Aug. 25, 1964 J. K. ROSE 3,146,452

REMOTELY OPERATED HAND CRANK AND GEAR DRIVE FOR ORIENTATION OF ANTENNAS ON A MAST

Original Filed June 10, 1953 2 Sheets-Sheet 1

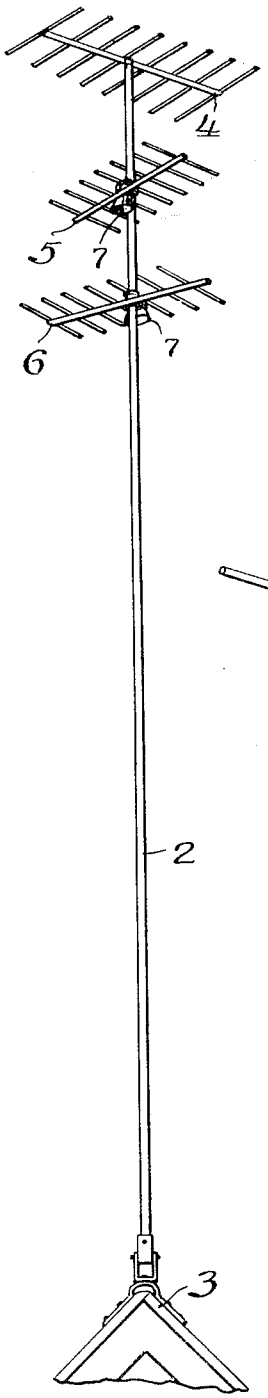


Fig. 1

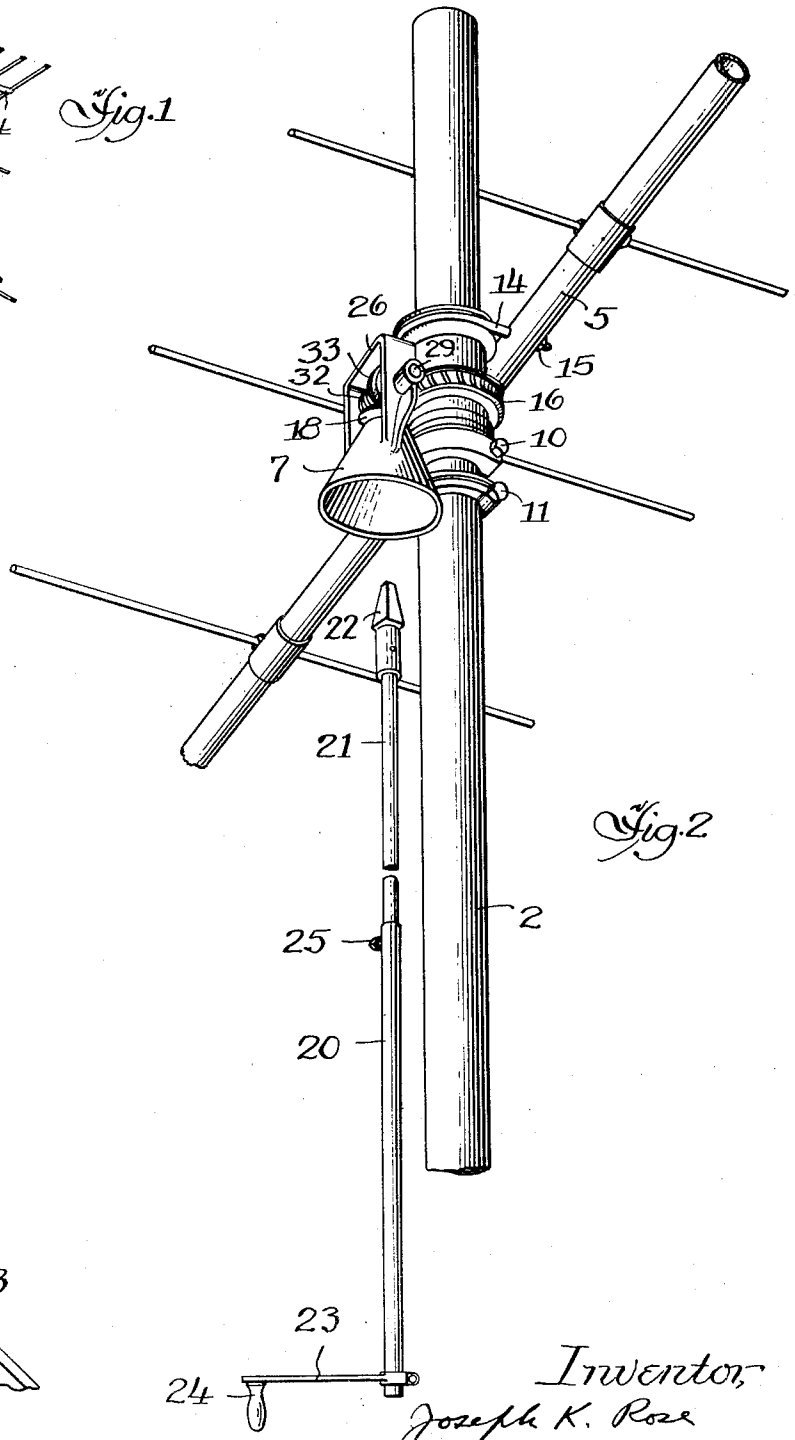


Fig. 2

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Fig. 3

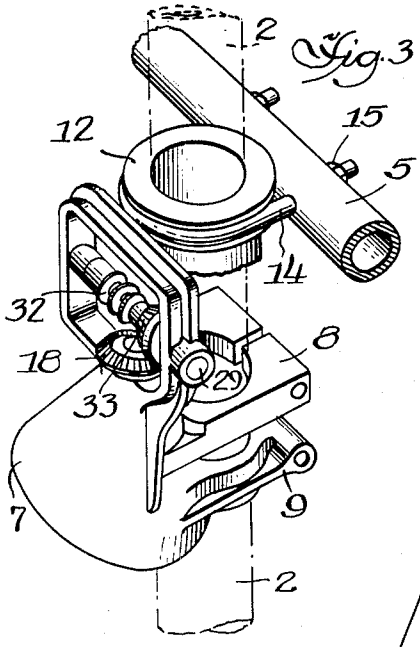


Fig. 4

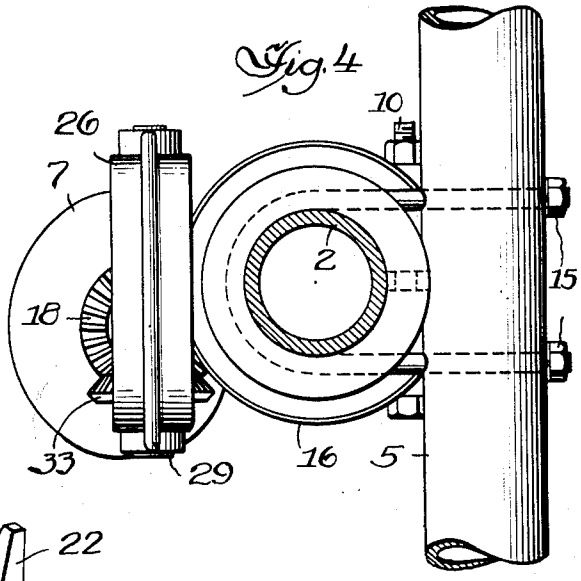


Fig. 7

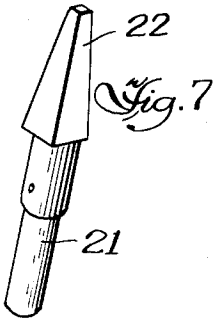


Fig. 5

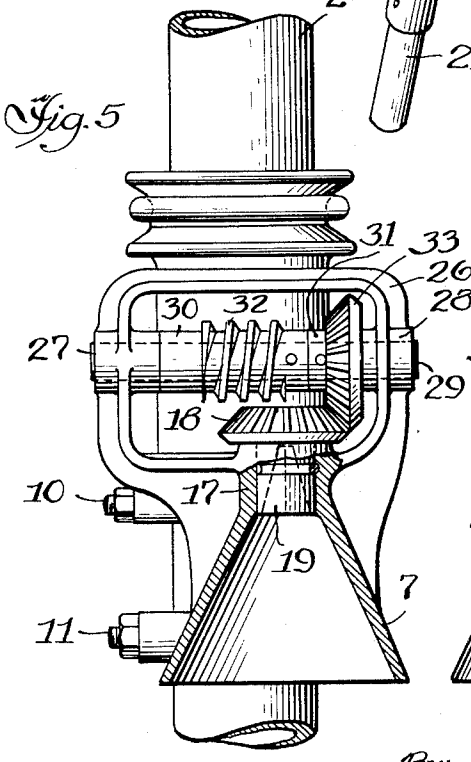
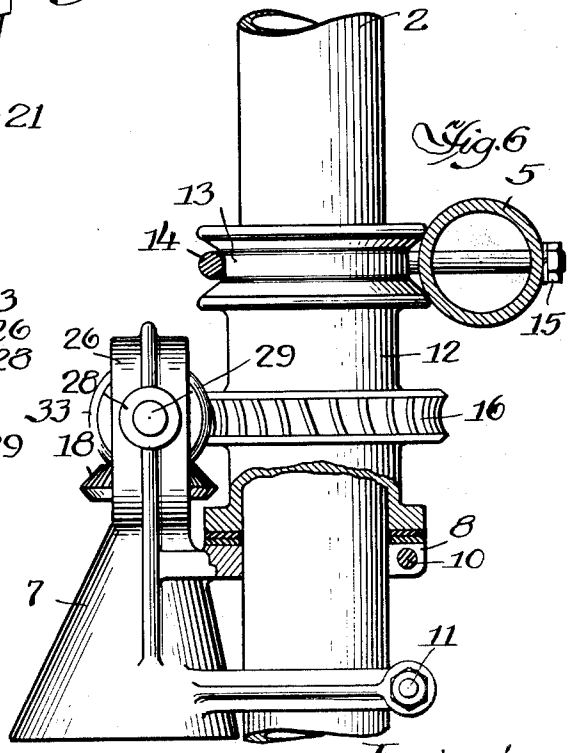


Fig. 6



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United States Patent Office 3,146,452 Patented Aug. 25, 1964

3,146,452

REMOTELY OPERATED HAND CRANK AND GEAR DRIVE FOR ORIENTATION OF ANTENNAS ON A MAST

Joseph K. Rose, 1116 Linden Ave., Highland Park, Ill.

Original application June 10, 1953, Ser. No. 360,707, now Patent No. 3,008,140, dated Nov. 7, 1961. Divided and this application June 27, 1961, Ser. No. 125,902

6 Claims. (Cl. 343—758)

This invention relates to means for independent orientation of antennas on a mast to selectively receive the television signals from broadcasting stations located in substantially different angular positions relative to the receiving antennas.

This application is a division of my prior copending application Serial No. 360,707, filed June 10, 1953, now Patent No. 3,008,140.

One of the characteristics of a television antenna is its directivity. This means that when pointed to or directed toward the transmitting antenna or signal source the signal pickup will be a maximum.

If the television antenna is rotated away from this direction, the signal pickup will be reduced. In the mechanical installation of a television antenna on its mast or tower, means must be provided for rotating the antenna until it is pointed in the direction of maximum signal pickup. It must then be mechanically secured to the mast or tower and kept in this fixed position without further movement.

If it is desired to pick up the signal selectively of two or more broadcasting stations located in substantially different directions from the receiving antenna, it is necessary to use a rotor which rotates the mast until the antenna is pointed at or correctly oriented for one of the desired signals. To receive the signal of the other broadcasting station, the mast or tower must again be rotated until the signal of the other station is received.

Another method of selectively receiving the signal of two or more stations located in substantially different angular positions relative to the receiving antennas is to use an antenna for each of the desired stations. Each antenna is directed toward the desired station.

To orient a single antenna on a mast or tower is relatively simple as the mast or tower can be rotated at the bottom until the antenna at the top is properly positioned rotationally.

However, if there are two or more antennas on such a mast or tower, this method can be used for one of the antennas only. To orient the other antenna, it is necessary to get up on a ladder and orient the second antenna without disturbing the position of the mast or tower.

If a tower is used, the tower can be climbed. However, most installations use a mast or single tube which can not be climbed. To reach the antenna with a ladder is difficult and dangerous. If the mast is mounted on a roof top the difficulty and danger is increased because of the sloping nature of most home roof constructions.

In my method, any one of two or more antennas can be independently oriented from a point remote from the point of attachment of the antenna to the mast, preferably adjacent the base of the motor or tower, without disturbing the orientation of any of the other antennas. The boom or longitudinal member of the antenna is rotatably secured to the mast or tower by means of a worm gear assembly. The worm gear is rotated by a set of bevel gears one of which is reached through a funnel shaped member. When it is desired to change the orientation of one of the antennas, a person standing adjacent the base of the mast extends a rod upwardly with the upper end extending into the mouth of the funnel-shaped member which guides it into engagement with a hollow stem

extending downwardly from one of the bevel gears into the neck of the funnel-shaped member. The hollow stem is rotatable in the neck of the funnel-shaped member, and its inside surface is non-circular. The upper end of the rod fits into the hollow stem, and the bevel gear is rotated by rotating the rod. This rotates the worm gear which turns a larger gear rigidly secured to a sleeve to which the boom of the antenna is secured. Thus the antenna may be rotated through substantially 360° to orient it to the desired point.

Wind or other forces exerted on the antenna will not change its rotational position. This is because it is characteristic of a worm gear that the worm will cause the gear to which it is engaged to rotate, but the gear itself is locked against the worm and can not rotate against it. A person standing at the base of the mast, whether it be on the ground or on the roof, can safely and easily rotate any of the antennas through substantially 360° to orient it without affecting the orientation of the other antennas and without the necessity of getting up on a ladder.

It is an object of my invention to provide simple, efficient means for securing a plurality of antennas to a mast or tower and for readily orienting any one of the antennas from a position remote from the point of attachment of the antenna to the mast, and preferably adjacent the base of the mast or tower, without disturbing the orientation of any of the other antennas.

It is further object of my invention to provide a mast or tower with a plurality of antennas each secured to a separate gear assembly arranged at different radial positions relative to the mast or tower and to provide each gear assembly with means for guiding a rod raised upwardly from a position adjacent the base of the mast or tower into engagement with the gear assemblies whereby any of said gear assemblies may be actuated to rotate an antenna secured thereto through substantially 360°.

Other objects and advantages of the invention will become apparent upon reading the following specification, taken in conjunction with the accompanying drawings showing a preferred embodiment of the invention, and in which:

FIG. 1 is a perspective view of a mast mounted on the top of a house and provided with three antennas;

FIG. 2 is a fragmentary perspective view showing a portion of the mast with a single antenna mounted thereon and a rod for orienting the antenna to any desired position;

FIG. 3 is a fragmentary perspective view showing the means for mounting the antenna on the mast;

FIG. 4 is a top plan view of the structure shown in FIG. 3;

FIG. 5 is a fragmentary side elevational view of the structure shown in FIG. 3;

FIG. 6 is another side elevational view showing the structure of FIG. 3 from a different angle; and

FIG. 7 is a fragmentary perspective view of the upper end of the rod adapted to orient the antenna relative to the mast in the embodiment illustrated in FIGS. 1 to 6, inclusive.

Although in the following description the structure to which the antennas are secured will, for convenience, be referred to as a mast, it will be understood that either a mast or tower may be used.

Referring to the drawings, the reference numeral 2 indicates a mast mounted in conventional manner on a rooftop 3. A plurality of antennas 4, 5, and 6 are mounted adjacent the top of the mast. The antenna 4 is rigidly mounted because it may be set in desired position to improve the reception of the television channel to which it is oriented at the time the mast is originally erected. However, it is obvious that it may also be mounted in the

same manner as the antennas 5 and 6. The mounting for the antennas 5 and 6 is the same so the following description will be limited to a single antenna.

An inverted funnel-shaped guide member 7 is rigidly secured to the mast 2 by means of a pair of split clamp members 8 and 9, each of which is held in tightened position by means of bolts. The clamping arms 8 and 9 are preferably integral with the funnel-shaped member 7, but, if desired, may be formed separately and rigidly secured to the funnel-shaped member. A sleeve 12 is rotatably mounted on the mast 2 above the upper clamping arm 8 and is supported thereby. The upper end of sleeve 12 is provided with a groove 13 adapted to receive a U-shaped clamp 14 which holds the antenna 5 rigidly to the sleeve. A simple way of securing the antenna in place is illustrated in FIGS. 3 and 5 wherein the U-clamp projects through apertures in the stem of the antenna and nuts 15 are tightened against the outer surface of the stem to hold the antenna securely in place. Any suitable means for securing the antenna rigidly against the sleeve 12 may be used. The sleeve 12 is provided with a worm wheel 16 which is preferably integral with the sleeve but may be formed separately and rigidly secured to the sleeve in any desired manner.

The funnel-shaped member 7 is provided at its upper edge with an open upstanding neck portion 17. A bevel gear 18 is provided with a stem 19 which fits into the neck portion 17 and is rotatable therein. The stem 19, which may be integral with the bevel gear 18 or may be rigidly secured thereto, is hollow, and its interior surface is preferably square, although any non-circular surface might be used. The bevel gear 18 is manually rotated from a position remote from the point of atachment of the antenna to the mast, and preferably adjacent the base of the mast by means of a rod 21 having its upper end shaped like a truncated pyramid, as indicated at 22. A crank 23 is secured to the lower end of the rod 20 and is preferably provided with a handle 24, by means of which the rod may be rotated. The rod may be of a single length, but for convenience is preferably made of telescoping sections which are held in extended position by means of a set screw 25. When the rod is fully extended, the end 22 is inserted through the bottom of the funnel-shaped member 7 and, because of its shape, will find its way in the hollow stem 19. Rotation of the rod 20 will then cause rotation of the bevel gear 18 in the same direction.

A frame member 26 integral with the funnel-shaped member 7 extends upwardly therefrom in the shape of a hollow rectangle and is provided on its vertical branches with a pair of horizontally extending bearings 27 and 28 which are axially aligned with each other. A shaft 29 is rotatably mounted in the bearings 27 and 28. A worm gear 30 and a sleeve 31 are mounted on the shaft 29 between the bearings 27 and 28. The worm 30 is provided on its outer surface with teeth 32 meshing with the teeth of worm wheel 16. A bevel gear 33, having its teeth in mesh with the teeth of bevel gear 18, is mounted on the sleeve 31.

When the gear 18 is rotated it will in turn rotate the gear 33. Since the gear 33 is keyed to the shaft 29, its rotation will cause the worm 30, which is also keyed to the shaft 29, to rotate. The teeth 32, which mesh with the worm wheel 16, will thereupon rotate the worm wheel to move the sleeve 12, to which the antenna is rigidly secured. Accordingly, it is a very simple thing to rotate the antenna in either direction without disturbing the setting of any other antenna mounted on the mast. The pitch of the teeth 32 and the teeth of the worm wheel 16 will prevent rotation of the worm wheel by wind blowing against the antenna. Accordingly it is not necessary to provide any other means for locking the antenna against such rotation. It should also be noted that the funnel-shaped member 7 of each antenna is preferably displaced angularly relative to the funnel-shaped members of the other antennas so that any of them is easily accessible to the rod 20.

From the foregoing it will be seen that I have devised a television mast or tower upon which a plurality of antennas may be mounted in such a manner that any of the antennas may be oriented independently of the others. This arrangement permits each antenna to be individually rotated relative to the mast to tune in a particular broadcasting channel so that no manipulation of the mast or antennas is required when the television viewer changes the receiver from one channel to another.

Although I have described a preferred embodiment of my invention in considerable detail, it will be understood that the description is intended to be illustrative, rather than restrictive, as many details may be modified or changed without departing from the spirit or scope of my invention. Accordingly, I do not desire to be restricted to the exact structure described, except as limited by the appended claims.

I claim:

1. A television mast having a plurality of vertically spaced antennas positioned thereon, separate means rotatably connecting each of said antennas to said mast, a second means detachably engageable by direct physical contact with any of said first mentioned means to rotate the antenna connected by it to the mast, said second means being operable by hand from a point remote from the point of attachment of said antenna to said mast, and a guide member fixed below each of said first mentioned means, each of said guide members converging toward the related first mentioned means for guiding said second mentioned means into engagement with any one of said first mentioned means from a wide range of positions spaced laterally from the vertical axis of the guide member fixed below said one first mentioned means.

2. In combination, a television mast, an inverted funnel-shaped member having a pair of laterally projecting arms clamped to said mast, a sleeve rotatably mounted on said mast above said arms, an antenna rigidly secured to said sleeve, a worm wheel rigidly secured to said sleeve, a gear assembly positioned above said funnel-shaped member, said gear assembly including a worm gear engaging said worm wheel, and manually operable means insertable through said funnel-shaped member for rotating said sleeve to orient said antenna.

3. In combination, a television mast, an inverted funnel-shaped member having a plurality of laterally projecting arms clamped to the upper portion of said mast, a frame member projecting above said funnel-shaped member, a plurality of interrelated gears mounted in said frame member, one of said gears having an internal surface engageable by a rod inserted through said funnel-shaped member to rotate said gears, a sleeve rotatably mounted on said mast above said funnel-shaped member, a worm wheel on said sleeve, said worm wheel being meshed with one of said gears whereby said sleeve is rotated relative to said mast when said gears are rotated, and an antenna rigidly secured to said sleeve.

4. In combination, a television mast, a plurality of inverted funnel-shaped members each having an upstanding neck portion and a pair of laterally projecting arms clamped to said mast in vertically spaced relationship, said funnel-shaped members being spaced radially of each other, each of said funnel-shaped members supporting a set of interrelated gears, one gear of each set having a hollow stem rotatably mounted in said upstanding neck portion and rotatable through substantially 360° by manually operable means projected through said funnel-shaped member into said hollow stem from a point remote from said funnel-shaped members, a plurality of sleeves each rotatably mounted on said mast above the arms of one of said funnel-shaped members and supported thereby, each of said sleeves having a worm wheel meshed with one of said gears whereby each of said sleeves may be independently rotated relative to said mast while

the other sleeves remain in fixed position relative to said mast, and an antenna rigidly secured to each of said sleeves.

5. In combination, a television mast, an antenna rotatably secured to said mast, a gear assembly operatively connected to said antenna, manually operable means movable into direct physical contact with said gear assembly for actuating said gear assembly from a point remote from the point of attachment of said antenna to said mast to rotate said antenna, and a guide member converging toward said gear assembly to guide said manually operable means into direct physical contact with said gear assembly.

6. In combination, a television mast, a sleeve rotatably mounted on said mast, an antenna rigidly mounted on said sleeve for rotation therewith, guide means comprising a convergent guide member fixedly mounted on said mast, a gear assembly operatively connected to said sleeve for rotating said sleeve and said antenna about said mast, said gear assembly including an input gear member having a first drive connector located at the apex of said convergent guide member, and a manually operable drive member including an elongated shaft having a second drive connector, complementary to said first drive connector, mounted at one end thereof, said second drive connector being insertable through and being guided by said convergent guide member into engagement with said first drive connector to rotate said antenna, through said drive connectors and said gear assembly, in response to manual rotation of said shaft.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,146,452 August 25, 1964

Joseph K. Rose

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 62, for "motor" read -- mast --; column 3, line 33, for "atachment" read -- attachment --.

Signed and sealed this 8th day of December 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents