

May 12, 1942.

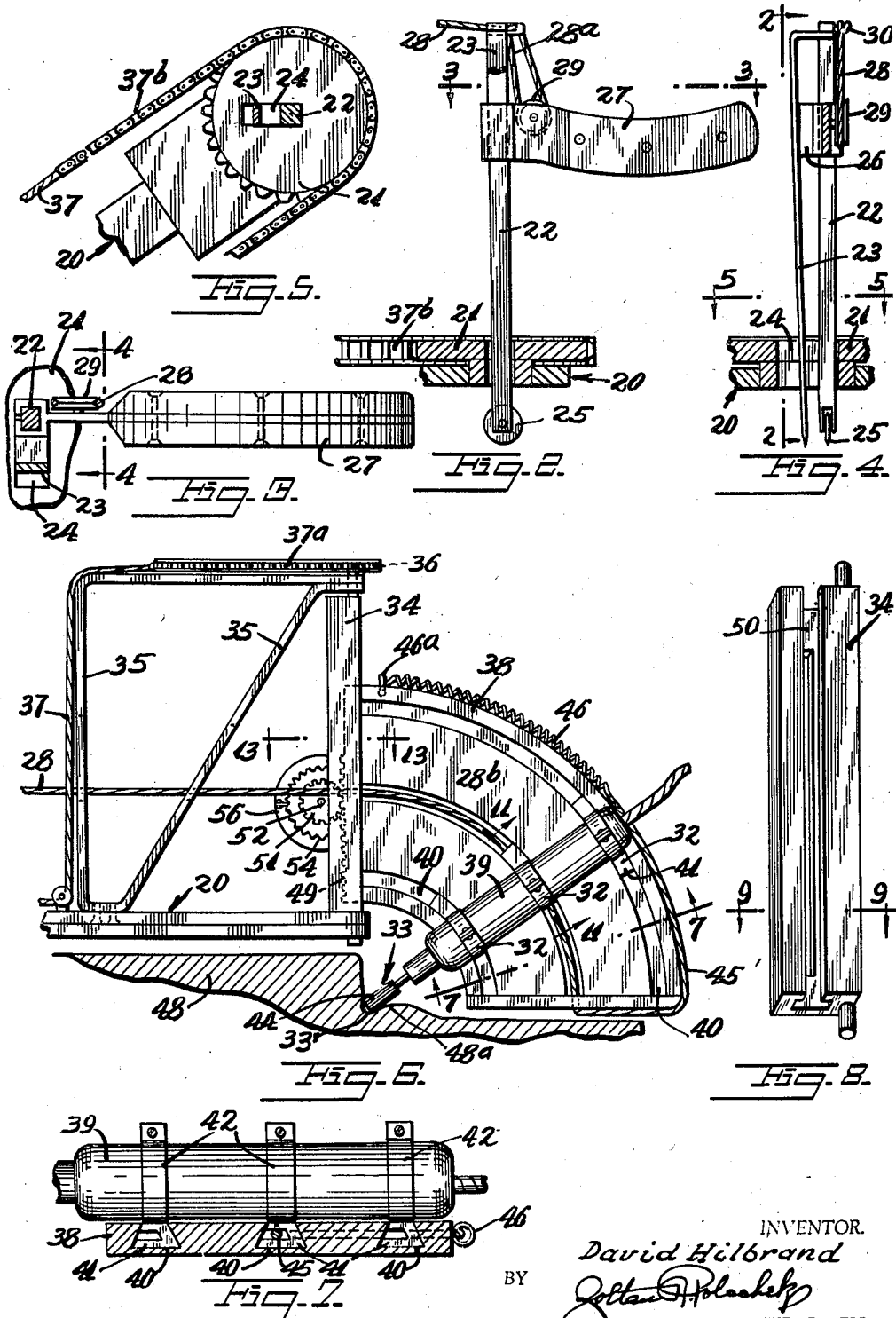
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CUTTING AND REDUCING DEVICE FOR RELIEF PICTURES

Filed Oct. 10, 1941

3 Sheets-Sheet 2



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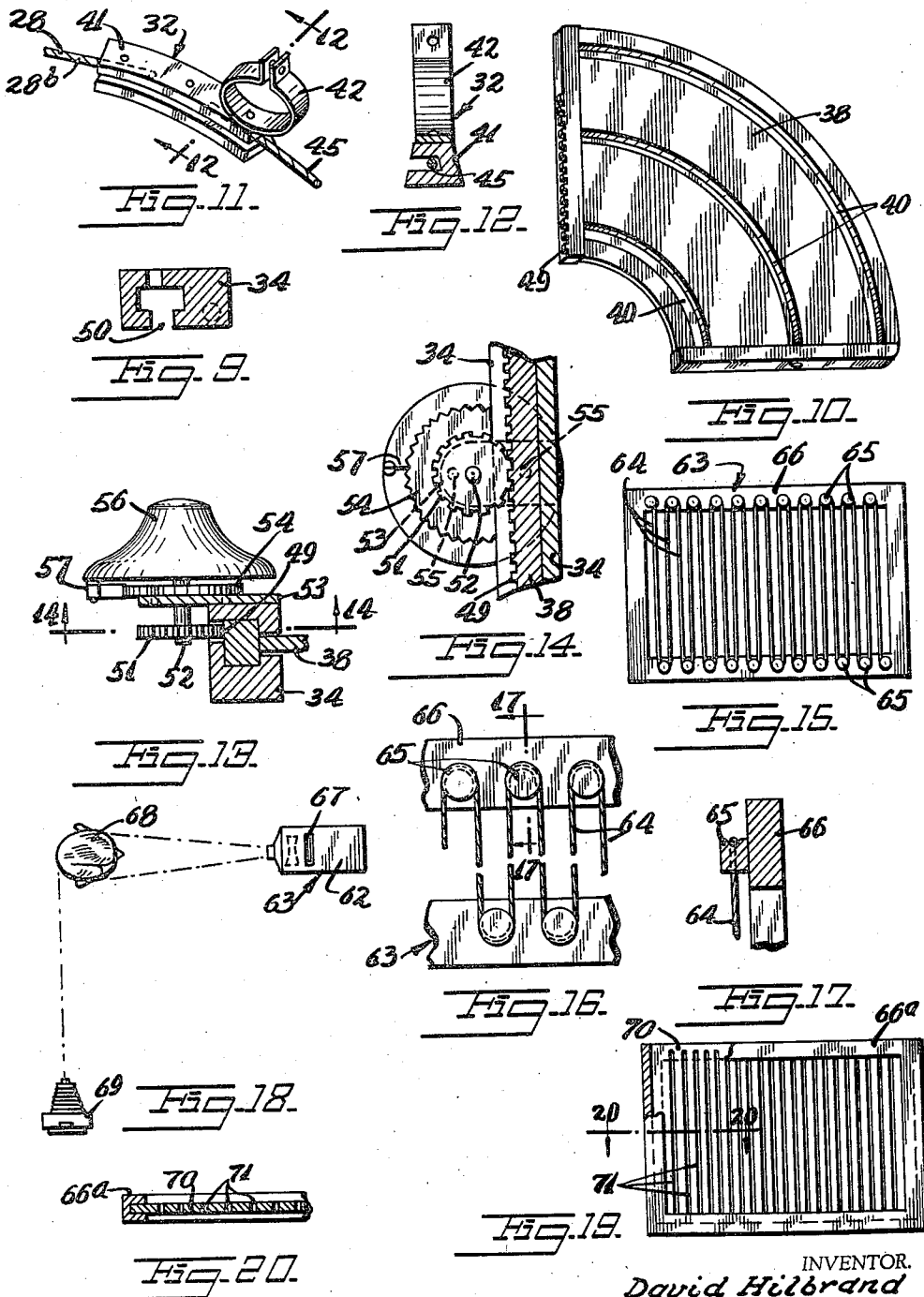
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CUTTING AND REDUCING DEVICE FOR
RELIEF PICTURES

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14 Claims. (Cl. 90—13.1)

This invention relates to new and useful improvements in a cutting and reducing device for relief pictures.

More particularly, the invention proposes a device as mentioned which is characterized by a pantograph and certain mechanism mounted thereon for cutting the relief pictures, as desired.

More specifically, the invention proposes to turnably mount a gear on one of the arms of the pantograph and to mount a following rod and following pointer in a certain way on and in relation to said gear, to provide a cam to control the separation of said pointer and rod, and a certain mechanism operated by these parts to control a cutting tool.

It is proposed to mount the cutting tool on an arcuate member which is mounted on a bar turnably mounted on another one of the arms of the pantograph at a similar point to the point of location of said gear on said pantograph arm. A transmission system is proposed from the first-named gear to turn said bar in relation to the turning of the following rod. A mechanism is also proposed for pivotally moving the cutting tool on the arcuate member in relation to the spacing of the following rod and following pointer.

In practising the invention it is proposed to provide a specially prepared picture which is to be copied in relief. It is proposed that this picture have guiding lines drawn or imprinted thereon in accordance with a certain process to control the relief of the picture. The invention will point out a photographic method of obtaining the copying picture with the lines.

For further comprehension of this invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a cutting and reducing device for making a relief picture in accordance with this invention, and shown being used.

Fig. 2 is a fragmentary vertical sectional view of a portion of Fig. 1, this view being taken on the line 2—2 of Fig. 4.

Fig. 3 is a fragmentary horizontal sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary vertical sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a horizontal sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is a fragmentary enlarged sectional view of a portion of Fig. 1 showing particularly the cutting tool and associated parts.

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 is a perspective view of the vertical bar shown in Fig. 6.

Fig. 9 is a horizontal sectional view taken on the line 9—9 of Fig. 8.

Fig. 10 is a perspective view of the arcuate member shown in Fig. 6.

Fig. 11 is a fragmentary perspective view looking in the direction of the line 11—11 of Fig. 6.

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11.

Fig. 13 is a horizontal enlarged sectional view taken on the line 13—13 of Fig. 6.

Fig. 14 is a vertical sectional view taken on the line 14—14 of Fig. 13.

Fig. 15 is an elevational view of a certain screen used in the process embodying the invention.

Fig. 16 is a fragmentary enlarged detailed view of a portion of Fig. 15.

Fig. 17 is a sectional view taken on the line 17—17 of Fig. 16.

Fig. 18 is an illustration showing a method of taking a copying picture in accordance with this invention.

Fig. 19 is a view similar to Fig. 15, but illustrating another form of the screen.

Fig. 20 is an enlarged sectional view taken on the line 20—20 of Fig. 19.

The cutting and reducing device for relief pictures, in accordance with this invention, includes a pantograph 20 of the usual construction. A gear 21 is turnably mounted on one of the arms of the said pantograph 20. A following rod 22 is coaxially fixedly mounted through the gear 21. This rod projects above and below the gear. A following pointer 23 is mounted upon the top end of the rod 22 and extends through a slot 24 formed in the gear 21. A wheel 25 is turnably mounted upon the bottom end of the following rod 22 to guide the following rod upon a picture being copied. The following pointer 23 is flexible and normally seeks a position so that its bottom end is very close to the following wheel 25. A cam 26 is movably mounted on the following rod 22 and is adapted to control the separation of the following pointer 23 and the following rod 22.

The cam 26 is provided with a projecting handle 27 by which it may be conveniently moved.

The arrangement is such that when the handle 27 is moved downwards the cam 26 separates the pointer 23 and rod 24 in direct relation to the distance through which the cam is moved. A cable 28 is connected with the cam 26 for communicating the position of the cam to the cutting tool of the device, as hereinafter more fully explained. One end 26^a of the cable 28 is attached to the top of the following rod 22. The cable then extends around a pulley 29 mounted on the side of the cam 26. The cable 28 then extends up over a guide element 30 mounted on the top of the following rod 22 and extends over a guide wheel 31 coaxially mounted at the junction of certain arms of the pantograph 20. The cable 28 then continues and connects at the end 28^b with a clamp 32 which supports the cutting tool 33.

A bar 34 is turnably mounted on another one of the arms of the said pantograph 20 at a similar point to the point of rotation of said gear 21 on its pantograph arm. The bar 34 has its top end supported by a frame 35 which is fixedly mounted on the pantograph arm. A gear 36 is mounted on the top end of the bar 34, and more particularly, on the pivot of the bar. An endless member 37 connects the gears 21 and 36 for turning the last-mentioned gear the same angular amount as the first mentioned gear is turned. This endless member 37 has a sprocket chain section 37^a which engages around the gear 36 and a sprocket chain section 37^b which engages around the gear 21.

An arcuate member 38 is mounted on the bar 34 and has its center of curvature directly below the bar in the vicinity of the extremity 33' of the cutting tool 33. The cutting tool 33 comprises a small electric motor 39 which is supported by several of the clamps 32 which are slidably mounted in arcuate tracks 40 formed concentric with the point 33'. Each clamp 32 comprises a base section 41 which slidably engages in a groove 40, and a motor supporting ring 42 mounted on the base section 41. A cutting implement 44 is mounted on the shaft of the motor 39.

The cable 28 has its end 28^b connected with the central one of the clamps 32. An auxiliary cable 45 connects with this central clamp and extends around the bottom portion of the arcuate member and up along the outer side and connects with one end of a spring 46 which has its other end 46^a fastened to the arcuate member. The construction is such that when the cable 28 is pulled the spring 46 will stretch and the cutting tool 33 will be moved to a different arcuate position without disturbing the extreme end 33' of the cutting implement of the tool. The cutting implement 44 is illustrated cutting the work 48 at the area 48^a.

A mechanism is provided for supporting the arcuate member 38 in various elevated positions. This mechanism includes a rack 49 on one side of the arcuate member 38 and disposed within a groove 50 formed in the bar 34. The rack 49 meshes with a gear 51 on a stem 52 rotatively supported in a plate 53 fixedly mounted on the side of the bar 34. The stem 52 extends through a gear 54 which is stationarily fixed on the plate 53 by several rivets 55. A handle 56 is mounted on one end of the stem 52. A spring 57 is carried by the handle 56 and engages the teeth of the gear 54.

The arrangement is such that the handle 56 may be turned in one direction or the other to force the spring 57 over the teeth of the stationary

gear 54 to turn the stem 52 so as to raise or lower the rack 49 and thus the arcuate member 34.

The apparatus is operated in conjunction with a picture 60 which is to be copied. This picture has certain prepared lines 61 drawn or printed thereon. One method of making a picture of this type is illustrated in Fig. 18. A standard projector 62 is provided with a special screen 63 having a plurality of parallel lines 64. These lines are formed by winding a cord over a plurality of top and bottom pegs 65 mounted on a frame 66 of the screen. The projector 62 has an opening 67 in which the screen 63 is mounted. The projector 62 is thrown upon an object 68 to be photographed and the object 68 will have lines on it produced by the lines 64. The object 68 is photographed with a standard camera 69. The finished picture will look like the picture shown in Fig. 1 and indicated by reference numeral 60.

In Figs. 19 and 20, a screen 70 is shown in a frame 66^a. This screen is made of an opaque screen and is formed with vertical slots 71 to permit the rays from the projector to form lines of rays on the object 68, which may be photographed by one or two cameras facing each other in direct alignment, each 90° from the projector 62. With two cameras the lines at both sides of the object may be photographed simultaneously. If it is desired, more than two cameras may be used and the photographs may be taken at 45° or at any other suitable angle. The lines 61 may also be prepared by drawing the lines on the picture 60.

The device is used as illustrated in Fig. 1. The picture 60 is copied by moving the following wheel 25 and the following pointer 23 along parallel lines 61 of the picture 60. This is done by merely holding the handle 27. The handle 27 must be moved downwards when the lines 61 separate, and moved upwards when they come closer together. The handle 27 must be turned to maintain the wheel 25 upon the line being followed when this line turns.

All turning movements of the following rod 22 will be communicated by the endless member 37 to correspondingly turn the bar 34. All movements of the pointer 23 towards and away from the following rod 22 will be communicated by the cable 28 to correspondingly move the cutting tool 33. It is merely necessary to follow the guiding lines on the picture 60 to produce the work 48 which will correspond with the picture but be in relief, depending on the guiding of the lines 61.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said

pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam.

2. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said first-named gear having a slot through which said rod and pointer extend.

3. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said first-named gear having a slot through which said rod and pointer extend, said pointer being flexible and normally maintaining a close position to the rod.

4. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of

the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said first-named gear having a slot through which said rod and pointer extend, said pointer being flexible and normally maintaining a close position to the rod, said cam having a handle by which it may be moved along the rod.

5. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said first-named gear having a slot through which said rod and pointer extend, said pointer being flexible and normally maintaining a close position to the rod, said cam having a handle by which it may be moved along the rod, said cam being non-rotative on said following rod so that the following rod is turned when the handle is turned.

6. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of the cam, said following rod being provided with a following wheel at its bottom end.

7. A cutting and reducing device for relief pic-

tures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said bar being mounted between a frame and the arm of the pantograph.

8. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said bar being mounted between a frame and the arm of the pantograph, said bar being provided with top and bottom pintles.

9. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said bar being mounted between a frame and the arm of the pantograph, said bar being provided with top and bottom pintles, said latter-named gear being on one of said pintles.

10. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said endless member having sprocket chain sections engaging the teeth of said gears.

11. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, said cutting tool being supported on clamps working in arcuate slots on said arcuate member.

12. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, comprising a spring on said arcuate member urging said tool in one direction, and said cable being connected with said tool to move it in the other direction.

13. A cutting and reducing device for relief

pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said pantograph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, and means for holding said arcuate member in various elevated positions.

14. A cutting and reducing device for relief pictures, comprising a pantograph, a gear turnably mounted on one of the arms of said panto-

graph, a following rod coaxially fixedly mounted through said gear, a following pointer mounted on said rod, a cam movably mounted on said rod and adapted to control the separation of said pointer and rod, a cable connected with said cam for communicating the position of the cam, a bar turnably mounted on another one of the arms of said pantograph at a similar point to the point of location of said gear on said pantograph arm, a gear mounted on said bar, an endless member connecting said gears for turning the last mentioned gear the same angular amount as said first mentioned gear, an arcuate member mounted on said bar and having its center directly below said bar, a cutting tool located at the center of said arcuate member and movably supported on said arcuate member to pivot about said center, and means actuated by said cable for moving said cutting tool in relation to the position of said cam, and means for holding said arcuate member in various elevated positions, comprising rack teeth on said arcuate member, a pinion engaging said rack teeth, and means for holding said pinion in various turned positions.

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