

B. MARTELLI.  
SAFETY GAS BURNER.  
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922,010.

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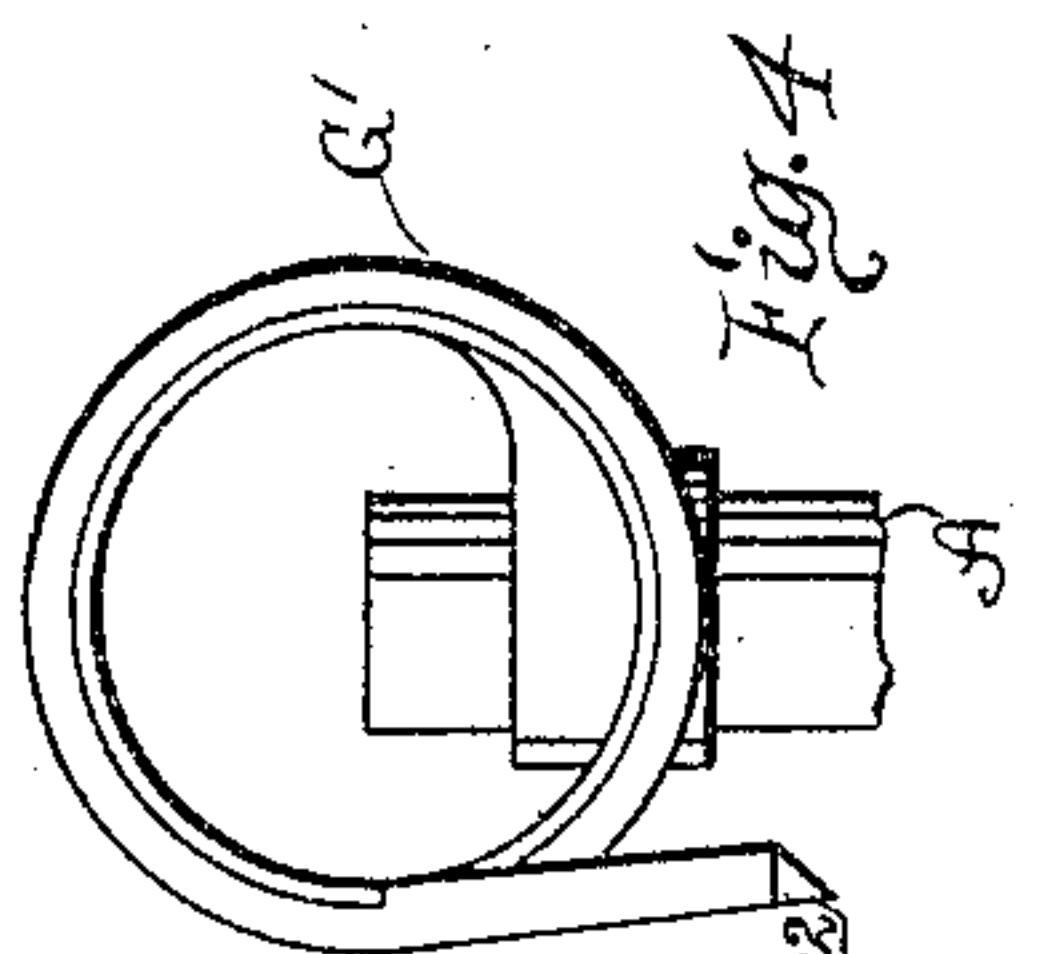
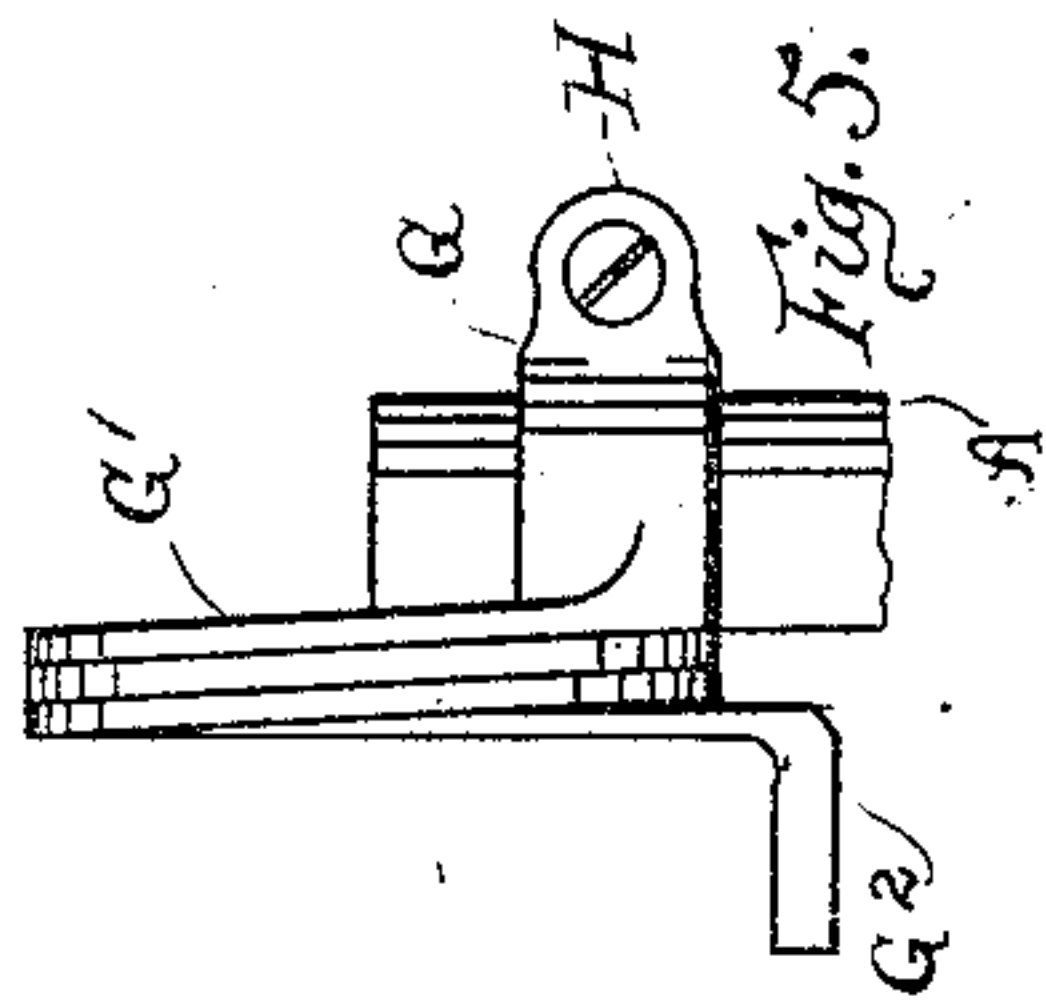


Fig. 1.

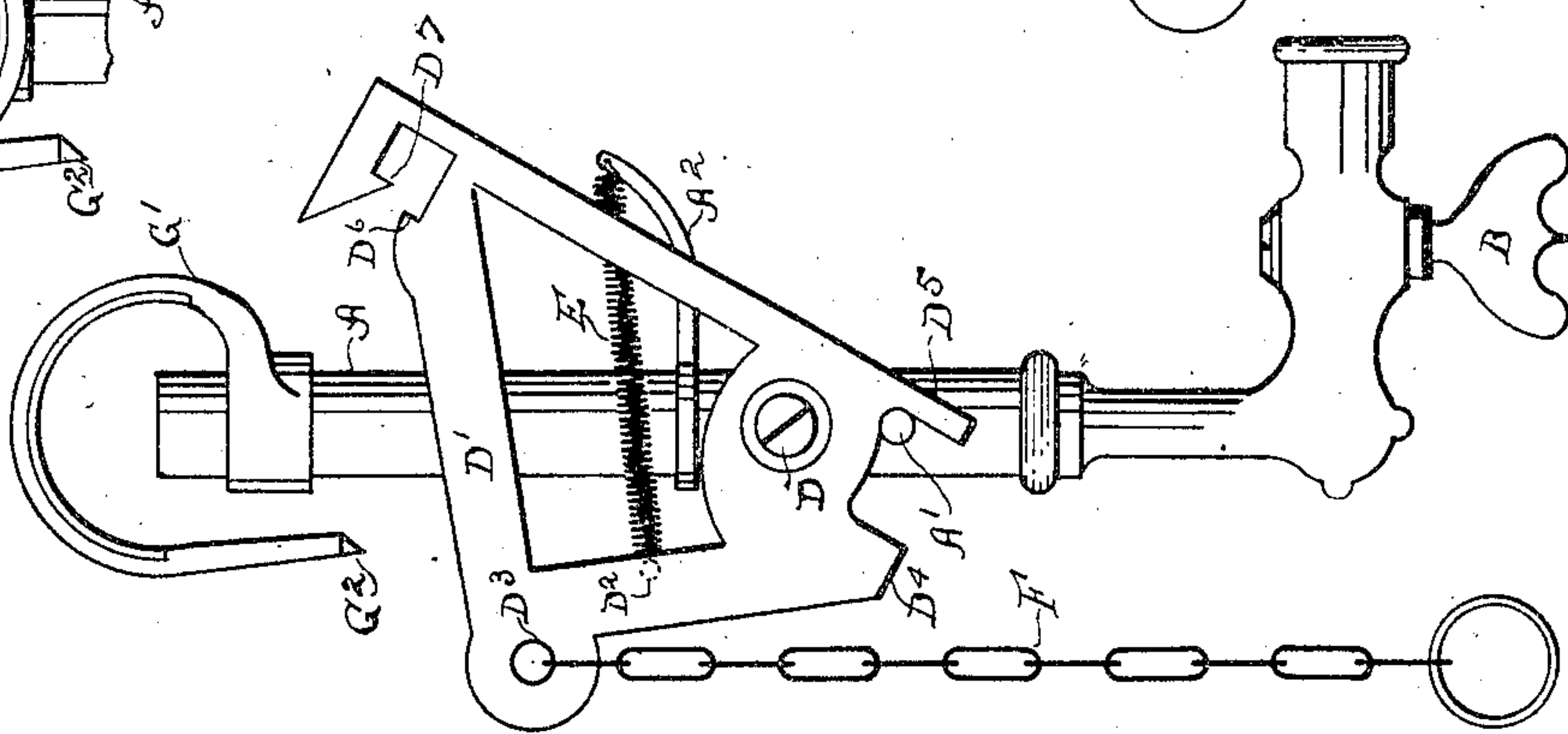


Fig. 3.

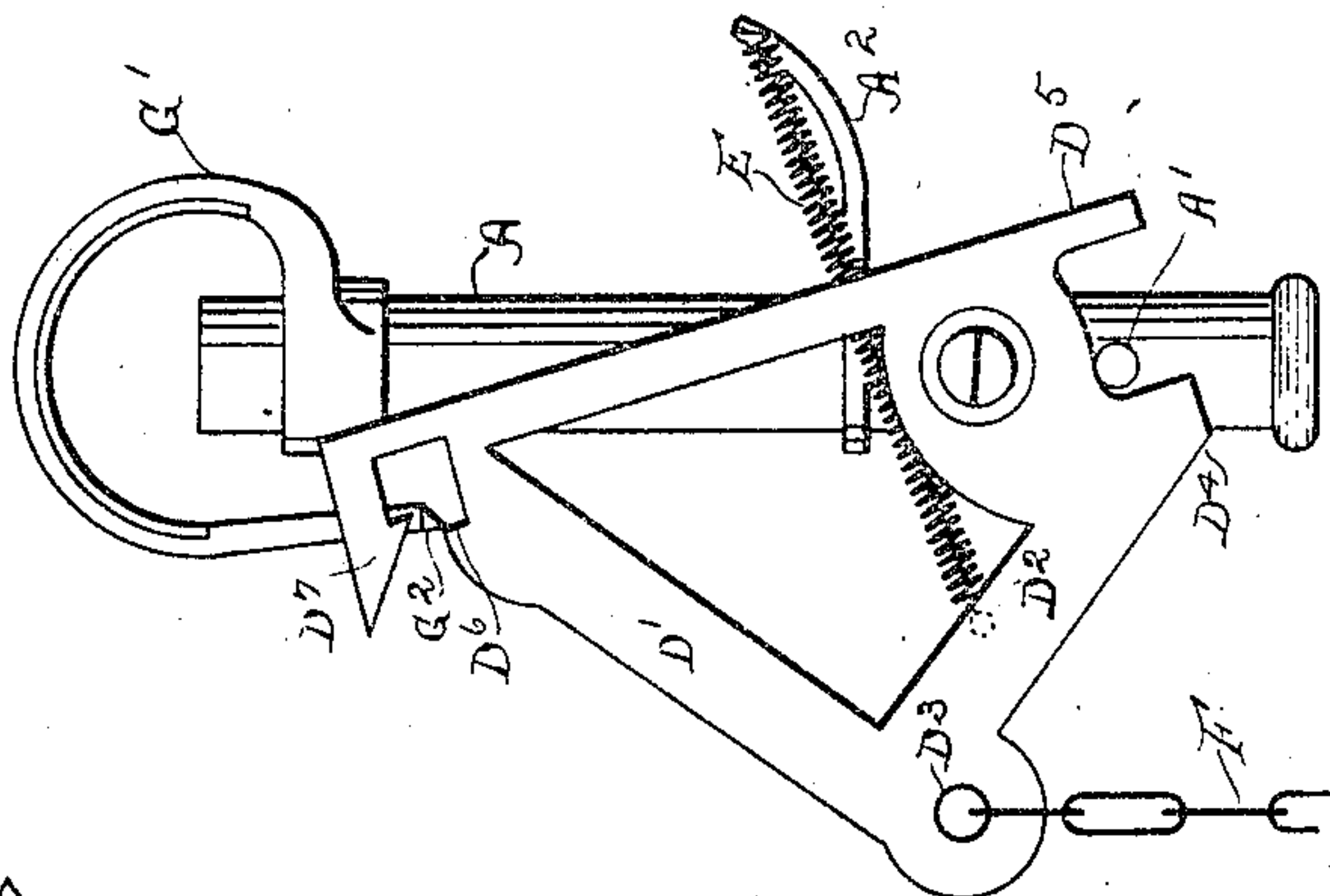


Fig. 2.

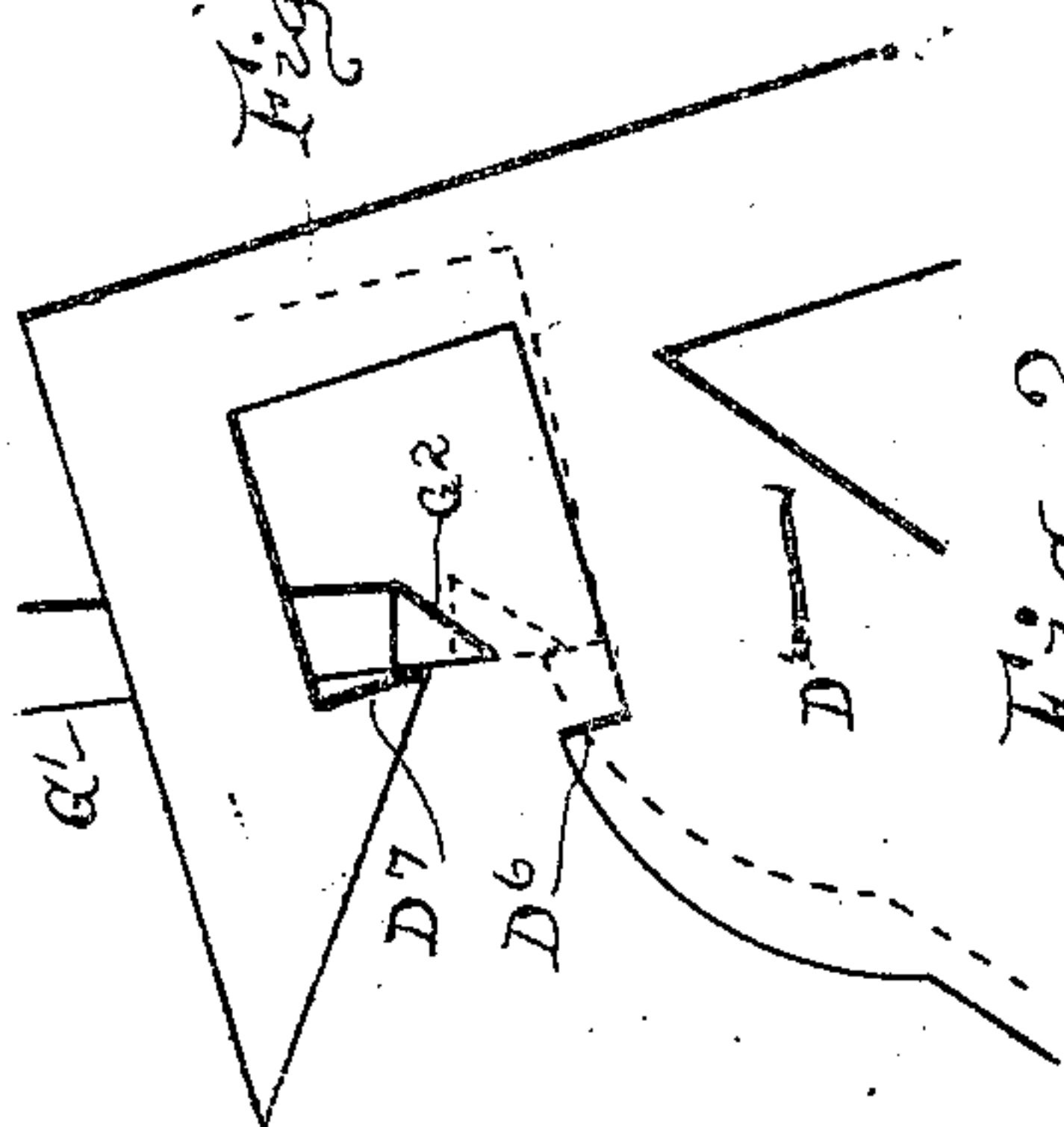
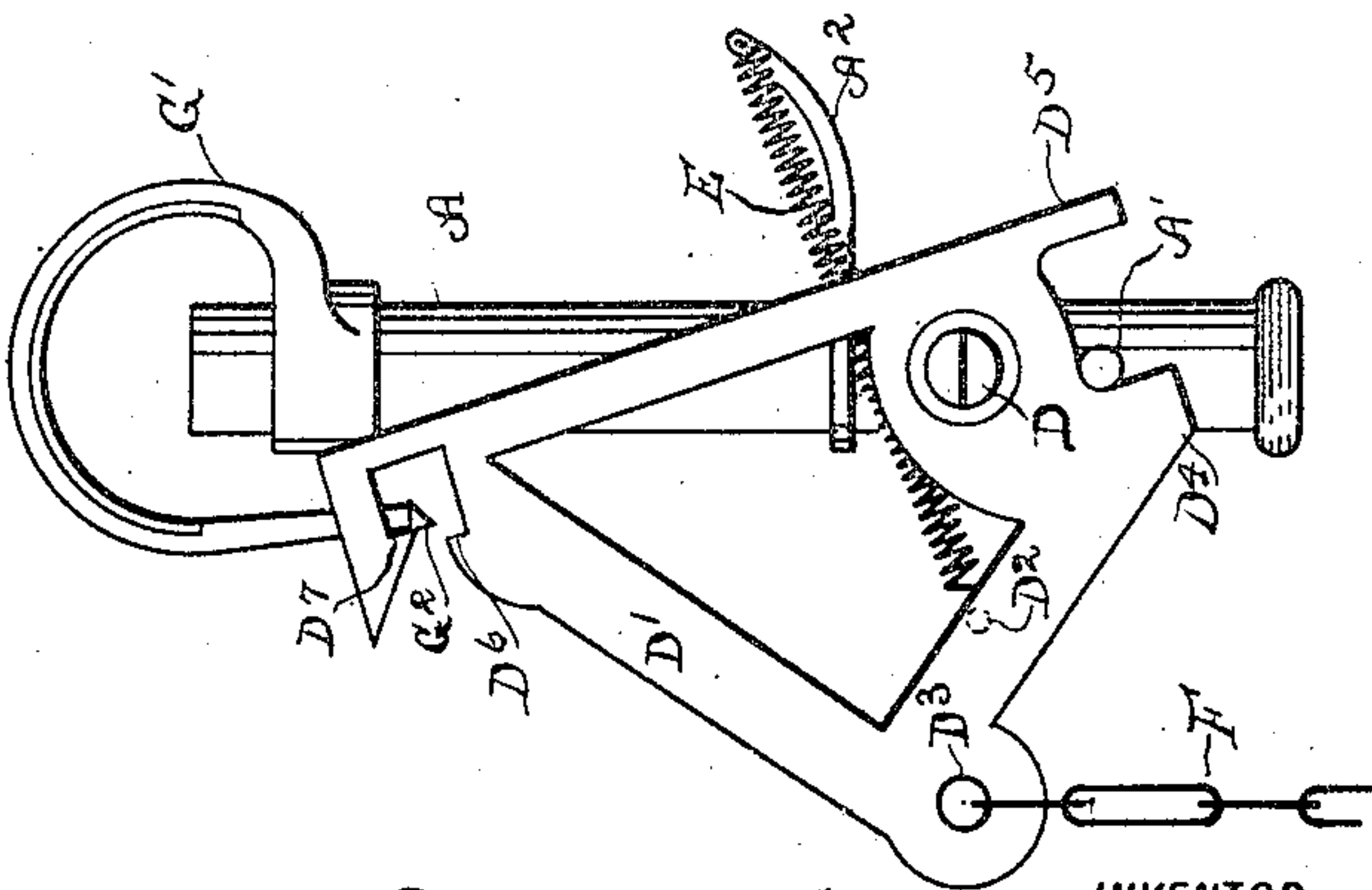


Fig. 2.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## SAFETY GAS-BURNER.

No. 922,010.

Specification of Letters Patent.

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Application filed June 23, 1908. Serial No. 439,891.

*To all whom it may concern:*

Be it known that I, BERNARDO MARTELLI, a citizen of the United States, residing in the borough of Manhattan, city and State of New York, have invented a certain new and useful Improvement in Safety Gas-Burners; and I do hereby declare that the following is a full and exact description thereof.

The improvement relates to means for insuring that the gas will be automatically shut off when through any cause as mistaken operations or a gust of wind the flame is extinguished. It relies like many previous efforts by myself and others on the unequal expansion and contraction of different metals with heat and cold.

The present invention involves means whereby the spring force which is relied on to shut off the gas when the flame is extinguished maintains its action with more instead of less force as the cock is turned into the closed position, and the necessity of waiting until the parts have become heated is avoided.

It also involves improved means for engaging the automatic cock with the holding and liberating means. The English patent to Plunket of 1884 showed a plan for employing two teeth on the lever of the automatic cock, the first holding this cock open temporarily a few seconds when first lighted and the second holding it open for as long a period as may be required. The first is subordinate to the second and soon transfers its charge to the second tooth. The first tooth is important in relieving the operator from the labor of standing and waiting for the compound bar to become hot. There are objections to his manner of working out the idea. I have devised a construction which is better, in that it avoids the lost motion and allows of being adjusted to work more certainly and more rapidly with small movements of the thermostat.

I provide a finger carried directly on a slender thermostatic bar mounted alongside the gas flame, and mount the two teeth arranged much like Plunket's, on the lever, not of the main cock but of a second cock which may be fitted to turn very easily. The absence of lost motion makes it practicable to effect the first liberation and the proper holding open, by but a very small amount of sinking motion induced by the heating, and to effect the second liberation and the instant closing of the cock by but a very small

amount of rising motion due to the cooling when the gas is accidentally extinguished.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a face view with the automatic cock closed and all the parts cold. Fig. 2 is a corresponding view with gas freshly turned on by pulling the chain,—the ordinary cock having been opened at any convenient period earlier, and Fig. 3 is a corresponding view at a later stage, after the metal has been so heated by the gas flame not shown, a fish-tail or similar flat flame alongside, as to induce the assumption by the cock of the final position for efficient use giving light. Fig. 2<sup>a</sup> is a face view of a small portion corresponding to Fig. 2 but on a larger scale. Figs. 4 and 5 show a modification adapted to attain a greater extent of the movement due to the heat. The parts not shown in these figures may be the same as in Figs. 1, 2 and 3. Fig. 4 is a face view and Fig. 5 is an edge view.

Similar letters of reference indicate like parts in all the figures where they appear.

A is a gas burner of any ordinary or suitable style adapted to screw tightly on the end of a gas pipe extending up from below.

B is the ordinary cock opened and closed by hand as usual.

D is a cock supplementary thereto.

My invention relates to the means of holding open and of closing this supplementary cock while the ordinary cock B is set wide open.

A' is a pin which serves to limit the movements as will be obvious, and A<sup>2</sup> is an arm fixed rigidly on A to the outer end of which is attached a slender helical contracting spring E which extends therefrom across the front of the burner. The parts are so arranged that when the cock is open the spring crosses nearly or quite in contact with the extended end of the cock D.

G<sup>2</sup> is a short horizontal finger triangular in cross section moved to a small extent up and down by the changes which occur when the gas is ignited and extinguished. It is carried on a compound arm G' fixed adjustably on the burner A. This arm is shown as curved about half a circle in Figs. 1, 2 and 3, and as curved in several complete circuits in the modification, Figs. 4 and 5. The motion of the arm and the finger carried thereon



is due to long known laws based on the difference in expansion by heat of the two metals employed, steel for the inner side and copper for the outer side of the curve. A number of coils as in Fig. 4 will induce a greater movement of the finger  $G^2$  at its free extremity, but the half coil shown in Figs. 1, 2 and 3 will be usually sufficient.

When with the parts previously cold the gas is turned on and lighted, the motion of  $G^2$  is downward, and it soon assumes a temporary position lower than before. This effect is due to the superior expansion of the copper, increasing the curvature of the arm  $G'$ . When the parts thus previously heated are subjected to the cooling which follows an extinguishment of the flame, the finger  $G^2$  rises by the superior contraction of the outer side inducing an uncoiling of the compound arm  $G'$  and a consequent rise of  $G^2$ . This rising and sinking of the finger  $G^2$  determines the holding or releasing of the supplementary cock D by the following means:

A peculiarly shaped piece of stout sheet metal is fixed on the projecting end of the cock D and controls its position. I will mark it as a whole  $D'$  and designate its several parts by further supernumerals.

$D^2$  is a pin indicated by dotted lines to which one end of the contracting spring E is attached. This pulls the lever  $D'$  to the right which gives the closed position of the cock D. The arrangement causes the line of tension of this spring to extend so near the cock D when most extended that its force is nearly radial to the cock D. See Figs. 2 and 3. Its tension is then greater but its effect in turning the cock is less than in other positions. When the lever  $D'$  is allowed to yield to the spring E and turn far to the right, thus inducing the closed position of the cock D, the spring E is raised as shown in Fig. 1. In this position its tension is less by its having shortened itself, but its effect in turning the cock  $D'$  is greater by reason of its increased leverage. An eye  $D^3$  serves as a means of attaching a chain F which may extend down any distance to be conveniently reached by an operator below. Pulling this chain turns  $D'$  to the left and opens the cock D. Short arms  $D^4$  and  $D^5$  below make contact respectively with the fixed pin  $A'$  and limit the extent of the motions.

Springs increase in tension as they are strained. The grip of the slightly rising and sinking finger  $G^2$  on the lever must be delicate. The compound arm  $G'$  is long and springy and the finger, if there is much force turning the lever is liable to retain its hold by friction, or more properly traction, and remains engaged with the lever, the cooling having induced a tendency in the finger to rise but not sufficient. If to avoid this, the spring which urges the lever to turn into the closed position as heretofore arranged is

made very gentle, the weakening which always occurs when it is yielded to, is liable to make it lack force and as the weight of a good portion of the lever and all of the chain (in the simplest arrangement, shown,) lies on the other side of the center of motion, the lever is liable to stop before completing its closing motion which would be a very serious evil. My spring E is long and its tension is consequently nearly equal in all positions. Its arrangement to pull nearly radially when the cock is open insures that the turning force shall be slight when the cock is delicately held open by the finger  $G^2$  and therefore the finger can rise with very slight resistance and release the lever, and its arrangement to pull nearly tangentially when the cock approaches its closed position insures that the only slightly diminished force of the spring shall act then with such increased leverage that it can certainly and always completely close the cock.

The form of the parts at the upper angle of the lever  $D'$  is important and enables the device to serve with marked advantage over any before known to me. A tooth  $D^6$  is favorably located to engage with the finger  $G^2$  when the gas has been so long burning as to cause the compound arm  $G'$  to be fully heated, in other words when the finger  $G^2$  is in its most depressed position. While the gas is burning for long periods, the cock D is held open reliably by the engagement of this tooth  $D^6$  with the finger  $G^2$ . If, from any cause, the gas flame is extinguished while these parts are in this position, the cock D will remain open and the gas will continue to flow without being ignited, but it will thus escape unburned and poison the air only a few seconds. The cooling of the arm  $G'$  inducing a rise of the finger  $G^2$  will presently lift it above the point of the tooth  $D^6$ . When this occurs, the spring E will assert itself and turn the lever  $D'$  to the right and close the cock. The action thus far is old.

$D^7$  is a tooth carried on the lever  $D'$  by a circuitous connection as shown. The left side of this tooth is beveled as shown, the right side is square. The tooth is located just sufficiently above and just sufficiently to the right of the tooth  $D^6$  to serve as an important auxiliary. When with the parts in the cold condition, with a lighted match in position to effect the igniting as usual, the chain F is pulled and the lever  $D'$  is swung to the left, the tooth  $D^6$  moves across idly under the finger  $G^2$  without touching it, or if it touches it at all, it is a gentle touch and performs no function. By the further motion of the lever  $D'$  the tooth  $D^7$  is brought into action. It moves across over the finger  $G'$  pressing down gently thereon, the finger or the tooth or both yielding a little elastically, and as soon as the tooth has quite passed it snaps down into engagement with the finger



5  $g^2$ . The chain E may be released at leisure, or immediately as convenience or whim may render preferable, and the lever  $D'$  will remain yoked to the finger and the cock D will  
 10 be held in the open position. The operator may give care to other matters, no further care is required. But the work of the mechanism is not yet completed. The finger  $G^2$  remains engaged with the tooth  $D^7$  only a  
 15 short time. So soon as the curved arm  $G'$  is sufficiently heated it depresses the finger  $G^2$  out of contact with the tooth  $D^7$ . When this stage occurs, the lever  $D'$  will be liberated from the tooth  $G^2$  and will turn to the  
 20 right in obedience to the force of the spring E, but it will move but a little distance before the tooth  $D^6$  will engage with the finger, and now the parts are in the properly engaged position ready for prolonged service

25 without any further changes.  
 On shutting off the gas the parts automatically assume their correct positions ready to serve again. First the gas is shut off by the other cock B and the flame is extin-  
 30 guished. So soon thereafter as the arm  $G'$  has cooled enough to again raise the finger  $G^2$  out of the path of the tooth  $G^6$ , the lever  $D'$  makes its proper full movement to the right in obedience to the strong final effect  
 35 of the spring E, and all the parts are in position for indefinite rest. In preparing for further use when occasion shall require, care must be taken to turn the cock B into the open position.

35 The mounting of the arm  $G'$  on the burner A is accomplished by making it integral with

a clamp G sufficiently stout which embraces the burner A and is tightened in its grip by a screw extending through lugs adjacent to the joint. This construction is indicated in  
 40 Fig. 5. In assembling the parts this screw H may be partially tightened and the clamp G and its attachments moved up and down to small extents by gentle percussion. When it is found that the finger is just the  
 45 right height, the screw H may be further tightened and the clamp secured firmly.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. 50

Figs. 4 and 5 show a modification which may be important by giving an increased extent of motion up and down to the finger  $G^2$ .

I claim as my invention:

In safety gas cock mechanism an auto- 55 matically closing stop-cock having a lever with two teeth, one  $D^6$  projecting outward and the other  $D^7$  projecting inward, relatively to the axis of motion out of line with each other in combination with a finger  $G^2$  60 carried on a thermostat coil  $G'$  exposed to the heat by the side of the gas flame and raised and lowered by the expansion and contraction of such thermostat coil by heating and cooling, arranged to engage with the  
 65 teeth in succession.

Signed at New York, New York this 22 day of June 1908.

BERNARDO MARTELLI.

Witnesses:

ARTHUR P. MARR.

THOMAS DREW STETSON.