April 27, 1965 P. L. SULLIVAN 3,180,307

FIRE ALARM

Filed April 29, 1963 2 Sheets-Sheet 1

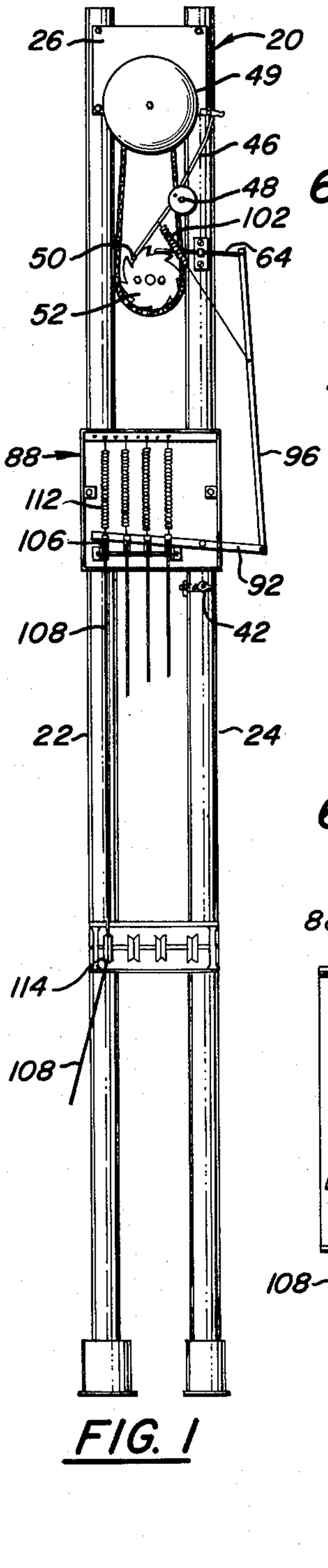
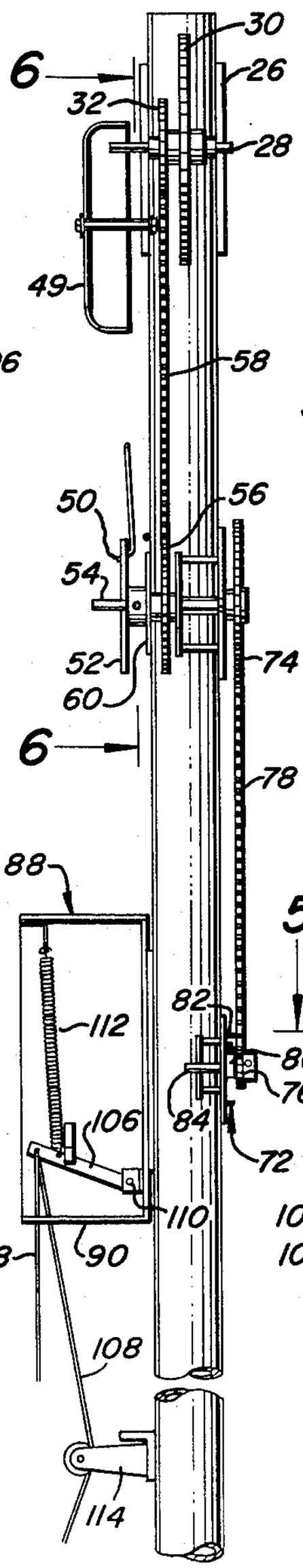


FIG. 1

FIG. 3



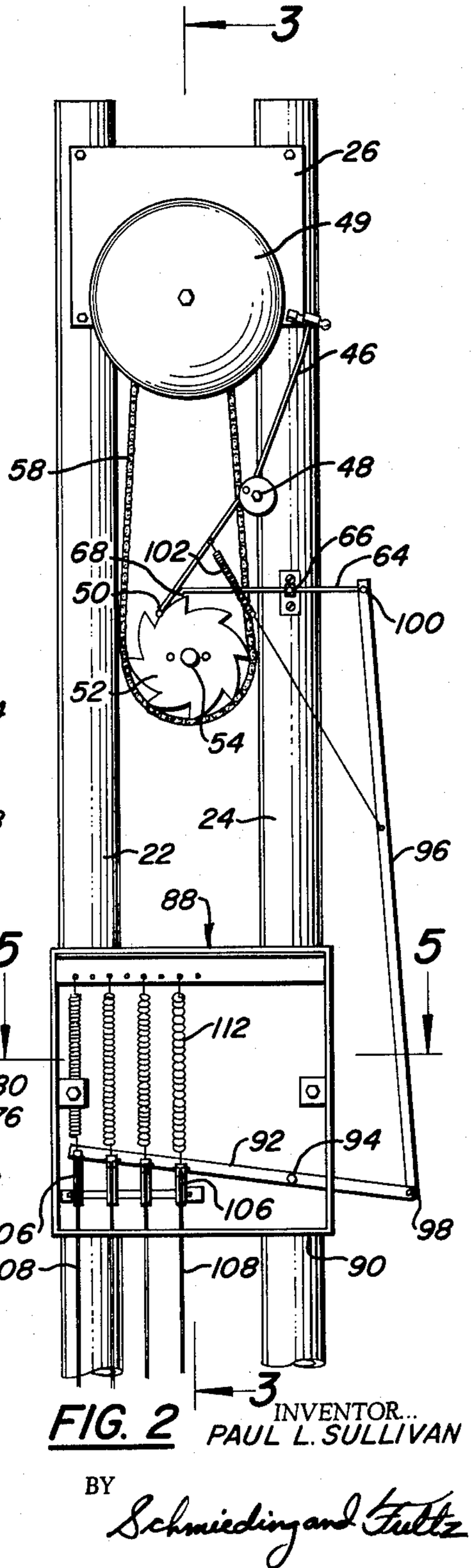


FIG. 2

INVENTOR...
PAUL L. SULLIVAN

BY Schmieding and Fultz

ATTORNEYS

April 27, 1965 P. L. SULLIVAN 3,180,307

FIRE ALARM

Filed April 29, 1963 2 Sheets-Sheet 2

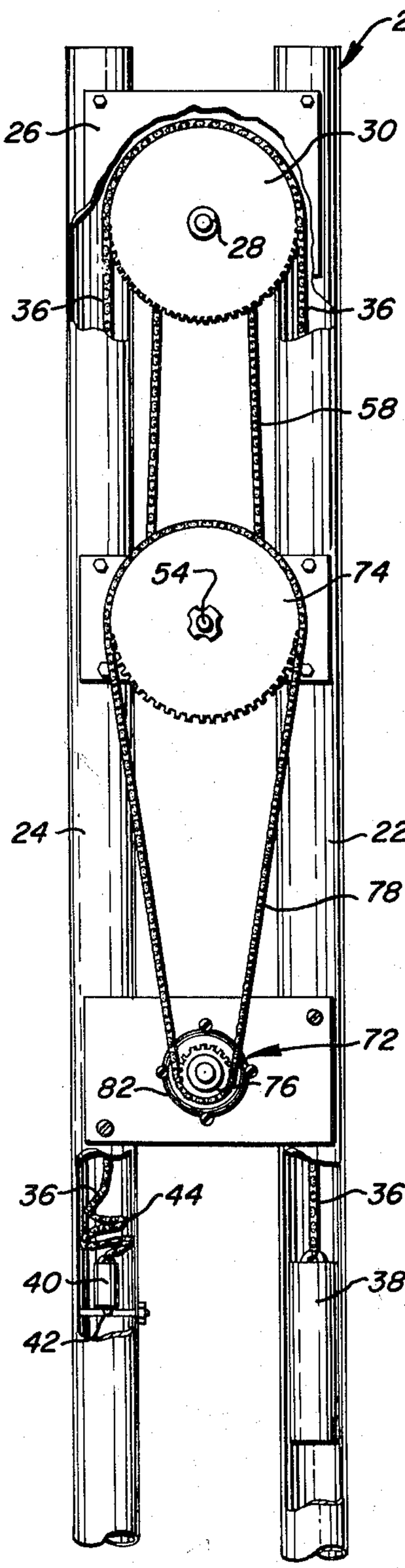


FIG. 4

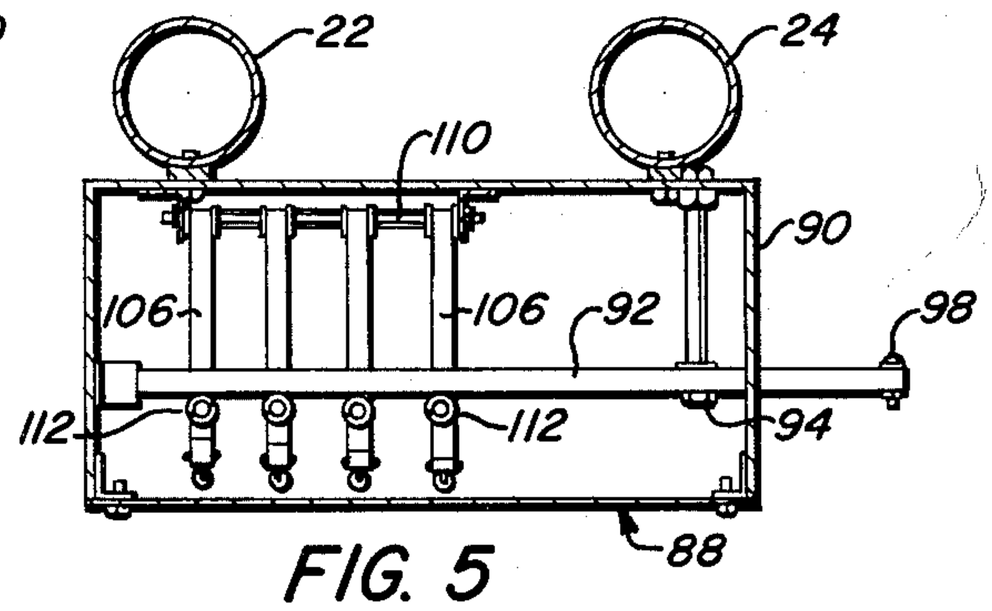


FIG. 5

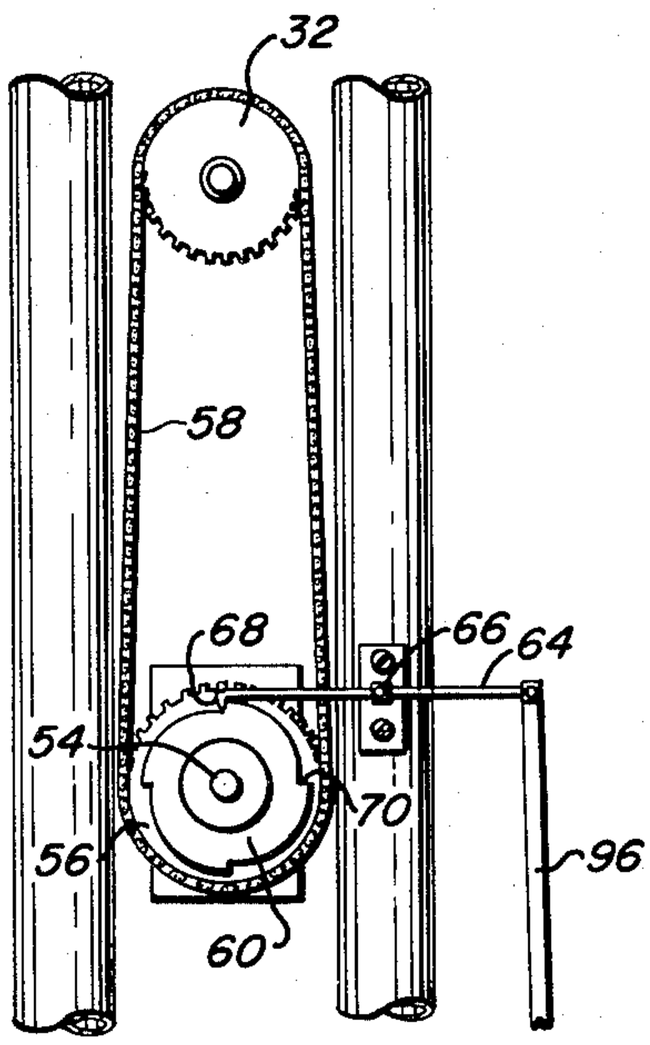


FIG. 6

INVENTOR.
PAUL L. SULLIVAN

BY Schmieding and Fultz
ATTORNEYS

United States Patent Office

3,180,307
Patented Apr. 27, 1965

3,180,307
FIRE ALARM

Paul L. Sullivan, 527 Harrison Ave., Lancaster, Ohio

Filed Apr. 29, 1963, Ser. No. 276,341
8 Claims. (Cl. 116—104)

This invention relates to fire alarm apparatus.

In general, the apparatus comprises an upright frame means that supports a bell and hammer mechanism arranged to produce a loud audible signal that can be heard throughout a dwelling or other building.

As another aspect of the present invention the apparatus comprises a driving means for intermittently actuating the hammer which driving means uniquely utilizes the controlled action of a falling weight to positively effect the alarm.

As still another aspect of the present invention, the above mentioned hammer driving means is released in the event of a fire by a unique trigger mechanism that incorporates a plurality of trigger members each of which is attached to a combustible string that is extended from the mechanism to a location in the building such that the string is severed and the trigger member released in the event a fire breaks out at any of the locations where the strings are anchored.

It is, therefore, an object of the present invention to provide a fire alarm apparatus that is driven by the potential energy of a falling weight. Hence, since no electrical apparatus is required, the apparatus will stiil function even though a fire causes failure of the electrical system in the home.

It is another object of the present invention to provide an apparatus of the type described that incorporates a novel trigger release and associated linkage which in the burning of any one of a plurality of combustible strings starts operation of a single alarm apparatus.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompany drawings wherein a preferred form of embodiment of the invention is clearly shown.

In the drawings:

FIG. 1 is a front elevational view of a fire alarm apparatus constructed in accordance with the present invention;

FIG. 2 is an enlarged partial front elevational view of the apparatus of FIG. 1;

FIG. 3 is an enlarged partial side elevational view of the apparatus of FIG. 1;

FIG. 4 is an enlarged partial rear elevational view of the apparatus of FIG. 1;

FIG. 5 is a top sectional view of a trigger mechanism comprising a portion of the apparatus of the preceding figures, the section being taken along the line 5—5 of FIG. 2; and

FIG. 6 is a partial sectional view showing a latch weld mechanism comprising a portion of the apparatus of the preceding figures, the section being taken along the line 6—6 of FIG. 3.

Referring in detail to the drawings, FIG. 1 illustrates a fire alarm apparatus constructed in accordance with the present invention that includes a frame means indicated generally at 20 that comprises spaced upright tubular frame members 22 and 24.

The upper end of the frame means carries bearing plates

26 that rotatably support a shaft 28 that mounts sprockets 30 and 32.

As is best seen in FIG. 4, a roller type chain 36 is passed over sprocket 30 and a heavier weight 38 is attached to one lower end of the chain, said weight being vertically movably mounted in tubular frame member 22.

A lighter weight 40 is attached to the lower end of chain 36.

When the apparatus is wound up to a stand-by position, by lifting heavier weight 38 in tubular member 22, then lighter weight 40 is dropped to a position where it rests on a stop pin 42 and the excess chain piles up above the weight as seen by the bends 44 in FIG. 4.

Referring again to FIGS. 1 through 3 a hammer member 46 is pivotally mounted to the frame at a pivot 48 and includes a follower portion 50 cyclically driven by a cam wheel 52, the latter being keyed to a shaft 54.

A driven sprocket 56, FIGS. 3 and 6, is also keyed to shaft 54 and is connected to the previously mentioned sprocket 32 by a chain 58.

As is best seen in FIG. 6, a latch wheel 60 is also keyed to shaft 54 and normally restrained from rotation by a latch lever 64 pivotally mounted to the frame means at pivot 66, said lever including a latch portion 68 that engages one of the latch portions 70 on latch wheel 60 as will be seen from FIG. 6.

With reference to FIG. 3 a centrifugal type speed governor indicated generally at 72 is driven, upon rotation of shaft 54 via sprockets 74 and 76 and chain 78.

Governor 72 includes a plurality of radially movable friction shoes 80 that engage the inner surface of a brake housing 82 upon rotation of governor shaft 84. The faster shaft 84 tends to move the greater the frictional engagement between brake shoes 80 and the inner brake surface on housing 82.

As is best seen in FIGS. 2, 3, and 5 the apparatus further includes a trigger mechanism indicated generally at 88 that comprises a housing 90 that contains a master lever 92 pivotted to the rear of the housing at a pivot 94. The right end of the master lever is connected to the lower end of a link 96 at a pivot 98, the upper end of the link being connected to latch lever 64 at a pivot 100.

A tension spring 102 constantly biases hammer 46 towards bell 49 and further functions to constantly urge link 96 upwardly and hence latch lever 64 into engagement with latch wheel 60.

Such latching engagement between lever 64 and wheel 60 is possible only so long as all of the trigger members 106 are maintained downwardly by the presence of tension in all of the plurality of strings 108. All of the trigger members 106 are pivoted to the rear of housing 90 at a pivot pin 110 and respectively biased upwardly by a plurality of tension springs 112. Each of the strings 108 passes under a respective pulley 114, one of which is seen in FIG. 1, whereby the strings pull directly downwardly on the trigger members 106.

In operation, the machine is prepared for standby by extending each of the strings 108 to a different location in the building, preferably at locations where a fire is most likely to start. The end of each string is anchored as its respective location such that its respective lever 106 is maintained downwardly, as seen in FIG. 1, against the action of springs 112 whereby linkage spring 102 is free to urge link 96 upwardly whereby latch lever 64 urges the latch portion 68 into engagement with latch portion 70 on latch wheel 60.

Main sprocket **30** is next wound in a counter-clockwise direction, as is seen in FIG. 4, to lift heavier weight **38** to a topmost position in tubular frame member **22** and when this occurs the lower end of chain **36** piles up in the other tubular frame member **24** above lighter weight **40**.

With this arrangement stop **42** and the accumulation of chain at **44** take part of the chain weight away from the left side of the apparatus as viewed in FIG. 4 until heavier weight **38** has descended approximately half-way downwardly. This makes the force exerted on main sprocket wheel **30** substantially constant whereby the period of oscillation of hammer **46** is also substantially constant.

Descent of weight **38** is also maintained substantially constant by the previously described centrifugal speed governor **72**.

When one of the combustible strings **108** is severed by burning one of the tension springs **112** lifts its respective trigger member **106** thereby disengaging latch portion **68–70** via lever **92**, link **96**, and latch lever **64**.

When latch portions **68–70** are released rotation of shaft **54** immediately begins whereby cam wheel **52** oscillates hammer member **46** in cyclical engagement with bell **49**.

The apparatus continues to produce hammer blow action on the bell until heavier weight **38** has reached the bottom of its path of travel in tubular frame member **22**.

I claim:

1. A fire alarm apparatus comprising, in combination frame means; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first free end; a second weight on said second free end; a bell mounted on said frame means; a lever pivoted on said frame means and including a hammer portion for striking said bell; a cam wheel rotatably mounted on said frame for driving said lever; cam wheel driving means connecting said cam wheel with said sprocket means; a latch wheel keyed for rotation with said cam wheel; a latch member releasably engaging asid latch wheel; a trigger member mounted to said frame means; linkage means connecting said latch member with said trigger member; and a combustible string attached to said trigger member whereby burning of said string releases said trigger member.

2. A fire alarm apparatus comprising, in combination frame means including two spaced upright tubular frame members; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first free end and vertically moveably disposed in one of said tubular frame members; a second weight on said second free end and vertically moveably disposed in the other of said tubular members; a bell mounted on said frame means; a lever pivoted on said frame means and including a hammer portion for striking said bell; a cam wheel rotatably mounted on said frame for driving said lever; cam wheel driving means connecting said cam wheel with said sprocket means; a latch wheel keyed for rotation with said cam wheel; a latch member releasably engaging said latch wheel; a trigger member mounted to said frame means; linkage means connecting said latch member with said trigger member; and a combustible string attached to said trigger member whereby burning of said string releases said trigger member.

3. A fire alarm apparatus comprising, in combination frame means; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first lower end; a second weight on said second free end, said second weight being heavier than said first weight; stop means on said frame for restricting the downward movement of said first lighter weight and for assisting the downward movement of said second heavier weight; a bell mounted on said frame means; a lever pivoted on said frame means and including a hammer portion for striking said bell; a cam wheel rotatably mounted on said frame for driving said lever; cam wheel driving means connecting said cam wheel with said sprocket means; a latch wheel keyed for rotation with said cam wheel; a latch member releasably engaging said latch wheel; a trigger member mounted to said frame means; linkage means connecting said latch member with said trigger member; and a combustible string attached to said trigger member whereby burning of said string releases said trigger member.

4. A fire alarm apparatus comprising, in combination frame means including two spaced upright tubular frame members; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first free end and vertically moveably disposed in one of said tubular frame members; a second weight on said second free end and vertically moveably disposed in the other of said tubular members, said second weight being heavier than said first weight; stop means on said frame for restricting the downward movement of said first lighter weight and for assisting the downward movement of said second heavier weight; a bell mounted on said frame means; a lever pivoted on said frame means and including a hammer portion for striking said bell; a cam wheel rotatably mounted on said frame for driving said lever; cam wheel driving means connecting said cam wheel with said sprocket means; a latch wheel keyed for rotation with said cam wheel; a latch member releasably engaging said latch wheel; a trigger member mounted to said frame means; linkage means connecting said latch member with said trigger member; and a combustible string attached to said trigger member whereby burning of said string releases said trigger member.

5. The apparatus defined in claim 1 that includes governor means for the speed of rotation of said cam wheel.

6. A fire alarm apparatus comprising, in combination frame means including two spaced upright tubular frame members; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first free end and vertically moveably disposed in one of said tubular frame members; a second weight on said second free end and vertically moveably disposed in the other of said tubular members; bell and hammer means for sounding an alarm; and driving means connecting said hammer means with said sprocket means.

7. A fire alarm apparatus comprising, in combination frame means; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first lower end; a second weight on said second free end, said second weight being heavier than said first weight; stop means on said frame for restricting the downward movement of said first lighter weight and for assisting the downward movement of said second heavier weight; bell and hammer means for sounding an alarm; and driving means connecting said hammer means with said sprocket means.

8. A fire alarm apparatus comprising, in combination frame means including two spaced upright tubular frame members; sprocket means rotatably mounted on said frame means; a chain carried on said sprocket and including first and second free ends; a first weight on said first free end and vertically moveably disposed in one of said tubular frame members; a second weight on said second free end and vertically moveably disposed in the other of said tubular members, said second weight being heavier than said first weight; stop means on said frame for restricting the downward movement of said first lighter weight and for assisting the downward movement of said second heavier weight; a bell mounted on said frame means; a lever pivoted on said frame means and including

a hammer portion for striking said bell; a cam wheel rotatably mounted on said frame for driving said lever; cam wheel driving means connecting said cam wheel with said sprocket means; a latch wheel keyed for rotation with said cam wheel; a latch member releasably engaging said latch wheel; a trigger member mounted to said frame means; linkage means connecting said latch member with said trigger member; and a combustible string attached to said trigger member whereby burning of said string releases said trigger member.

References Cited in the file of this patent

UNITED STATES PATENTS

500,329	Hewitt	June 27, 1893
623,747	Triscott	Apr. 25, 1899
757,490	Nickels	Apr. 19, 1904
962,625	Couture	June 28, 1910
1,895,967	Bowen	June 31, 1933
2,457,072	Smith	Dec. 21, 1948
2,569,062	Kjeldergaard	Sept. 25, 1951