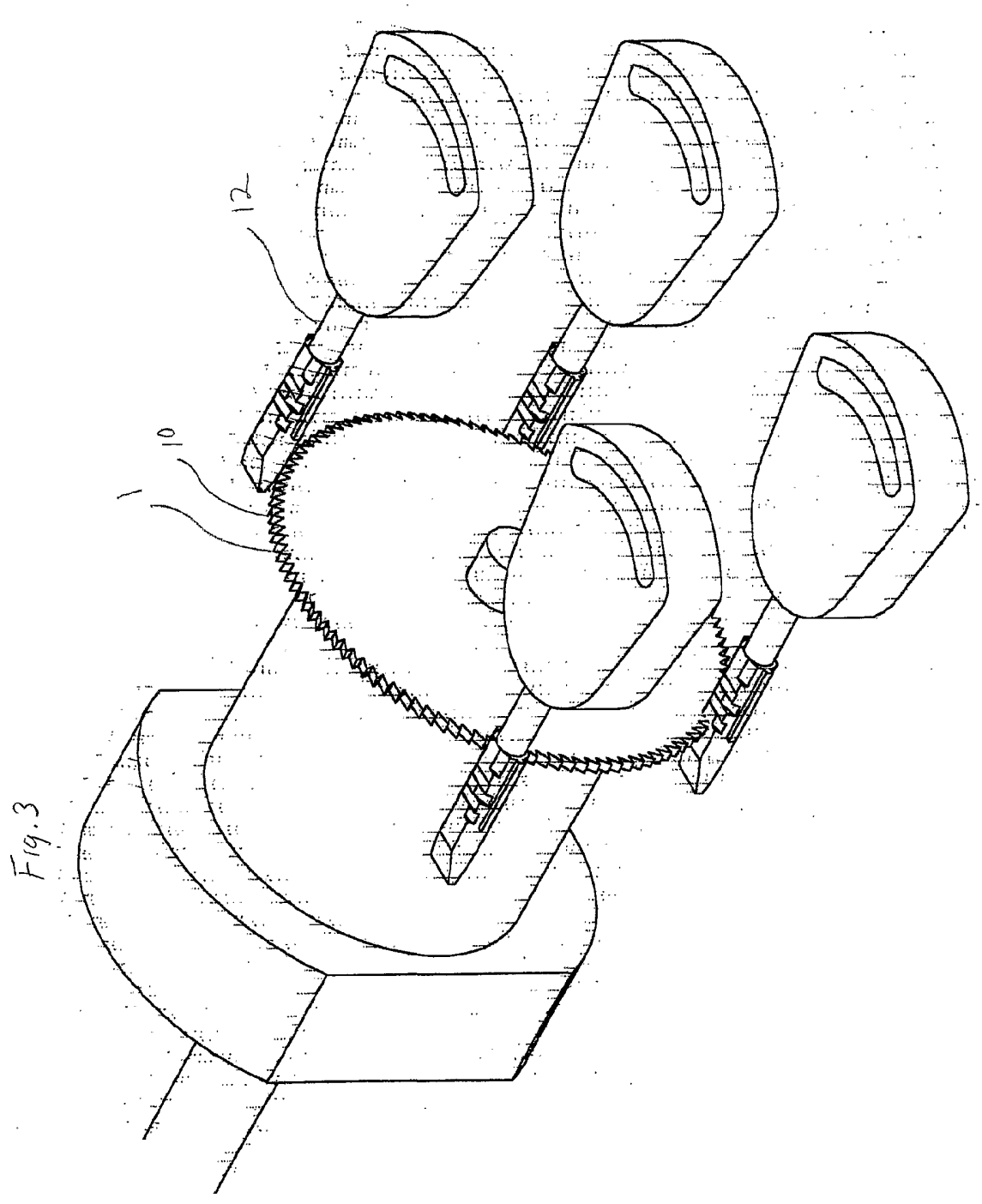


Fig. 3

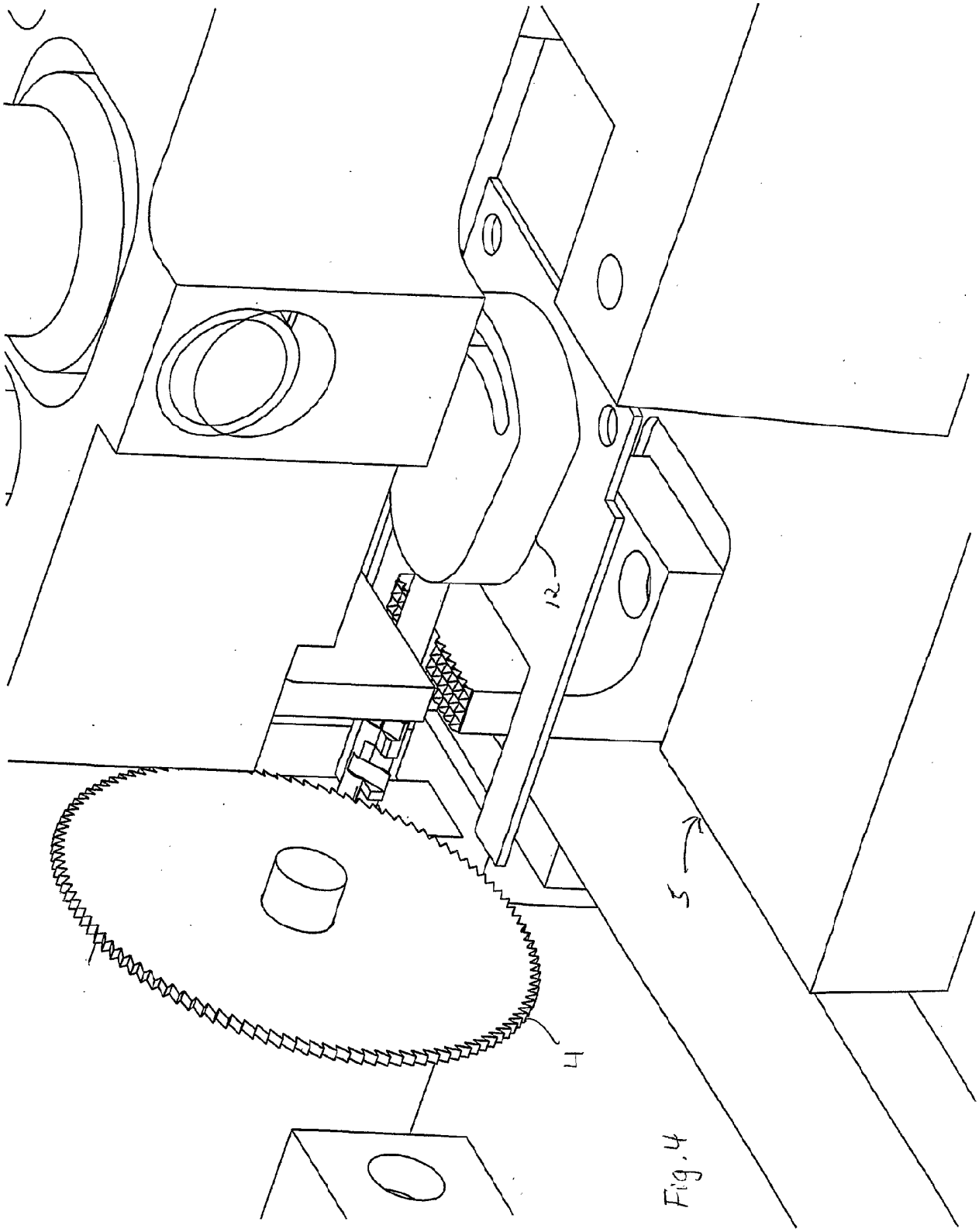


Fig. 4

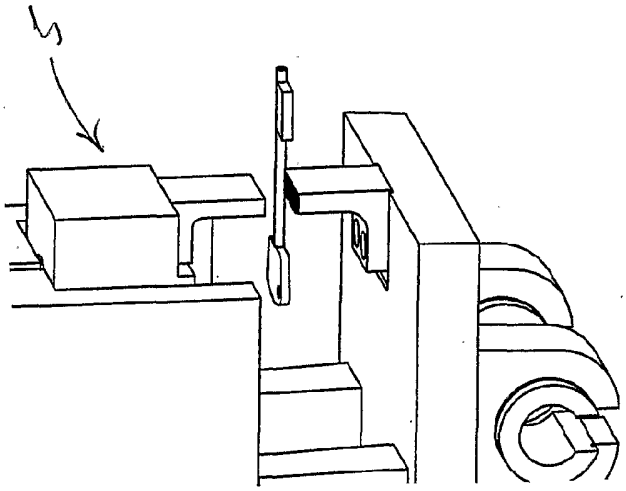


Fig. 5

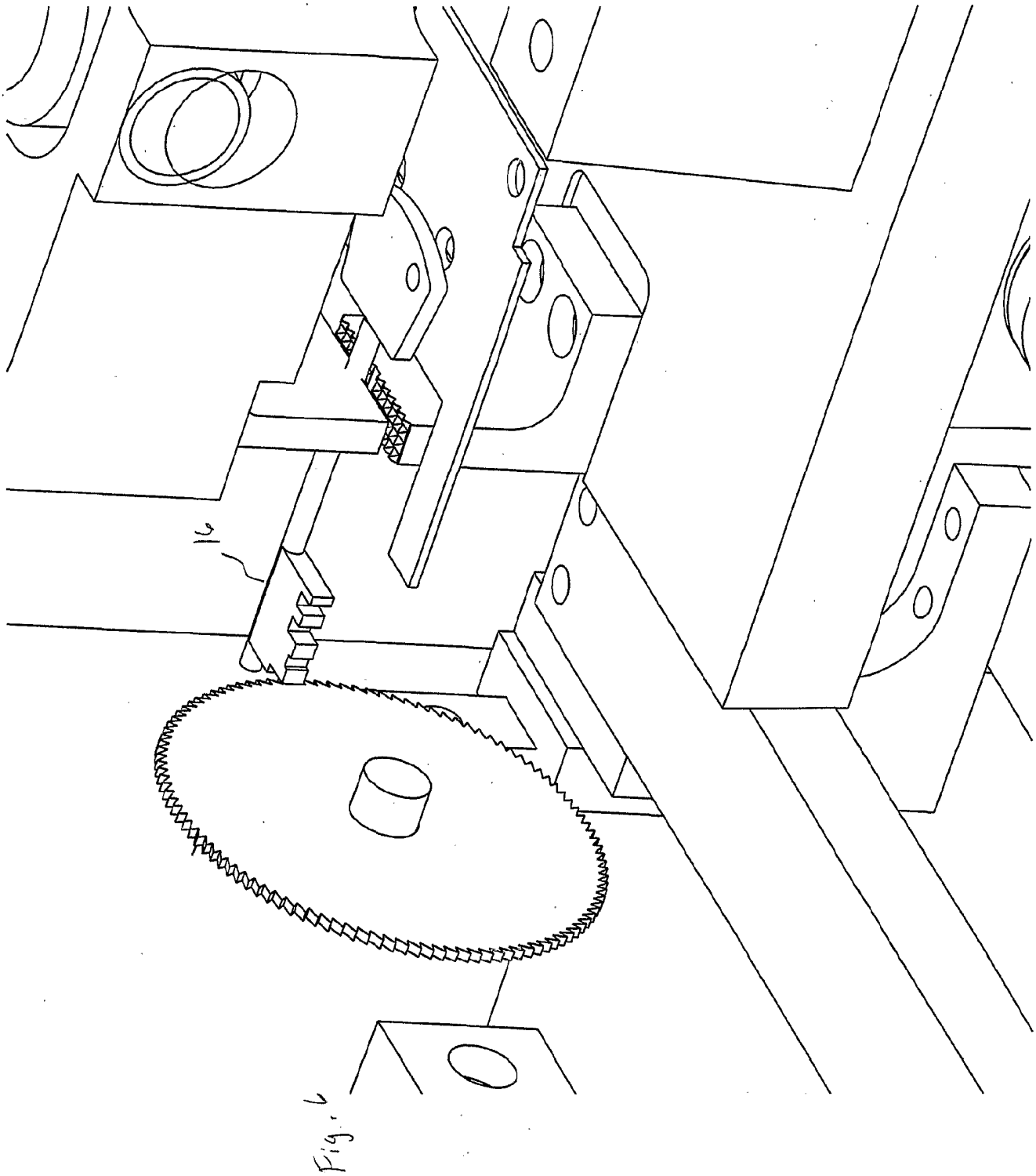
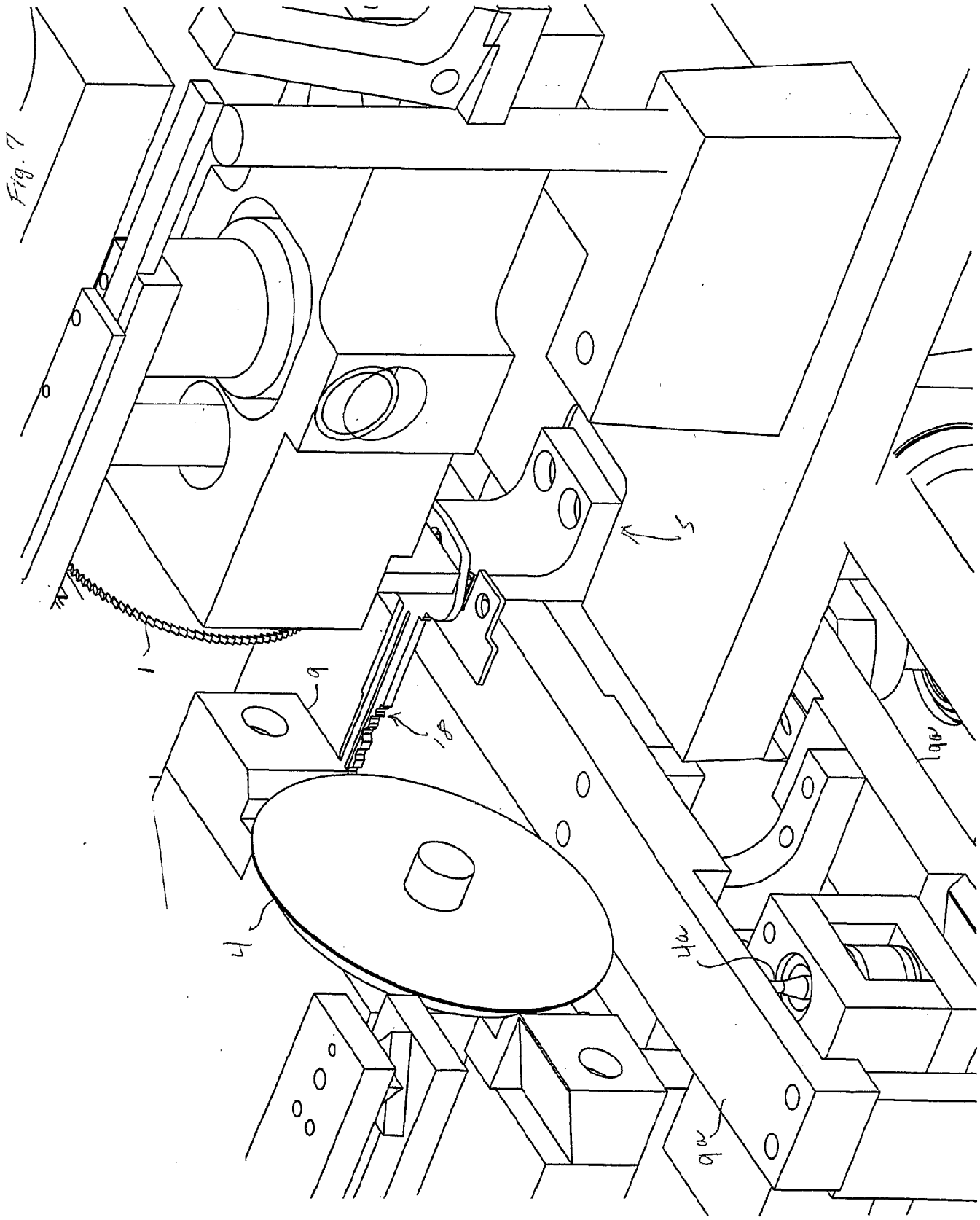


Fig. 7

Fig. 7



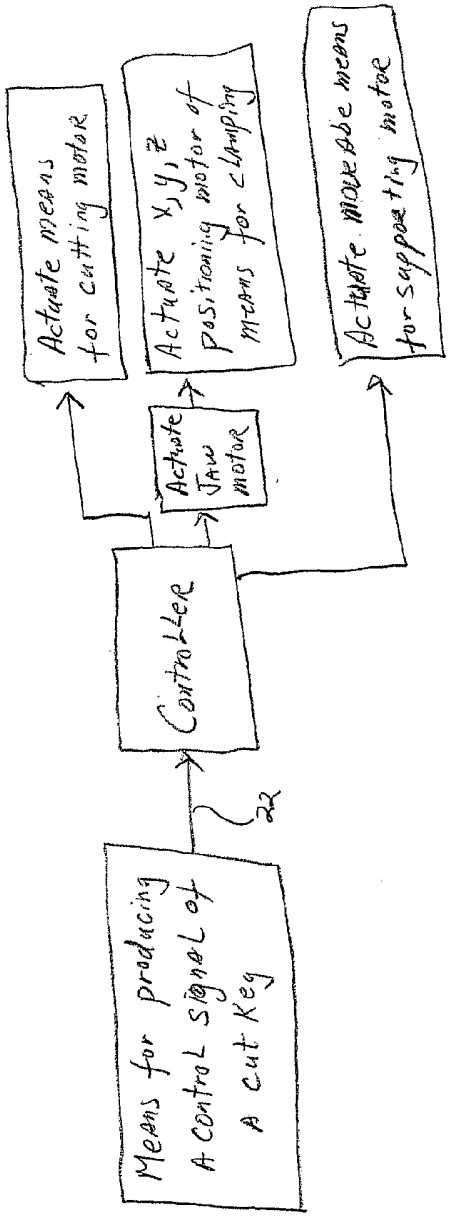

Means for producing A control signal of A cut Key
22
Controller
Actuate Jaw motor
Actuate means for cutting motor
Actuate X, Y, Z positioning motor of means for clamping
Actuate movable means for supporting motor

Fig. 8