2 Sheets—Sheet 1.

J. S. PESSENGER.

MACHINE FOR SETTING ELLIPTIC SPRINGS.

No. 186,159. Patented Jan. 9, 1877.

Fig. 1.

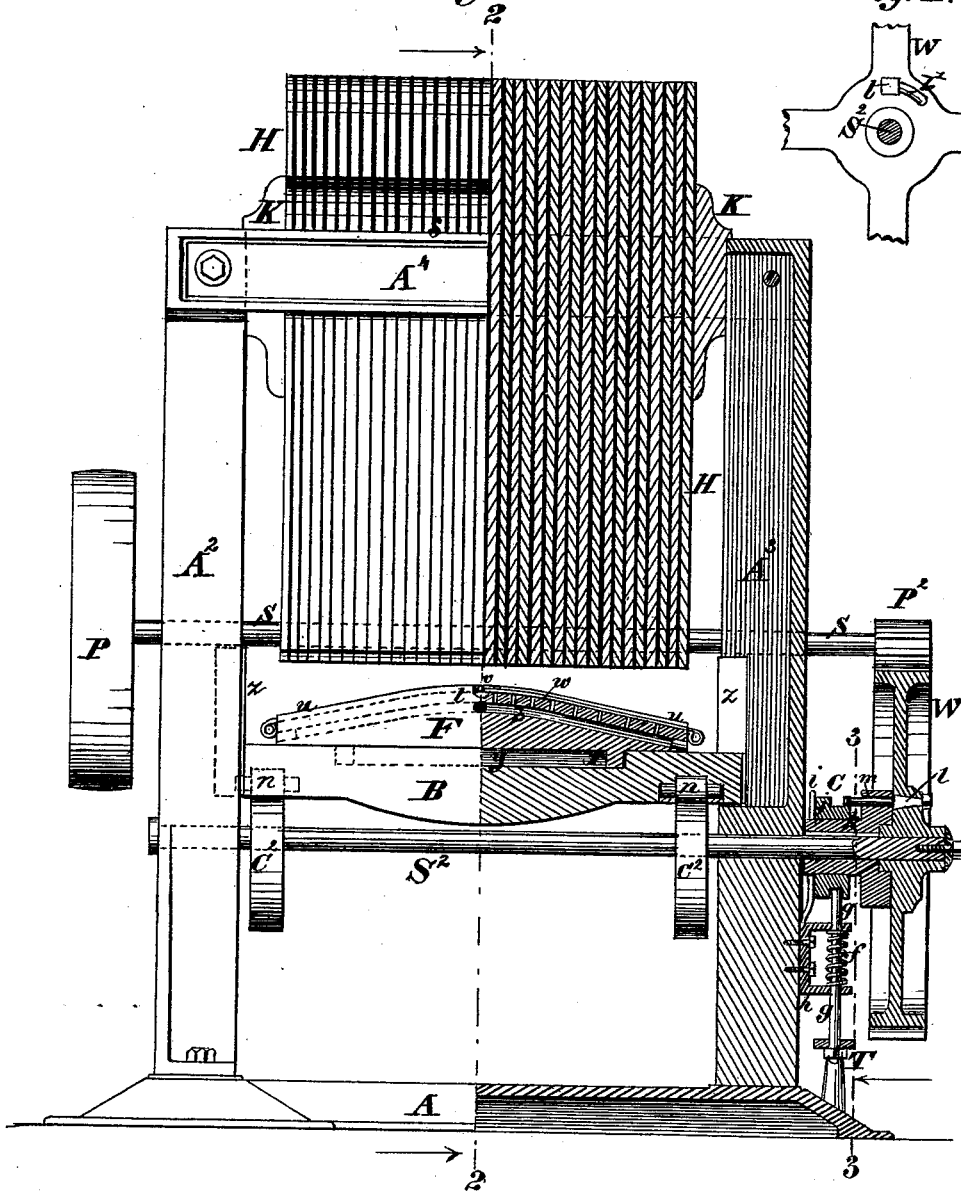


Fig. 1.ª

WITNESSES

Chas. J. Cook

La Blond Burdett

INVENTOR

John S. Pessenger.

By Knight Bros Attorneys.

2 Sheets—Sheet 2.

J. S. PESSENGER.

MACHINE FOR SETTING ELLIPTIC SPRINGS.

No. 186,159. Patented Jan. 9, 1877.

Fig. 2.

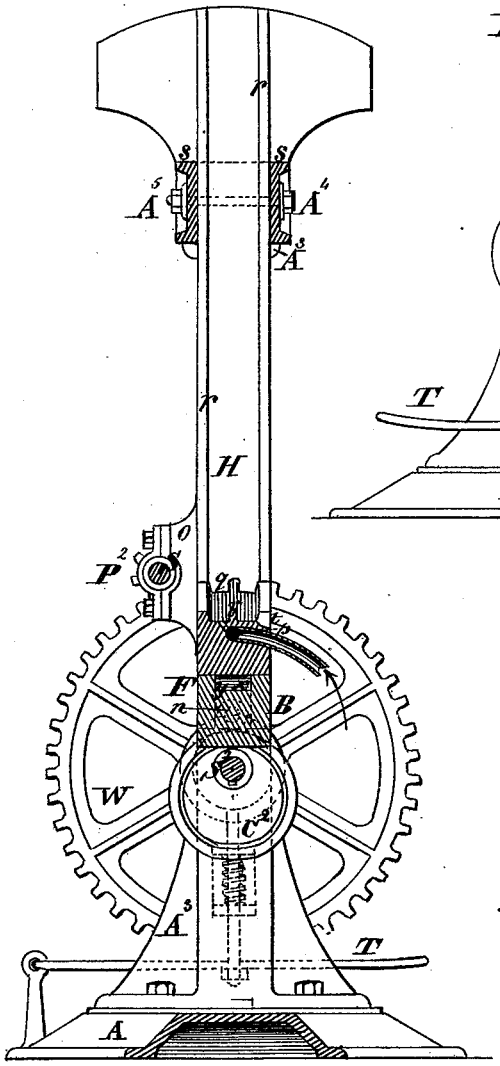


Fig. 3.

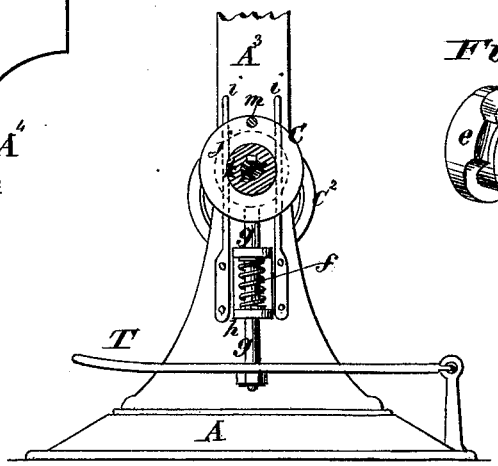


Fig. 4.

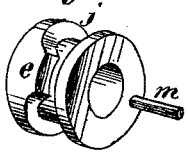


Fig. 5.

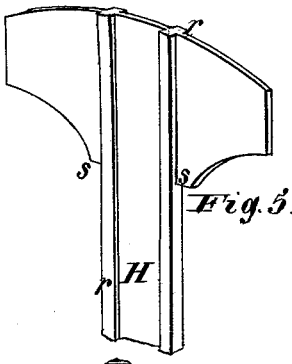
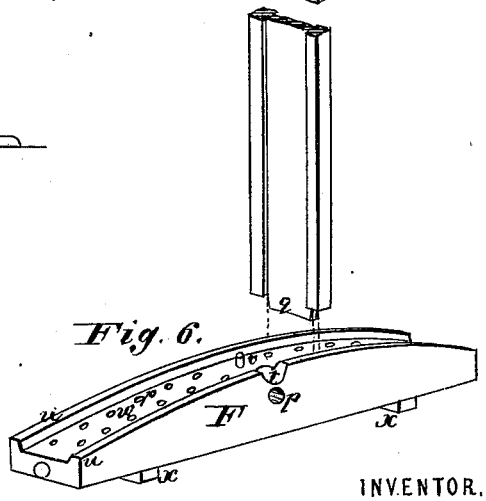


Fig. 6.



WITNESSES

Chas J Gooch

LeBlond Burdett

INVENTOR.

John S. Pessenger.

By Knight Bros Attorneys.

UNITED STATES PATENT OFFICE.

JOHN S. PESSENGER, OF BIRMINGHAM, CONNECTICUT.

IMPROVEMENT IN MACHINES FOR SETTING ELLIPTIC SPRINGS.

Specification forming part of Letters Patent No. **186,159**, dated January 9, 1877; application filed October 6, 1876.

To all whom it may concern:

Be it known that I, JOHN S. PESSENGER, of Birmingham, in the county of New Haven, in the State of Connecticut, have invented a new and useful Improvement in Apparatus for Fitting or Setting Elliptic Springs, of which the following is a specification:

This invention relates to the manufacture of elliptic springs for carriages and other vehicles and for other uses, and more particularly to the work of fitting or setting each plate and leaf, which consists in giving thereto the required curvature or set. This is the last operation before tempering, after which the parts are assembled for testing.

The old method of fitting or setting is to clamp the heated plate or leaf on a thin former of its own width, and then pinch or bite it by means of tongs until it is completely fitted down upon the former. Two men work together on each piece, and the operation is necessarily laborious and expensive. A greater objection thereto consists, however, in its slowness, which causes great loss of stock, through the failure of the plates and leaves to temper properly after it. This is owing to the heat of the plate or leaf falling below the proper tempering-point during the protracted fitting operation.

In United States Letters Patent No. 166,918, dated August 24, 1875, of which I am the sole owner, a setting-machine is described, in which the heated plate or leaf is clamped on an adjustable former, which is raised and lowered by means of screws, beneath a flexible upper die or series of weights, against which the heated plate or leaf is slowly pressed by the elevation of the former, said weights operating by gravity to press and hold the plate or leaf down upon the former, beginning at the middle and acting successively toward the ends.

The present machine is an improvement on that described in said Patent No. 166,918.

The objects of the invention are, first, to perform simultaneously the operation of fitting or setting the plate or leaf and the operation of straightening the same edgewise; secondly, to chill the bent plate or leaf on its bottom or concave side, so as to cause it to retain its form more perfectly and, by the same means, to keep the former cool and to remove the scale from the top of the former; thirdly, to employ interchangeable positive formers, adapted to be cast and to be readily applied and removed without careful adjustment; fourthly, to so operate the sliding cross-head or bed which carries the former as that the heated spring-plate or leaf shall receive distinct blows from the successive weights or hammers which constitue the flexible upper die, in order to effect a positive displacement of the hot metal outward from the middle, as in hand-pinching; fifthly, to provide for stopping the rapidly-reciprocated former, either up, so as to hold the plate or leaf a moment under the pressure of the weights or hammers, or down, in position for removing the plate or leaf and introducing another, at the will of the operator without using his hands; and finally, to provide for straightening the heated plates or leaves edgewise, and fitting or setting the same with such rapidity that they can be brought to the proper temper by their subsequent immersion in the tempering-bath, with superior certainty, besides the other advantages of more rapid work.

The improved machine accomplishes said objects, and is also simple and economical in its construction and operation, as hereinafter set forth.

Figure 1 is a front view of this improved machine, partly in vertical section. Fig. 2 represents a vertical transverse section on the line 2 2, Fig. 1. Fig. 3 represents a vertical transverse section on the line 3 3, Fig. 1, showing the clutch mechanism. Fig. 4 is a perspective view of the sliding clutch-sleeve or hub. Fig. 5 is a perspective view of one of the sliding weights or hammers. Fig. 6 is a perspective view of a former.

Like letters of reference indicate corresponding parts in the several figures.

The frame of this improved machine is composed of an oblong base, A, a pair of uprights, A^2 A^3, at the ends of the base, and a pair of flat cross-pieces A^4 A^5, at the top of the uprights, making in all five castings, securely united by bolts, as shown in Figs. 1 and 2. At a certain point a cast-iron cross-head or sliding bed, B, is arranged between the up-

rights A^2 A^3. Shoulders at the ends of the sliding bed are planed, and vertical planed ways *z* are provided therefor on the inner surfaces of the uprights. Its upper surface is planed also, to render it perfectly level, and is provided with a depression or socket, *y*, to adapt it to receive interchangeable positive formers F, the bottoms of which are correspondingly planed and provided with projections or tenons *x*, adapted to fit snugly in the socket *y* at its respective ends. These formers are adapted to be cast to nearly or quite the required shape, as regards their upper surface, but may be readily perfected by planing. A sufficient number of formers will be provided to "fit" the various sets of plates and leaves for springs of different sizes within the limits of each individual machine. One is shown detached in Fig. 6. Besides the convex surfaces *w* of the required curve, and the usual center pins *v*, to occupy the rivet-holes in the plates and leaves, the formers F have been constructed with marginal flanges *u*, to gage the edges of each plate or leaf. The flanges of each former are beveled slightly on the inside, and are reduced in depth toward the middle. The front flange is also made somewhat the lowest, and is cut away to form a tongs-space, *t*, to facilitate introducing and removing the plates or leaves. One of the latter is shown in position in Fig. 1 as at the end of the fitting operation. The sliding bed B, carrying one of the formers, as shown, works beneath a flexible upper die, composed of sliding weights or hammers H, guided by the cross-pieces A^4 A^5 of the frame, and by edge guides or keys K K, Fig. 1. The hammers work independently of each other by gravity and inertia. Each one is about half an inch thick, and is a simple solid casting of the required weight. Shoulders *s* are provided to rest on the top of the frame, and below these the width of the hammers is determined by the depth of the uprights A^2 A^3 from front to rear. The upper ends of the hammers above said shoulders can be made of any preferred width and form, provided an equal balance be maintained.

For fitting the plates and leaves of elliptic springs for railway-cars one hundred pounds per hammer is considered sufficient; for those of the general class of elliptic springs, such as are used on carriages and wagons, seventy-five pounds per hammer; and for those of seat-springs thirty pounds per hammer. This gives blows of two hundred pounds weight per linear inch in railway-work, one hundred and fifty pounds per inch in general work, and sixty pounds per inch in seat-work, besides the momentum of the sliding bed and formers.

To limit the area of surfaces on the hammers requiring planing, narrow longitudinal strips *r* have been formed on each, as represented in Figs. 2 and 5. These, with the edges, are planed. The inner and upper surfaces of the cross-pieces A^4 A^5 and the faces of the keys K are likewise finished. The lower ends of the hammers are reduced in width, as represented at *q*, so as to fit between the flanges of the narrowest former which they are adapted for, and the extreme lower end or face of each is made slightly concave, so as to insure an effective bearing at the edges of the plate or leaf. The face of the middle hammer is cut away still farther, to fit over the center-pin, as indicated in Fig. 2.

When short formers are used, one or more hammers at each end of the series will be elevated out of the way and supported by blocks placed beneath the shoulders *s* on the cross-piece A^4. Provision is thus made for fitting spring-plates and leaves of different proportions, so that those of each spring shall be of the required form and have the required dependence on each other, and for simultaneously straightening the plates and leaves edgewise, as heretofore done by hand-hammering, preliminary to the fitting operation.

The positive formers F, for use in the combination above described, may be cast solid; but it is deemed preferable to core them out, as represented, so as to form passages *p* for cold air or water, discharging through the convex tops of the formers.

When air is to be used, the core-holes at the ends of each former are plugged, and the end of a hose leading from a blower is inserted in the middle hole, as in the illustration. When water is to be used, the middle hole will be plugged, and the water will be conducted to the former at one end and carried off to the tempering-tub at the other. Which is used will depend on the quality of steel being worked.

The object of thus applying air or water is to chill the fitted plates or leaves on the bottom or concave side, so as to prevent them from straightening out of their proper form or set, and at the same time to keep the former cool and to remove scale.

The air or water may flow continuously, but when the latter is allowed to escape at top, like the air, the water will preferably be admitted for a moment before each plate or leaf is removed, and then cut off by a valve in the supply-pipe.

A horizontal shaft, S, mounted in journal-bearings *o* on the back of the frame, at about mid-height, is provided at one end with a driving-pulley, P, and at its other end with a transmitting-pinion, P^2. The latter meshes with a loose gear or spur wheel, W, on a parallel shaft, S^2, below the sliding bed B. A clutch, C, provides for uniting the spur-wheel to its shaft at will, the spur-wheel receiving a continuous motion from the driving-pulley. A pair of cams, C^2, are keyed on this shaft S^2, beneath the ends of the sliding bed, and the latter is provided with friction-rollers *n* to rest on the cams. Provision is thus made for imparting a relatively-fast reciprocating motion to the sliding bed B, as compared with one raised and lowered by screws. The primary object

of this is to elevate the former and superimposed spring plate or leaf so rapidly as that the latter will receive distinct blows from each of the hammers H when it comes in contact therewith. The hot metal is thus displaced outward, so as to insure a perfect fit or set.

The cams C^2 may be circular disks bored eccentrically; but the periphery of each is preferably flattened somewhat at its highest point, to facilitate stopping the bed and former in elevated position, so as to hold the plate or leaf under pressure for a moment when this is deemed advisable.

Provision for stopping the bed up or down at will, without using the hands, is made in the clutch mechanism, which will now be described with references to Figs. 1, 3, and 4. The spur-wheel W has a solid hub, of proper proportions, which is perforated to receive the clutch-pin *m*. A steel taper piece, *l*, Fig. 1, drawn into place by a screw-nut, is inserted at the rear side of this perforation, to prevent or to receive the wear. The clutch-pin slides through a heavy flange on a sleeve, *k*, which is keyed on the shaft S^2, behind the hub of the loose wheel. A sliding sleeve or hub, *j*, embraces the contracted portion of the keyed sleeve behind its flange, and carries the clutch-pin. Behind this clutch-sleeve a pair of straight springs, *i*, are arranged, tending to project it so as to unite the loose wheel and shaft. These springs are attached at their lower ends to the upright A^3 by screws or bolts on each side of the housing of the shaft S^2. Below the clutch-sleeve a bracket, *h*, is similarly supported. Through this a vertical bolt, *g*, slides. A spiral spring, *f*, within the bracket, tends to elevate the bolt *g*, and the bolt is depressed at will by a treadle, T, to which its lower end is attached. The clutch-sleeve has two flanges projecting beyond its smaller periphery. Its outer flange, next to that of the keyed sleeve *k*, is plain. Its inner or rear flange has a pair of cam-projections, *e*, corresponding in position with the highest and lowest points of the cams C^2, and of sufficient depth to draw the clutch-pin out of the loose wheel when either of them comes in contact with the elevated bolt *g*, as represented in Fig. 1. This stops the shaft S^2. When the pressure of the foot is applied to the treadle T the bolt *g* is retracted, and the released clutch-sleeve is projected by the springs *i*, driving the clutch-pin *m* into its hole in the loose wheel at the first coincidence of the two, which causes the shaft S^2 and cams C^2 to receive motion. If the foot is removed from the treadle at once, the bed, if started from its lower position, will stop up. If the foot is kept on the treadle until the bed begins to descend, and then removed, the bed will stop down, and by simply continuing to hold the treadle down the stroke may be repeated two or more times without stopping.

In the manufacture of machines according to this invention, one or more of the peculiar features may be omitted or modified, and the proportions and other mechanical details will be treated as variable.

I am aware that machines for fitting or setting elliptic springs have been provided with special mechanical devices for straightening the heated plates and leaves edgewise; and that formers have been constructed with flanges to keep straightened plates and leaves true during the fitting or setting operation, said flanges being adjustable as to distance apart; also, that various provisions have been made for applying water to the bent plates and leaves for the purpose of hardening them on the former. My claims touching the corresponding provisions in the present apparatus are therefore limited. My improved former has fixed low flanges, between which the heated plate or leaf is straightened in the act of fitting or setting the same by hammering it upon the curved surface between said flanges. Both effects are thus produced at one operation. My improved former also differs essentially from all known means for applying cold to the bent plates or leaves in that it chills the concave side, and, by causing the metal to contract first on this surface, causes the plates and leaves to retain their form more perfectly than heretofore.

I wish to be understood, also, as laying no claim to the self-adjusting flexible upper die in the present specification, inasmuch as it is covered by Patent No. 166,918, hereinbefore referred to; but my peculiar bed B, adapted to receive interchangeable formers, is held to constitute, with said self-adjusting upper die, a patentable combination. The cams C^2, with their shaft and driving mechanism, are disclaimed also as old in other machinery; but these devices, in combination with said flexible upper die, and with a sliding bed carrying a former beneath said upper die, produce a novel and highly valuable effect in machines for fitting or setting elliptic springs.

The following is what I claim as new in this my invention, and desire to secure by Letters Patent, namely:

1. A positive former, for use, in combination with a flexible upper die, to fit or set a given size and shape of plate or leaf for elliptic springs, and to simultaneously straighten the same edgewise, said former being constructed with fixed low flanges *u u* at its respective upper longitudinal edges, a fixed center-pin, *v*, between the flanges, and a tongs-space, *t*, in the front flange, as herein illustrated and described.

2. A former constructed with a convex fitting or setting surface, and with passages for air or water, substantially as herein shown and described, and thus adapted to chill each fitted plate or leaf upon its concave side, so that the incident contraction of the metal shall tend to preserve the set of the plate or leaf, and not to straighten it, as herein set forth.

3. The sliding bed B, adapted to receive interchangeable positive formers F, substantially as herein shown and described, in combi

nation with the flexible upper die composed of independent sliding weights or hammers H, two or more of which can be supported in elevated position to adapt the series to short formers.

4. The combination of the driving-pulley P, shaft S, pinion P^2, spur-wheel W, a clutch, C, the shaft S^2, and cams C^2 with a sliding bed, B, carrying a convex former, F, and the flexible upper die composed of weights or hammers H, substantially as herein shown and described, for fitting or setting spring plates and leaves by means of distinct blows in rapid succession, operating to displace the hot metal outward in the act of bending it, as in hand-pinching.

5. The sliding clutch-sleeve *j*, projected by springs and retracted by the action of a cam-flange and spring-bolt, under control of a treadle, substantially as herein specified, in combination with the inner keyed sleeve *k*, spur-wheel W, shaft S^2, and cam C^2 for stopping the sliding bed in its elevated or lowered position, at will, in the manner set forth.

JOHN S. PESSENGER.

Witnesses:

JAS. L. EWIN,

ABNER C. THOMAS.