

Center Point Marker (CPM)

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ABSTRACT

Present invention provides specially an instrument called Center Point Marker (CPM). Center Point Marker is an instrument, which is used to mark the Center point of a line, in a single step. It can also be used to mark the center point of the line located on undulating ground like hilly area or valley area, in addition to the plain area. It is a user-friendly instrument and makes the job of the surveyor convenient. It can also be used to mark Offsets and Perpendiculars very easily. Following invention is described in detail with the help of Figure 1 of sheet 1 showing the sketch of the proposed main body of center line marker.

Keywords – Center, Point, Marker, undulating, convenient.

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I. INTRODUCTION

Present invention in general relates to design and develop an instrument Called Center Point Marker (CPM) to mark the center point of a line in a single step and in particular to mark the center point of the line located on undulating ground.

1.1 PROBLEM STATEMENT:

In day-to-day Surveying Practice, Surveyor comes across number of times to mark the center point of the Survey line.

In the Project like laying out a building plan, there are a number of places where one needs to mark the center point of the line and take perpendicular offsets. At present tapes and chains are usually used to mark the center points. But, during such work they should be operated with much care and some calculations are always having to be made.

Field measurements are taken with the assumption in mind that ground is plane which is not the case most of the times. Even after making the calculations, the calculated center point should be transferred to the ground with high degree of accuracy.

While marking the center point of undulating ground or inclined surface, most of the times some mistake is committed. This usually happens due to the following reasons:

1. Making Calculations in the open ground is difficult and usually leads to errors.
2. When the climate is adverse (i.e., Sunny etc.), especially in the tropical regions the Surveyor may leave his patience.
3. When there is limitation of time or work is to be wrapped quickly.
4. When the Surveyor is a temporary staff & does not have many obligations towards the organization.

1.2 PRESENT SYSTEM:

To Mark the offsets at any point Cross staffs are used along with the ranging rods, which helps to mark the perpendicular offsets or oblique offsets to the existing survey line. But this process requires ranging operation of very high degree of accuracy, which may not be possible some of the times, due to the above cited reasons.

After marking the offset's, measuring tape is used to mark the center point. In this method the head of tape is kept on the first point and then the tape is dragged to the second point thus the distance between the two points is noted and then the location of the point at half of the distance is identified, this point is marked as center point. In this method, it is not possible to get actual true center point between 2 points due to undulations in the ground.

Chain can also be used to mark the center point, but the limitations with use of chain are that

- 1) It is Very heavy to carry.
- 2) It is not as flexible as tape.
- 3) Its least count is 20cm (which is too high).

Due to above mentioned practical difficulties use of measuring Tape is recommended over the chain.

1.3 PROPOSED SYSTEM:

In the proposed system, use of a newly devised instrument is recommended to mark the center point of the line. This instrument named as “**Center Point Marker**” has rolling mechanism at the center and housed inside the cylinder. The cylinder is regarded as the main body of the instrument. One handle is provided on each side of the cylinder. Handle remains connected to the tape. Tape remains wrapped inside the cylinder and is in contact with the gear system. So, when one handle is pulled, then some length of the tape gets unwrapped and comes out of the cylinder. At the same time, the other side of instrument i.e., second handle’s side gets loosened & equal length of the tapes comes out of the cylinder in the loose catenary form. So, when tape of both the sides are kept tight, the instrument (main body i.e cylinder) is always located at the center of the two handles. Thus, marking center point becomes a one-step, Job. All the job, which the first person needs to do is, to grab the handle on one side of the cylinder and stand over the first point and another person (i.e., second person) should grab the handle on other side of the cylinder & proceed in the direction of second point. He should reach to the second point and stand exactly over the second point. Then, the third person needs to just mark the center point which would be exactly beneath the instruments position. For this purpose, the third person can drop a pebble from just below the cylinder’s position and the point where pebble touches the ground is regarded as the “Center Point”

II. FIGURES AND TABLES

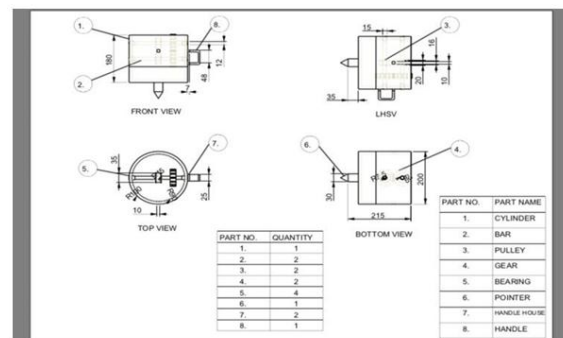


Fig 2.1 Centre point marker design

2.1 WORKING:

Above mentioned figure shows two-Dimensional (i.e., 2D) view of Center point marker. It consists of following parts:

1. Cylinder
2. Bar
3. Pulley (on which tape is wound)
4. Gear
5. Bearing
6. Pointer
7. Handle housing
8. Handle
9. Steel tape.

When the tape on one side (i.e part 9) is stretched using the handle, then the other side of the tape (i.e part 9) also gets unwrapped in equal length. This is achieved due to the rotation of the gear no. 1 i.e (part 4) and gear no. 2 i.e (part 4) because they are in mesh condition. therefore, the tape on the other side i.e (part 9) will be unfolded simultaneously in equal length.

The tape on one side (i.e part 9) is stretched at the one end and simultaneously the tape on other side (i.e part 9) is stretched at the other end and then the whole assembly is dropped at the center of the both the tape side and hence the center point will be marked (when the third person is not available). When, the third person is available, then the procedure mentioned in the proposed system should be followed.

2.2 Example of marking the center point with the instrument:

Let us say center point is to be marked between the two points named as Point No. 1 and the Point No.2. The first person should hold one of the handles of the instrument and stand exactly over the Point No. 1. While the second person should grab the second handle (located on other side of the instrument) and stretch the handle by giving little Jerk. The tape will be unfolded from both the sides

in equal length (due to gear arrangement provided in mesh condition). The second person should start moving in the direction of the Point No.2. In this process he will have to go on stretching the tape by giving little Jerks (if required). He will always keep the tape in tight condition & inform the first person also to maintain it tight. During this course of travel, he will observe (by eye judgment) that the main part of the instrument (i.e., cylinder) is always located somewhere midway of the distance travelled. When the second person reaches to the Point No.2, then both of them should ensure first that the tape is maintained in perfectly tight position and catenary is not available in any portion. Then, they should sit on the ground simultaneously & slowly, by maintaining the tape on both sides of the instrument in tight condition. The point on the ground, where pointer (part no 6) touches the ground is regarded as the center point.

If third person is available, then his assistance can be taken as explained in the proposed system.

2.3 Advantages of Center Point Marker (CPM) :

- 1) It reduces the time period taken for marking the location of center point.
- 2) The accuracy of marking the location of center point improves considerably.
- 3) This instrument does not require skilled labor.

2.4 Disadvantages of Center Point Marker (CPM):

- 1) We need to maintain the tape in perfectly straight condition on both sides.
- 2) We have to take care that tape does not get submerged in water (in low lying areas).

2.5 APPLICATIONS

- 1) For survey of the road (profile leveling) for marking offsets etc.
- 2) For making building layout.
- 3) For marking out center point in the interior work.

III. CONCLUSION

It eliminates the tedious work encountered for marking the center point, using the existing conventional methods. It also minimizes the efforts and time to be taken for marking the center points in the surveying operation, which ultimately leads to economy in the project.

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