United States Patent

Duncan

[15] **3,706,235**

[45] **Dec. 19, 1972**

[54] ORTHOGONAL LINE GENERATOR

[72] Inventor: **William E. Duncan,** China Lake, Calif.

[73] Assignee: **The United States of America as represented by the Secretary of the Navy**

[22] Filed: **March 10, 1971**

[21] Appl. No.: **122,952**

[52] **U.S. Cl.** **74/52,** 74/436, 74/112

[51] **Int. Cl.**.....**F16h 27/00**

[58] **Field of Search**.....74/52, 436, 112

[56] **References Cited**

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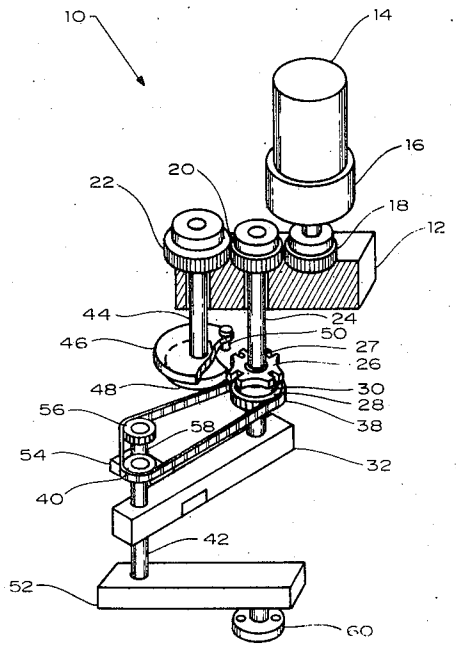
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[57] **ABSTRACT**

An orthogonal line generator is provided which comprises a combination of a straight line generator and a geneva mechanism. The straight line generator is a rotating system of two equal length arms. A first or base arm rotates about one of its ends while a secondary arm pivoted on the other end of the base arm rotates in the opposite direction.

3 Claims, 4 Drawing Figures



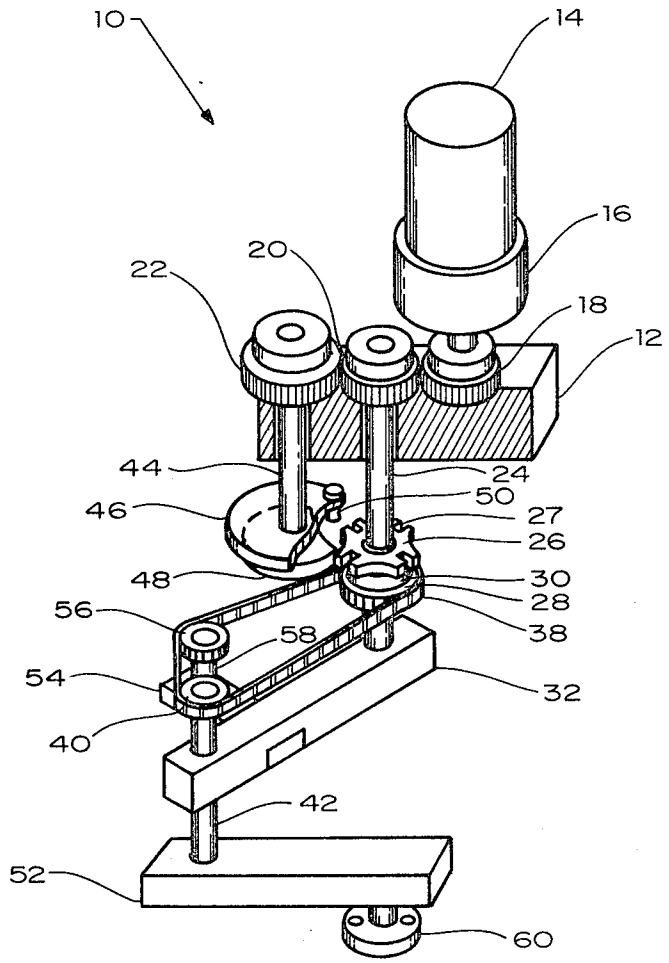


FIG. 1.

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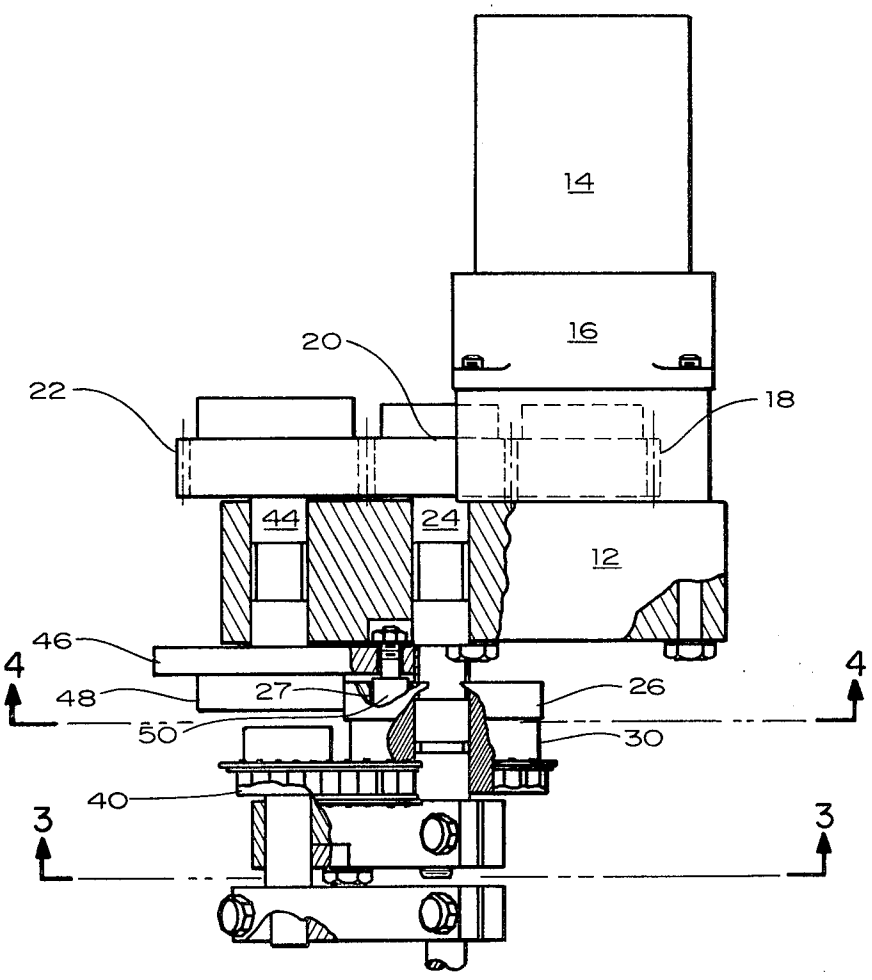


FIG. 2.

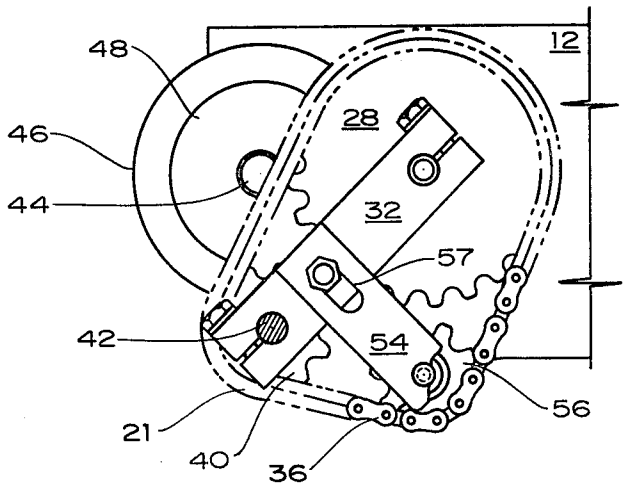


FIG. 3

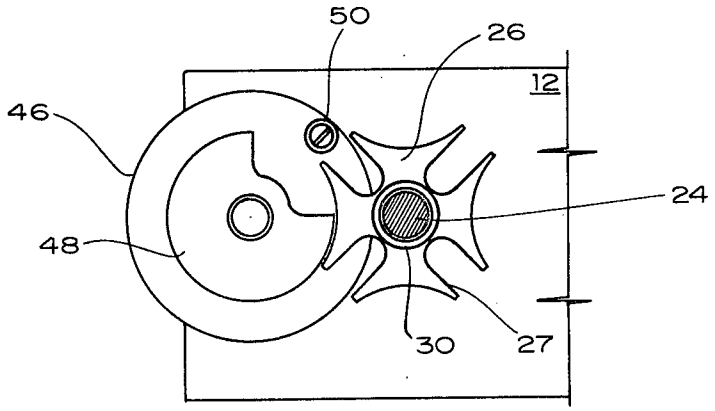


FIG. 4.

ORTHOGONAL LINE GENERATOR

BACKGROUND OF THE INVENTION

In the testing of gimbal mounted missile seeker devices, for example, it is desirable that an attractive device be moved within the view of a seeker head under test to ascertain how well the seeker head follows or "tracks" movements of the attractive device. According to the present invention, a mechanism is provided which will trace two orthogonal straight lines in a continuously repeated pattern. When a heat source is placed on the apparatus, for example, and a heat seeker head is caused to view the heat source, the seeker head will follow the heat source in its movements with a degree of accuracy dependent upon the efficiency of the seeker head.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 is a diagrammatic illustration of a preferred embodiment of the invention;

FIG. 2 is a side elevational view partly in section of the device of FIG. 1;

FIG. 3 is a view taken along line 3—3 in FIG. 2; and

FIG. 4 is a view taken along line 4—4 of FIG. 2.

DETAILED DESCRIPTION OF THE INVENTION

The device **10** (FIGS. **1** and **2**) comprises a base member **12** supporting a motor **14** which motor drives a gear **18** through a reduction gear box **16**. Drive gear **18** in turn drives gears **20** and **22**. Gear **20** is attached to a shaft **24** which is journaled in the support member **12** and passes through a hub **30**. A geneva driven gear **26** and a sprocket gear **28** are rigidly fastened to opposite ends of hub **30**. The other end of shaft **24** is fastened to one end of first or base arm **32**.

Gear **22** is fastened to and drives a shaft **44** which is fastened at its other end to a geneva drive gear **46** (also see FIG. **4**). Geneva drive gear **46** has a lock member **48** and a drive pin **50** which operate to drive the gear member 26¼ revolution for each revolution of gear **46**. When gear **26** is rotated it causes rotation of sprocket gear **28** through the connecting hub **30**, thus driving gear **40** through chain **38**. Gear **40** drives shaft **42** which is journaled in base arm **32** and fastened to one end of secondary arm **52**.

This latter movement only occurs when one straight line excursion has been completed and a shift is necessary to draw the orthogonal line. When gear **26** is stationary with locking means **48** in place, mounting means **60** will move in a straight line beginning at a designated point, proceeding to a limit, returning to the point of origin, proceeding to an opposite limit and returning to the origin.

This movement of mounting means **60** may be more fully understood by tracing the drive when hub **30** remains motionless. Since shaft **24** turns continuously, gear **40** will move in a planetary manner around hub **30**. Assuming a clockwise motion of shaft **24**, Gear **40** will be rotated by reaction with chaim **38** in a counterclockwise direction.

Arms **32** and **52** are equal in length and arm **32** moves with a given angular velocity in one direction while arm **52** moves with equal velocity in the opposite sense. Therefore, since the end about which arm **52** rotates is coincident with the free end of arm **32**, the free end of arm **52**, in 360° rotation of shaft **24**, will trace a straight line from a point of origin to a point X, returning to the origin thence to a point —and again to the point of origin.

In the embodiment illustrated, pinion **20** has 40 teeth and pinion **22** has 50 teeth.

Chain **38** is kept in tension by a gear **56** mounted on a stub shaft **58** on one end of a tension arm **54** which has the other end attached to arm **32** through an adjustment slot **57**. When motor **14** rotates gears **20** and **22** through gear **18**, shaft **24** will rotate arm **32** in a continuous manner. Likewise gear **22** will continuously drive gear **46**. Rotation of arm **32** by shaft **24** will cause a planetary gear action of the gear **40** when gear **28** is in "locked" condition. When the pin **50** enters a slot **27** on gear **26**, gear **26** will start to rotate and gear **40** will be affected thereby through sprocket **28** and chain drive **38**.

In operation, continuous rotation of gear **18** will cause the free end of arm **52** to describe, with only small deviation, two orthogonal straight lines. When an attractive device is mounted on the mounting means **60** on the free end of arm **52**, the device will be moved in the pattern described and will offer an accurately predictable path against which a seeker head path may be checked for investigating tracking accuracy.

What is claimed is:

1. An orthogonal line generator comprising:

a secondary arm and a secondary arm;

said secondary arm being fixed at one end to a first shaft journaled in one end of said base arm;

a driven sprocket gear attached to the other end of said first shaft;

a second shaft attached to the opposite end of said base arm;

a first drive pinion attached to the other end of said second shaft;

a third shaft attached to a second drive pinion in mesh with said first drive pinion;

a geneva drive gear attached to the other end of said third shaft;

a hollow shaft journaled on said second shaft;

said hollow shaft having a geneva driven gear fastened on one end and a sprocket drive gear mounted on the other end;

a drive chain connecting said drive sprocket and said driven sprocket; and

tensioning means for said drive chain including an idler sprocket adjustably mounted on said second arm.

2. The apparatus of claim **1** wherein

said geneva mechanism causes one quarter revolution of said sprocket drive gear for every one revolution of said third shaft.

3. The apparatus of claim **1** wherein said first drive pinion has 40 teeth and said second drive pinion has 50 teeth.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,706,235 Dated December 19, 1972

William E. Duncan

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The second line of claim 1 (Column 2, line 34) should read as follows.

a base arm and a secondary arm;

Signed and sealed this 29th day of May 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents