March 9, 1937. B. HEILMAN 2,073,343

WIREWORKING MACHINE

Filed April 13, 1936

2 Sheets-Sheet 1

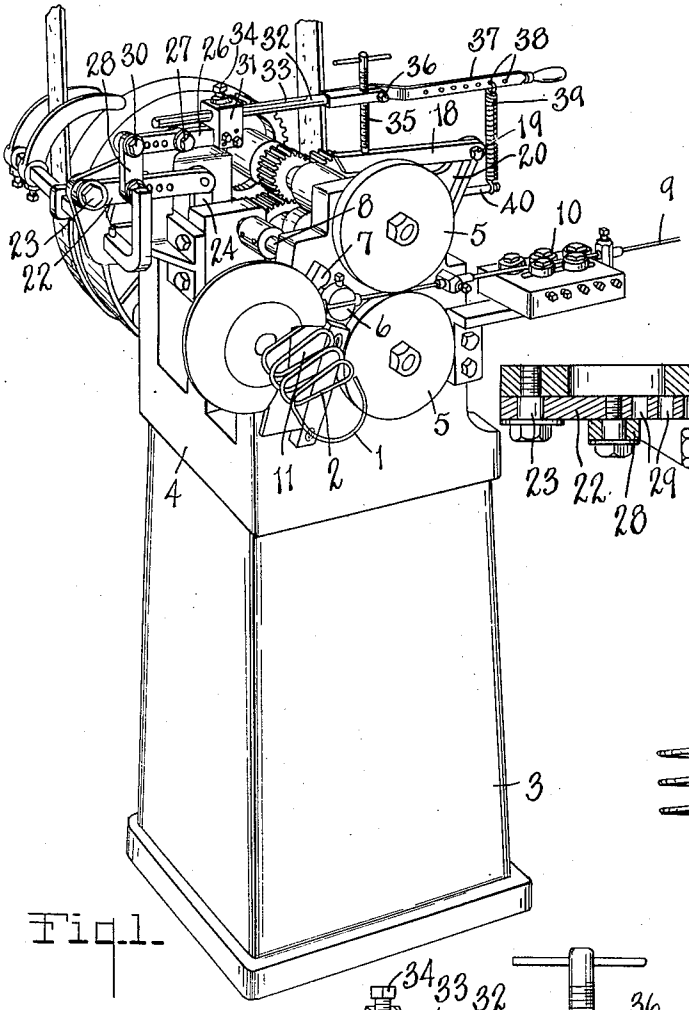


Fig. 1.

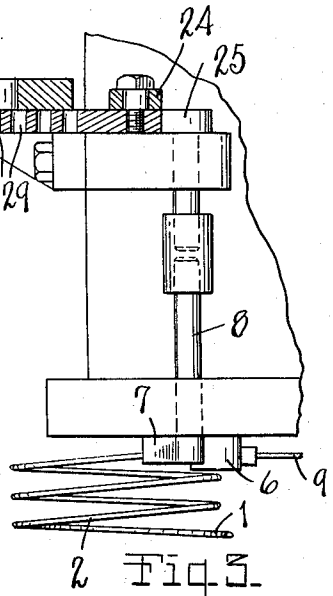


Fig. 3.

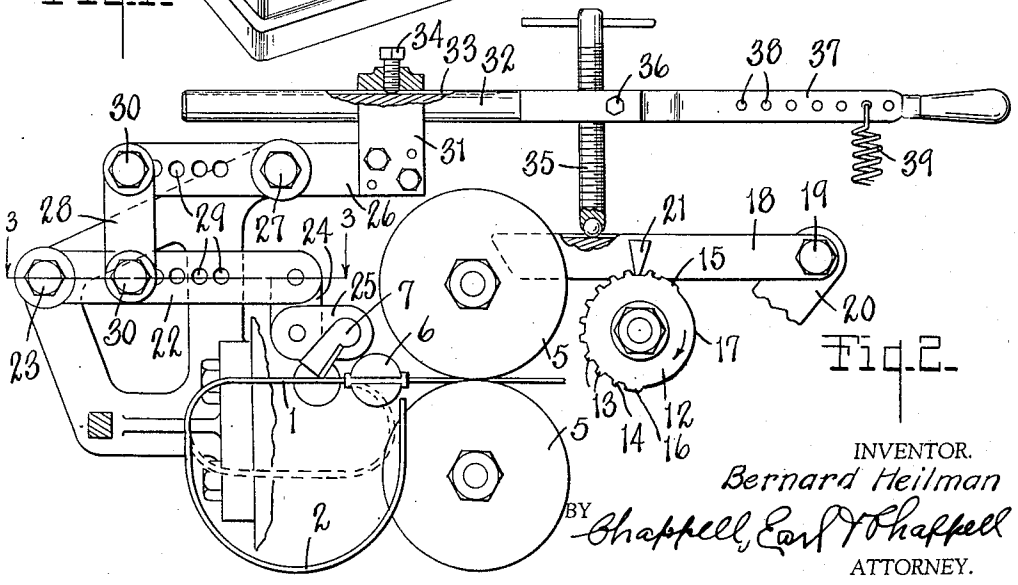


Fig. 2.

INVENTOR.
Bernard Heilman
BY Chappell, Earl & Chappell
ATTORNEY.

March 9, 1937. B. HEILMAN 2,073,343

WIREWORKING MACHINE

Filed April 13, 1936 2 Sheets-Sheet 2

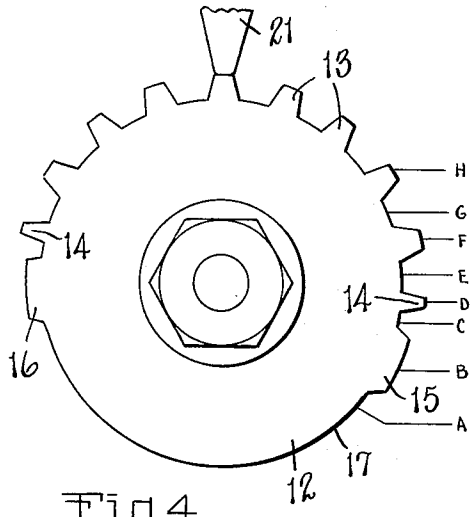


Fig. 4.

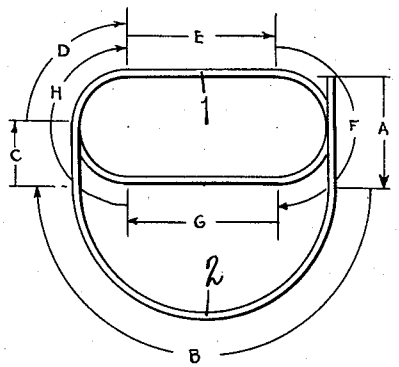


Fig. 5.

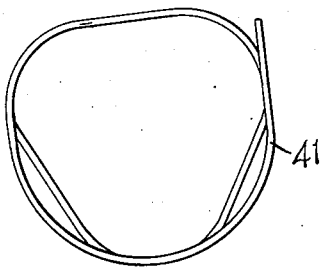


Fig. 6.

INVENTOR.
Bernard Heilman
BY Chappell, Earl & Chappell
ATTORNEYS

Patented Mar. 9, 1937 2,073,343

UNITED STATES PATENT OFFICE

2,073,343

WIREWORKING MACHINE

Bernard Heilman, Detroit, Mich., assignor to L. A. Young Spring & Wire Corporation, Detroit, Mich.

Application April 13, 1936, Serial No. 74,000

17 Claims. (Cl. 140—78)

The main objects of this invention are:

First, to provide an improved coil forming machine which may be readily adjusted for forming coils having a wide range in the matter of shape and size or diameter of the coils.

Second, to provide an improved coiling machine which may be adjusted for forming coils in which certain of the individual coils differ widely in shape and diameters from other coils of the spring.

Third, to provide a coiling machine having these capabilities which is comparatively simple in its parts and is of large capacity.

Objects pertaining to details and economies of construction and operation of my invention will definitely appear from the description to follow. The invention is defined in the claims.

A structure which embodies the features of my invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of a coiling machine embodying the features of my invention, one type of coil for which the machine is adapted being illustrated in partially formed condition.

Fig. 2 is a fragmentary view of the main coil forming and operating parts of the machine in their operative relation certain features being omitted for clearness of illustration.

Fig. 3 is a fragmentary view partially in section on line 3—3 of Fig. 2.

Fig. 4 is a diagrammatic view of the control cam with the follower in operative relation thereto.

Fig. 5 is a diagrammatic view of a coil formed on the machine with the cam shown in Figs. 2 and 4, the lettering of Figs. 4 and 5 corresponding.

Fig. 6 is a view of another form of spring illustrating the capabilities of the machine.

The machine illustrated is adjusted for the forming of a spring having flattened intermediate coils 1 and offset end coils 2. The machine comprises a suitable pedestal 3 having a head 4 thereon of suitable design for the mounting of the moving parts. The coil is formed by being fed through suitable coacting feed rolls 5 through the guide 6 and against the forming or coiler member 7 which is mounted on the rockshaft 8. The wire is fed into impinging relation to or against the coiler member and the position of this coiler member determines the shape and size of the coil.

The stock or wire 9 is drawn through the straightening rollers 10 and in practice the feed rollers act intermittently, being moved to and from feeding position so that the feeding operation is discontinued during the cutting operation. The means for effecting this are well-known in the art, as is also the association of a suitable pitch block 11 with the forming member. The details of the cut-off and the pitch block are therefore not illustrated as they form no part of this invention, which relates primarily to the control of the forming member whereby springs of a great variety of forms and dimensions may be effectively produced.

The control cam 12 illustrated is provided with a series of tooth-like cam projections 13, the end projections 14 being of substantially one-half the width of the other or intermediate cam projections of the series. At each end of the series I provide cam projections 15 and 16, these cam projections being wider but of less height than the other cam projections.

Between the cam projections 15 and 16 the cam is provided with a dwell 17. In Fig. 4 I have applied the letters A, B, C, D, E, F, G, and H to certain of the cam surfaces to facilitate understanding of the operation of the machine or the functional relation of the parts, as will be described later.

The forming lever 18 is pivoted at 19 on a suitable bracket 20 on the head of the machine, this lever being provided with a cam follower 21 of such design as to follow the various cam surfaces of the cam.

The forming member actuating lever 22 is pivoted at 23 and connected by the link 24 to the arm 25 on the rockshaft 8. An intermediate lever 26 is pivoted at 27 and connected by the link 28 to the actuating lever 22. The levers 22 and 26 are each provided with a longitudinal series of holes 29 adapted to selectively receive the pivots 30 of the link 28 so that by adjusting the link connection between these levers 22 and 26 the relative throw of the levers may be very greatly varied.

The lever 26 is provided with a block 31 on one end which adjustably receives the lever arm 32, this arm being grooved at 33 to be engaged by the set screw 34 so that the arm may be adjusted, and thus the length of the lever or the arm of the lever carrying the forming lever follower 35. This follower 35 is screw-threaded through the arm 32, the arm being split as shown in Fig. 4 and a clamping screw 36 being provided for securing the follower in its adjusted position on the arm. The arm has an extension 37 provided with a series of holes 38 with which the spring 39 may be selectively engaged, the other end of the spring being engaged with the pin 40.

With this arrangement the position at which the follower engages the forming lever 18 may be varied as desired, thus securing a variation in the throw or the degree of throw of the lever 26 when the forming lever is actuated by one of the cam projections. Further variation is secured, as stated, by the adjustment of the link. Through this compound lever variable throw mechanism the range of movement of the coiler member or block may be very greatly varied; for example, from the position shown in Fig. 2, where the coiler block or forming member is swung to a position which does not deflect the wire as it is projected from the guide, to the position forming the relatively short bends or curves as at the ends of the flattened coils. In Fig. 2 the parts are shown with one extended end coil formed, and also a succeeding coil.

In Figs. 4 and 5 I have applied the letters A to H, inclusive, and have indicated on Fig. 5 the sections of the formed work which are formed while the follower travels the lettered portions of the cam, the letters corresponding to those in Fig. 4 being applied to Fig. 5. It will be understood, however, that part of the time while the follower is traveling the surface A the feeding rollers are in inoperative position and the cut-off is functioning. It will also be understood that the exact shape and number of the cam projections may be greatly varied, according to the work it is desired to produce. Great variations in the work may be had merely by the adjustment of the operating connections between the forming lever and the forming member. If it is desired to produce work in which the latterly extended spring is intermediate the end coils, the cam would be modified by interposing a cam projection such as 15 of suitable dimensions between the other cams.

In Fig. 6 I illustrate one form of spring 41 which may be formed on the machine illustrated merely by the adjustment of operating connections and there are many other forms or modifications possible on the same machine and with the same cam. However, the range of the machine may be greatly extended by variations in the arrangement of the cam projections.

I have illustrated and described my machine in a practical embodiment thereof and primarily as set for producing springs having flattened or elongated intermediate coils, these coils being well adapted for use as border coils in spring mattress units. I have not attempted to illustrate or describe the very wide range of adjustments and adaptations as it is believed that that would be impractical with any degree of brevity or conciseness. It is further believed that the disclosure made will enable those skilled in the art to embody or adapt my improvements as may be desired.

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

1. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam having a series of uniformly spaced tooth-like cam projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being cam projections of substantially greater width but of less height at each end of the series, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever provided with a longitudinally adjustable arm having an adjustable follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said actuating lever, said intermediate lever and actuating lever each being provided with a longitudinal series of holes with which the connecting link pivots may be selectively engaged to vary the relative throw of the levers.

2. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam having a series of uniformly spaced tooth-like cam projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being cam projections of substantially greater width but of less height at each end of the series, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever provided with a longitudinally adjustable arm having an adjustable follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said actuating lever.

3. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam having a series of uniformly spaced tooth-like cam projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being cam projections of substantially greater width but of less height at each end of the series, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever having a follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said actuating lever, said intermediate lever and actuating lever each being provided with a longitudinal series of holes with which the connecting link pivots may be selectively engaged to vary the relative throw of the levers.

4. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam having a series of uniformly spaced tooth-like cam projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being cam projections of substantially greater width but of less height at each end of the series, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever having a follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said actuating lever.

5. In a coiling machine, the combination with

a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever provided with a longitudinally adjustable arm having an adjustable follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said forming member actuating lever, said intermediate lever and actuating lever being each provided with a longitudinal series of holes with which the connecting link pivots may be selectively engaged to vary the relative throw of the levers.

6. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever provided with a longitudinally adjustable arm having an adjustable follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said forming member actuating lever.

7. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever having a follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said forming member actuating lever, said intermediate lever and actuating lever each being provided with a longitudinal series of holes with which the connecting link pivots may be selectively engaged to vary the relative throw of the levers.

8. In a coiling machine, the combination with a coiler member provided with a rockshaft having an arm thereon and feed means operatively associated with said coiler member, of a coiler member control means comprising a control cam, a pivoted actuating lever, a link connecting said actuating lever to said arm on said coiler member rockshaft, a pivoted forming lever provided with a follower coacting with said cam, a pivoted intermediate lever having a follower thereon coacting with said forming lever, and a link connection for said intermediate lever and said forming member actuating lever.

9. In a coiling machine, the combination of a coiler member and feed means operatively associated therewith, of a control cam having a series of uniformly spaced tooth-like cam projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being other cam projections at each end of the series, a forming lever provided with a cam follower coacting with said cam, and a compound lever assembly operatively connected to said coiler member, one lever of said assembly being provided with a follower operatively associated with said forming lever, the follower being mounted for adjustment longitudinally of said forming lever and transversely of the lever on which it is mounted, the compound lever mechanism including adjusting means for varying the relative throw of the levers.

10. In a coiling machine, the combination of a coiler member and feed means operatively associated therewith, of a control cam having a series of uniformly spaced tooth-like cam projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being other cam projections at each end of the series, a forming lever provided with a cam follower coacting with said cam, and a compound lever assembly operatively connected to said coiler member, one lever of said assembly being provided with a follower operatively associated with said forming lever.

11. In a coiling machine, the combination of a coiler member and feed means operatively associated therewith, of a control cam, a forming lever provided with a cam follower coacting with said cam, and a compound lever assembly operatively connected to said coiler member, one lever of said assembly being provided with a follower operatively associated with said forming lever, the follower being mounted for adjustment longitudinally of said forming lever and transversely of the lever on which it is mounted, the compound lever mechanism including adjusting means for varying the relative throw of the levers.

12. In a coiling machine, the combination of a coiler member and feed means operatively associated therewith, a control cam having a series of uniformly spaced tooth-like projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being cam projections of substantially greater width but of less height at each end of the series, a forming lever provided with a cam follower coacting with said cam, and operating connections for said forming lever to said coiler member.

13. In a coiling machine, the combination of a coiler member and feed means operatively associated therewith, of a control cam having a series of uniformly spaced tooth-like projections, the end cam projections of the series being substantially one-half the width of the other cam projections of the series, there being other cam projections at each end of the series, a forming lever provided with a cam follower coacting with said cam, and operating connections for said forming lever to said coiler member.

14. In a coiling machine, the combination of a coiler member, and feed means operatively associated therewith, of a control cam having a series of tooth-like cam projections, a forming lever provided with a cam follower coacting with said cam, and operating connections for said forming lever to said coiler member including means for increasing the throw of said forming lever.

15. In a coiling machine, the combination of a coiler member, and feed means operatively associated therewith, a control cam having a series of tooth-like cam projections, a forming lever provided with a cam follower coacting with said cam, and operating connections for said forming lever to said coiler member.

16. In a coiling machine, the combination of a coiler member, and feed means operatively associated therewith, of a control cam having a series of relatively narrow cam projections, a forming lever provided with a cam follower coacting with

said cam, and operating connections for said forming lever to said coiler member including means for increasing the throw of said forming lever.

17. In a coiling machine, the combination with a coiler member, and feed means operatively associated therewith, of a control cam having a series of tooth-like cam projections, certain of the cam projections having wider faces than others, a forming lever provided with a cam follower coacting with said cam, and operating connections for said forming lever to said coiler member including means for increasing the throw of said forming lever.

BERNARD HEILMAN.