Oct. 31, 1950 R. BESSON 2,527,696

COUPLING DEVICE FOR AMPLIFIER TUBES

Filed April 11, 1945 2 Sheets-Sheet 1

FIG. 1

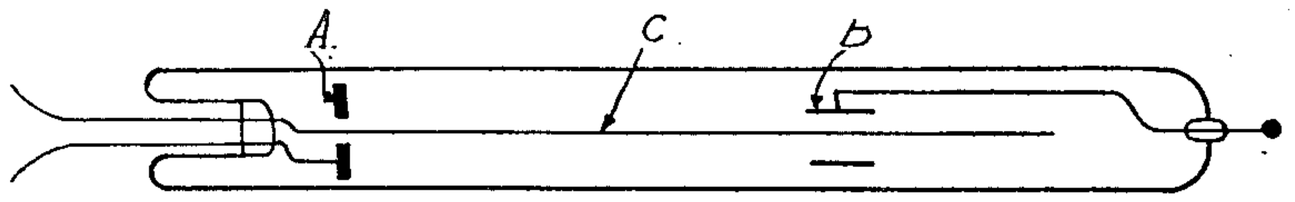

FIG. 2

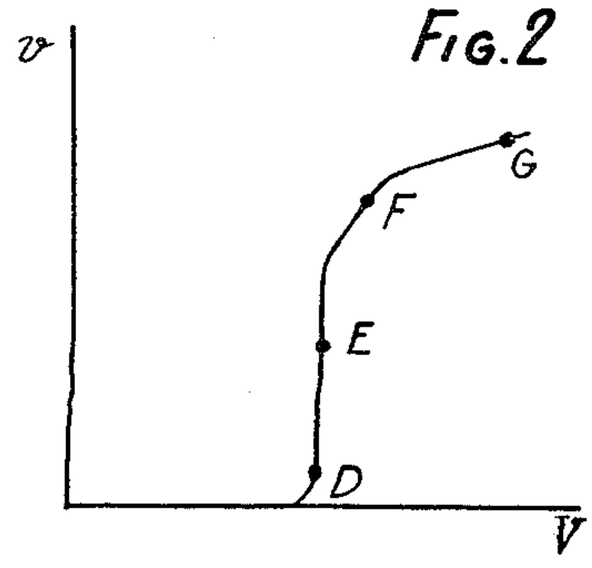

FIG. 3

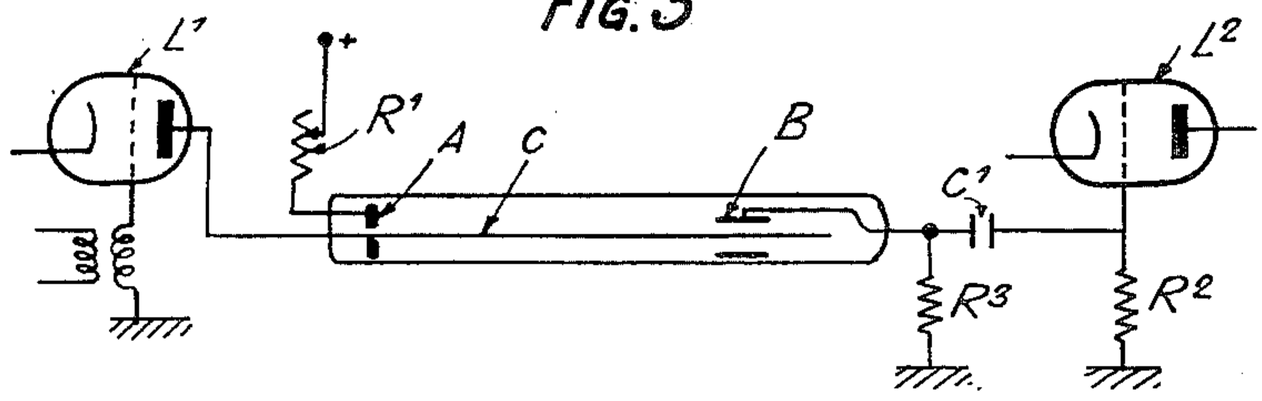

FIG. 4

Patented Oct. 31, 1950 2,527,696

UNITED STATES PATENT OFFICE

2,527,696

COUPLING DEVICE FOR AMPLIFIER TUBES

Raoul Besson, Paris, France

Application April 11, 1945, Serial No. 587,786
In France March 27, 1944

Section 1, Public Law 690, August 8, 1946
Patent expires March 27, 1964

2 Claims. (Cl. 179—171)

1

This invention relates to luminescent gas tubes of the cold cathode type and more particularly to a novel type of gas tube in which a secondary anode is located in a portion of the tube removed from the region of luminescence.

The connection between two vacuum tubes for instance, is usually accomplished by inserting in the anodic circuit of the first tube an impedance termed output impedance, consisting of a resistance, a reactance, a plug circuit or the primary winding of a transformer. The variations in voltage produced in this impedance by the variations in the anodic current are transmitted to the grid circuit of the second tube either through a condenser or through the secondary of the transformer.

If the first tube has a coefficient K of volt amplification and an internal resistance R, while Z is the value of the output impedance, effective amplification in volts of the system comprising the tube and the output impedance has a value equal to

$$\frac{KZ}{Z+R}$$

always lower than K.

The transmission through a condenser has per se no coefficient of voltage amplification. In the case of such a connection through impedance and condenser, the effective voltage amplification transmitted to the grid of the second tube is always lower than K.

The connection through a transformer provides a voltage amplification which is equal approximately to the product of the transformation ratio by the effective amplification of the first lamp. Transformer amplification has the disadvantage, however, of introducing distortion, if the transformation exceeds a rather low value, generally about five. Consequently, in the most favorable case, the variations in voltage fed to the grid of the first tube are transmitted to the grid of the second tube with an amplification which is less than five times the coefficient K of the first tube.

A first object of the invention is to provide a coupling between two vacuum tubes with a volt amplification readily transmitted from the first to the second tube which is equal to tens and even hundreds of times the volt amplification coefficient K of the first tube. This value of the transmitted amplification may moreover be adjustable at will between zero and its maximum value.

Another object of the invention is to provide

2

a coupling device adapted to transmit very slow variations in direct current voltage as well as the variations in alternating voltage, said device having per se a volt amplification coefficient of high value, which coefficient may be moreover adjustable in operation between zero and a maximum value. The effective amplification of the system comprising the first tube and the connecting means is therefore adjustable and equal to a great many times the coefficient K of the first vacuum tube.

According to a further feature of my invention the luminescent state of the tube may serve as a visual indicator for the adjustment of the amplification.

My invention will be better understood by referring to the accompanying drawings.

In the drawings:

Figure 1 shows a simple form of my invention.

Figure 2 is a diagram showing the variation in the potential v of the third electrode as a function of the anodic voltage V.

Figure 3 illustrates the connection between two wireless amplifying tubes, said connection incorporating my novel tube.

Figure 4 shows a particular mounting for the control of the plasma length in a tube mounted between two amplifying tubes.

Figure 5 shows the connection between two amplifying tubes including a cathodic glow tube with a flat cathode.

Figure 6 shows the connection between two amplifying tubes including a luminescent discharge tube.

Figure 7 shows the connection between two vacuum tubes in a direct current amplifier.

A cathodic glow tube with a long rod is shown in Figure 1. The anode A is preferably in the shape of a disc provided with a central hole. The cathode C is a rod having a considerable length with reference to its diameter.

The third electrode B is a cylindrical tube surrounding the cathodic rod at a few centimeters from its opposite end.

The tube is preferably filled with one or more of the inert gases, but other gases may be used. I have found of particular advantage to use a filling of neon with an addition of a few milligrams of mercury, the pressure of the neon being equivalent to that of a mercury column 4 to 60 mm. high.

Figure 2 illustrates the variations in potential v of the third electrode B as a function of the potential V of the anode A, the negative pole

a connection through several batteries, but this is very inconvenient. With my improved tube, however, the fluctuating direct current may be passed through resistance R_1, and coupling is achieved with a minimum of auxiliary battery potential.

Figure 7 shows a very simple form of connection executed in accordance with my invention. The cathodic glow tube provided with a long cathodic rod C transmits and amplifies the continuous or D. C. variations in voltage, however slow they may be, together with the variations in alternating voltage.

The third electrode B of the glow tube is connected directly with the grid of the tube L_2 with the omission of the condenser C_1 shown in Figure 3, while the two resistances R_2 and R_3 are merged into one single resistance R_4 which should be of the magnitude of one to several tenths of megohms. According to the negative polarization given to the cathode C, the cathodic glow tube is caused to operate in the vicinity of point D, of point E or of point F of Figure 2.

What I claim is:

1. An electrical voltage amplifier comprising a glow discharge tube of positive voltage-current characteristic, two cold principal electrodes in said glow discharge tube, one of said principal electrodes being a cathode of elongated form, the other of said principal electrodes being an anode surrounding one of the ends of said cathode, said cold cathode maintaining a glow of a length variable with the voltage to be amplified, means for applying a voltage to be amplified to one of said principal electrodes, an auxiliary electrode, said auxiliary electrode being arranged near that end of said cathode opposed to the anode and around said cathode, and being farther spaced from said cathode than the thickness of the cathode glow, a source of continuous current voltage, means for applying said continuous current voltage to one of said principal electrodes, said applying means including a resistance for varying the initial magnitude of the glow of said glow discharge tube, and conducting means connected to said auxiliary electrode for utilizing the amplified voltage produced in said gas discharge tube at said auxiliary electrode.

2. Electrical magnifying system comprising in combination, an amplifier tube, a glow discharge tube of positive voltage-current characteristic, two cold principal electrodes in said glow discharge tube, one of said principal electrodes being a cathode of elongated form, the other principal electrode surrounding one of the ends of said cathode, said cold cathode maintaining a glow of a length variable with the voltage to be amplified which is impressed on said two principal electrodes, and at least one auxiliary electrode arranged near that end of said cathode opposed to the anode and around said cathode, being farther spaced from said cathode than the thickness of the cathode glow, means for so adjusting the initial length of glow of said glow discharge tube as to make said glow a source of positive ions relative to said auxiliary electrode, a resistance of high magnitude connecting said auxiliary electrode to the mass of the system and being arranged to collect the amplified voltage and a source of continuous current voltage adapted to feed the system and to maintain a glow discharge between said principal electrodes.

RAOUL BESSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,865,064	Valensi	June 28, 1932
1,893,638	Schmierer	Jan. 10, 1933
1,927,755	Rogowski	Sept. 19, 1933
1,950,003	Hund	Mar. 6, 1934
1,951,416	Hund	Mar. 20, 1934
1,970,223	Case	Aug. 14, 1934
1,999,649	Brett	Apr. 30, 1935
2,055,753	Schnitzeler	Sept. 29, 1936
2,103,022	Senauke	Dec. 21, 1937
2,216,269	Holmes	Oct. 1, 1940
2,326,614	Bowman	Aug. 10, 1943
2,375,830	Spencer	May 15, 1945

FOREIGN PATENTS

Number	Country	Date
369,578	Great Britain	Mar. 21, 1932

Oct. 31, 1950

L. T. BLASEN

ANIMAL TRAP

2,527,697

Filed Aug. 7, 1947

2 Sheets-Sheet 1

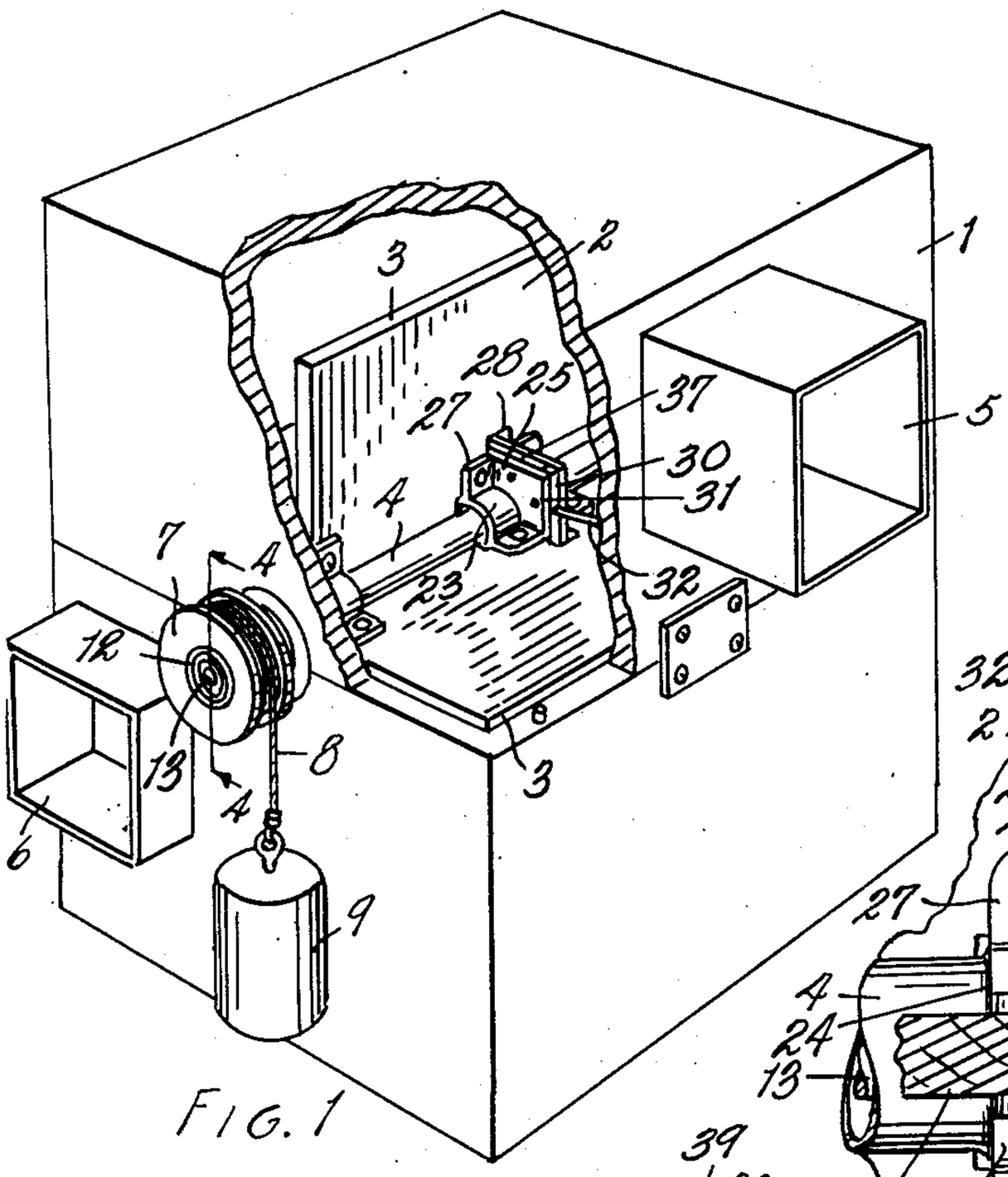

FIG. 1

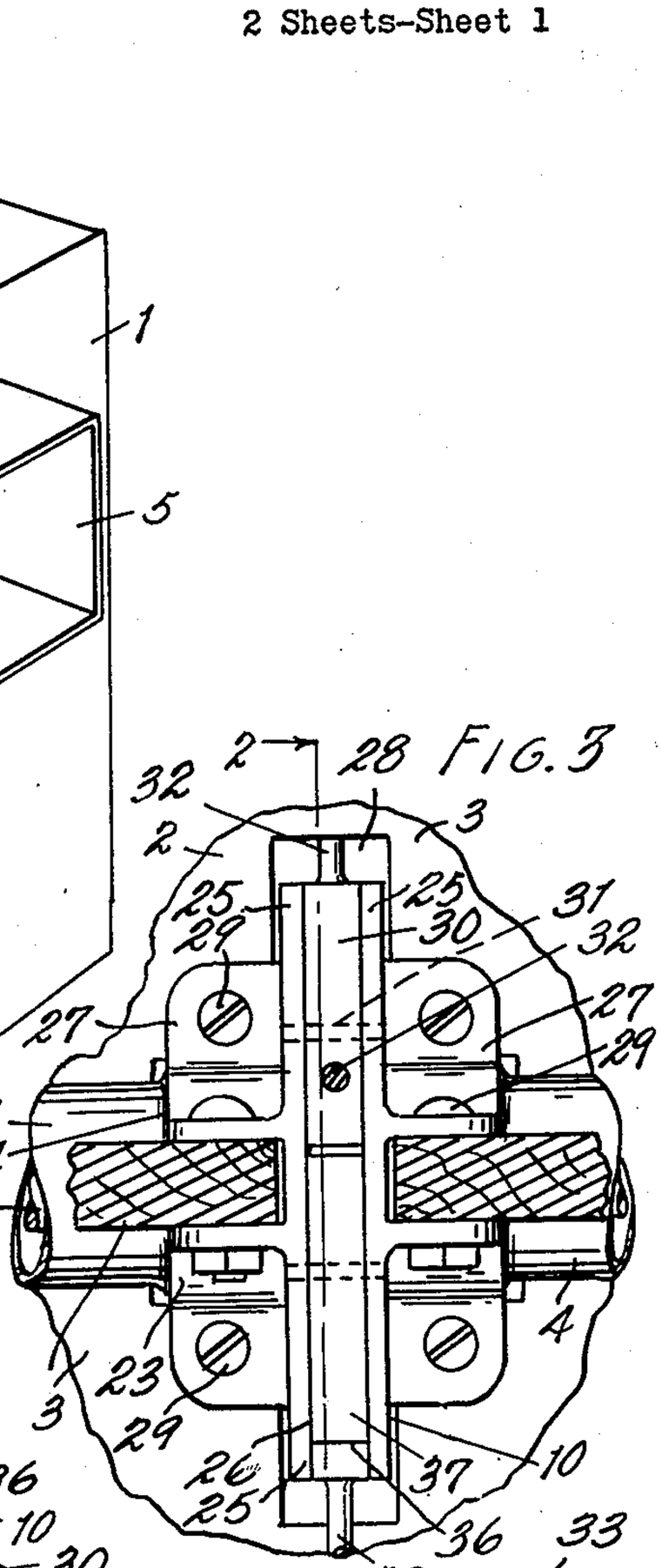

FIG. 3

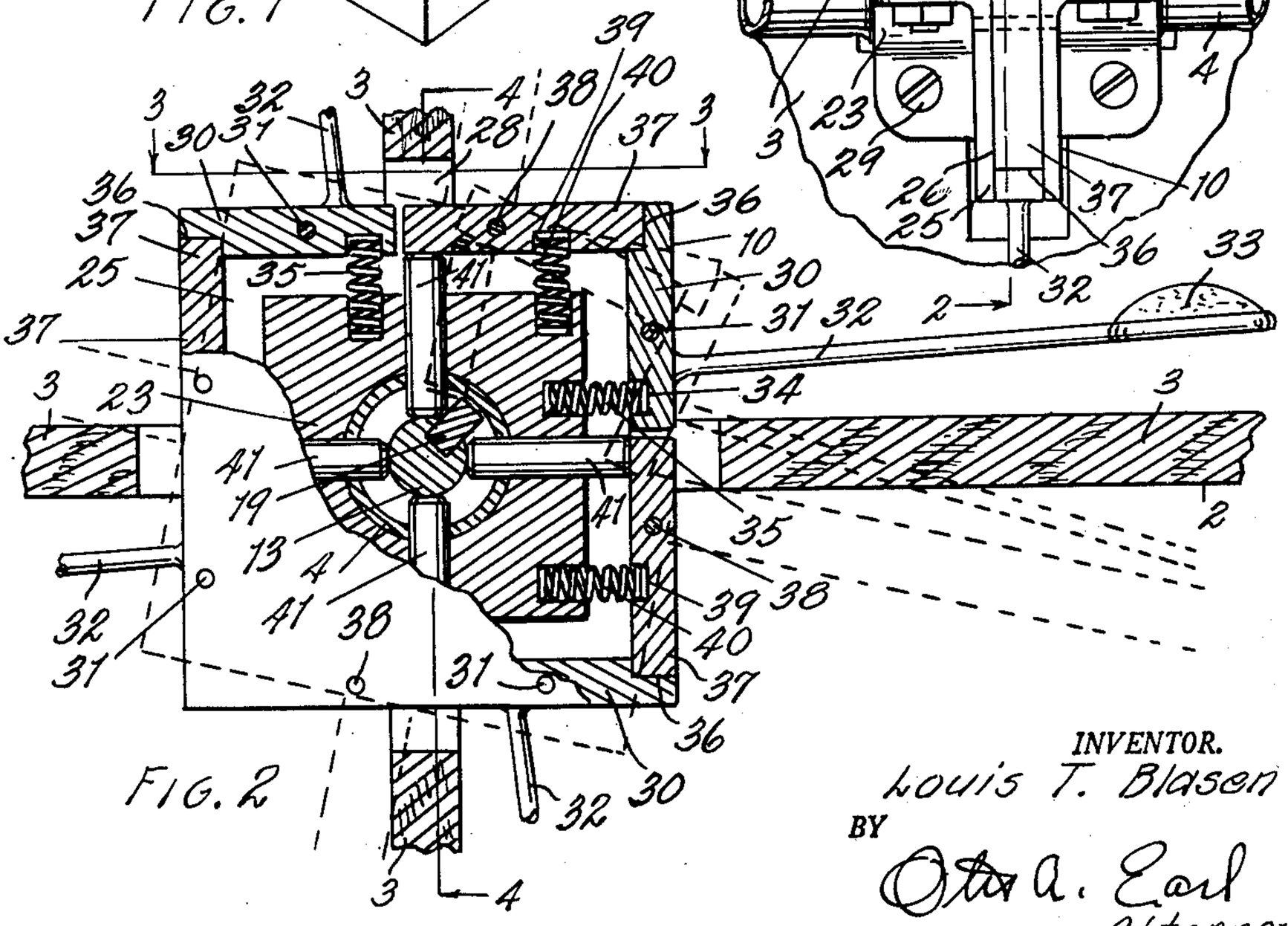

FIG. 2

INVENTOR.
Louis T. Blasen
BY
Otto A. Earl
Attorney