Jan. 22, 1924. 1,481,630

M. H. SUSSMAN

FORGING MACHINE

Filed Dec. 12, 1922 2 Sheets-Sheet 1

Fig. 1.

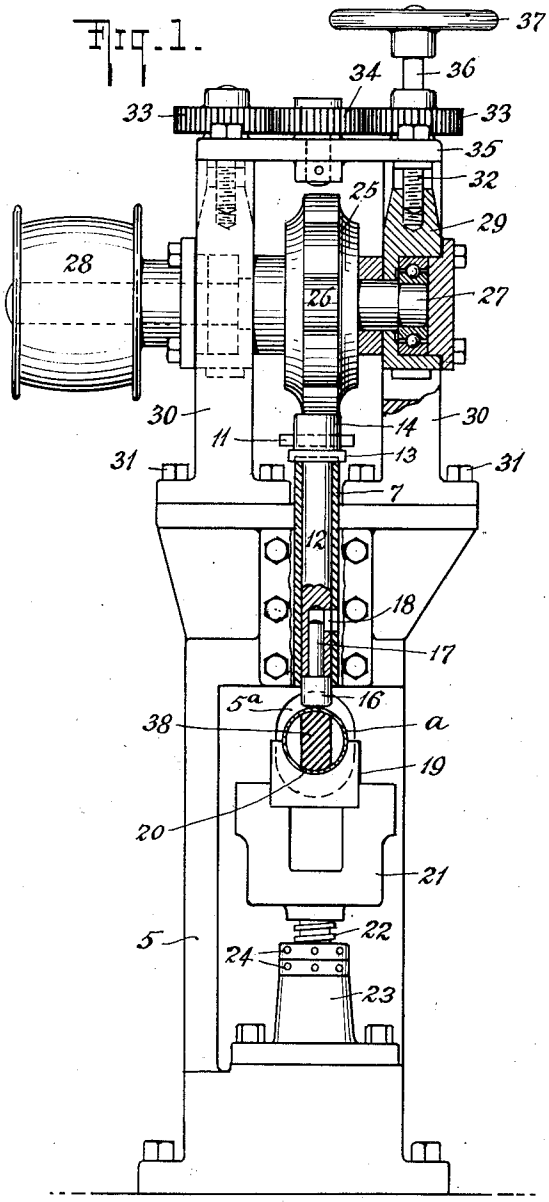
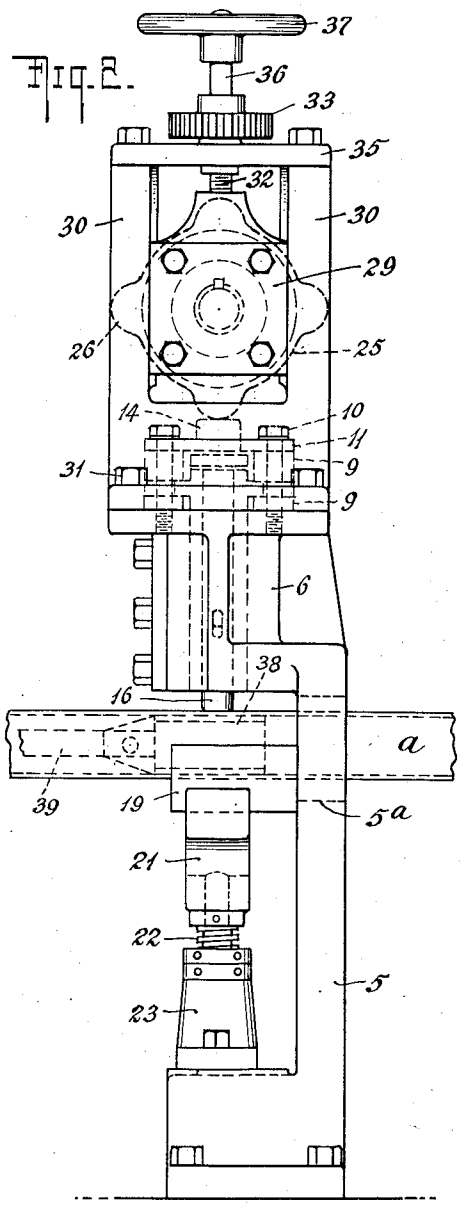


Fig. 2.



WITNESS

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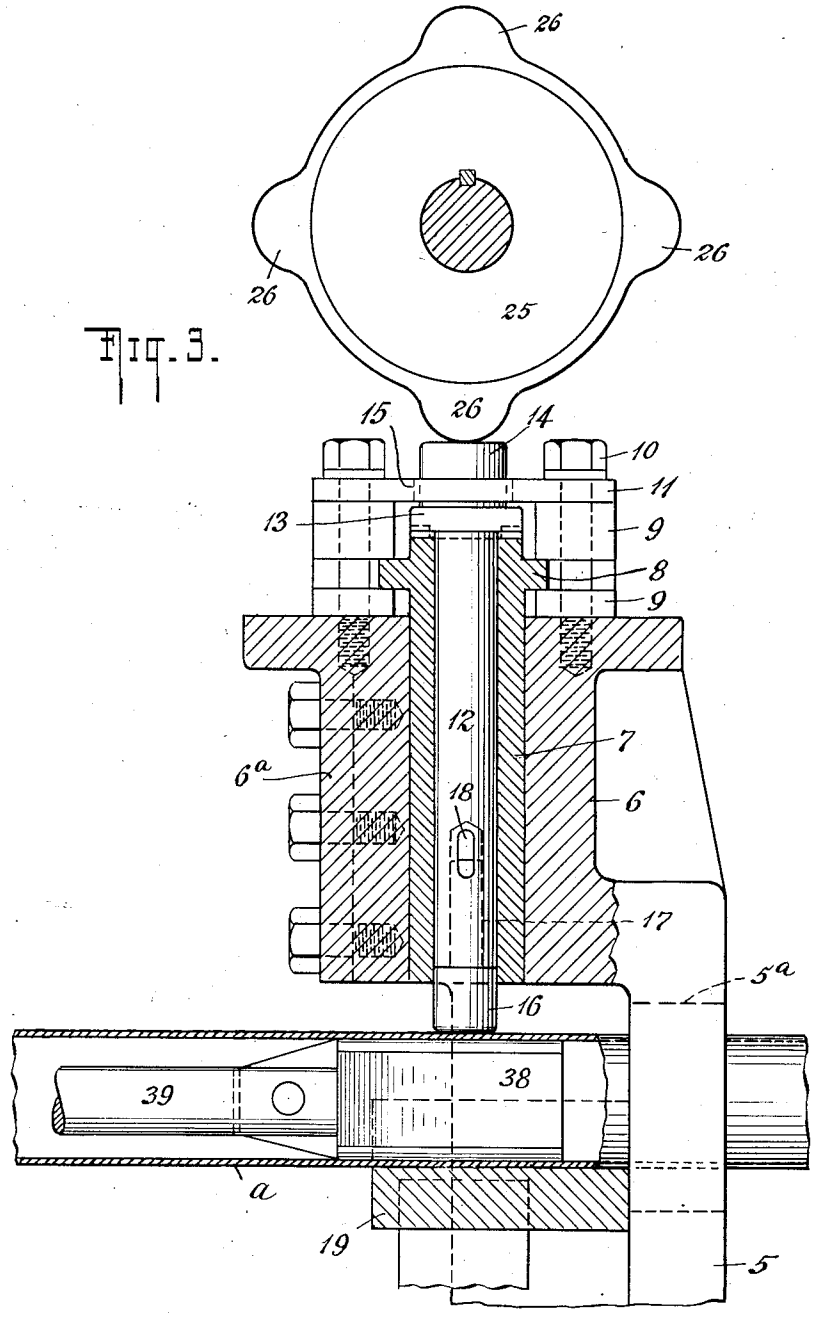
Fig. 3.



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Patented Jan. 22, 1924. 1,481,630

UNITED STATES PATENT OFFICE.

MAXWELL H. SUSSMAN, OF KEW GARDENS, NEW YORK, ASSIGNOR TO THE MOHEGAN TUBE COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

FORGING MACHINE.

Application filed December 12, 1922. Serial No. 606,356.

To all whom it may concern:

Be it known that I, MAXWELL H. SUSSMAN, a citizen of the United States of America, and a resident of Kew Gardens, borough and county of Queens, city and State of New York, have invented certain new and useful Improvements in Forging Machines, of which the following is a specification.

My invention relates to forging machines and more particularly to a type of such machines intended for use in connection with tubing and welding machines in the manufacture of metal tubing, and has for its object to provide a machine of novel construction, whereby the forging operation to finish the welded seam and impart to the tube the appearance of seamless tubing is most efficiently carried out. Other more specific objects will appear from the description hereinafter and the features of novelty will be pointed out in the appended claims.

In the accompanying drawings, which illustrate an example of the invention without defining its limits, Figure 1 is a front elevation, with parts in section; Fig. 2 is a side elevation, and Fig. 3 is a detail, sectional elevation on an enlarged scale.

The machine comprises an upright support 5 having a bearing head 6, in which a guide sleeve 7 is removably mounted for instance by means of a detachable cover 6^a; for the purpose of fixing the guide sleeve 7 in position in the bearing head 6 against lengthwise movement, said guide sleeves may be provided with a flange 8 clamped between collars 9 upon the head 6 by means of bolts 10. A guide plate 11, is located at a distance from said flange 8 and is secured upon the uppermost collars 9 by means of the bolts 10. An impact member 12 is slidably mounted in the sleeve 7 and is provided with a flange 13 located between the end of the sleeve 7 and the guide plate 11 and further includes a head 14 which projects through an opening 15 in said guide plate 11, as shown in Fig. 3; the flange 13, by being located between the guide plate and the end of the sleeve 7, serves to limit the movements of the impact member 12 in the direction of its length. The latter is preferably provided at its lower end with a tool steel or other suitable butt 16 whereby the actual forging blow is delivered as will appear more fully hereinafter; the butt 16 is secured in place in any convenient manner as by means of a stem 17 which is driven into a suitable axial recess in the end of the impact member 12. To facilitate the removal of the butt 16 the impact member 12 and sleeve 7 may be provided with aligning slots 18 in registry with the end of the stem 17 and adapted to accommodate a tool whereby said butt may be forcibly driven from the impact member 12.

The machine further includes an anvil die 19 which is shaped to fit the article to be forged and in the illustrated example is provided with a curved recess 20 for the reception of a tube *a*. The anvil die 19 is located in registry with the impact member 12 and is carried by a support 21 which is preferably mounted in the machine so as to make it possible to adjust the anvil die 19 toward and away from the butt 16 of the impact member 12; thus in the illustrated example the support 21 is carried by a screw 22 which is screw-threaded into a bearing 23 fixed upon the support 5, one or more lock nuts 24 being provided for locking said screw 22 in an adjusted position.

In addition to the elements so far described, the machine includes means for delivering successive blows upon the head 14 of the impact member 12, the effect of which blows are converted into a forging action upon the tube *a* or its equivalent by the butt 16. In the illustrated example the means referred to comprises a rotatable hammer 25 having a plurality of projections 26 located at spaced intervals upon its periphery. The hammer 25 is carried by a shaft 27 upon which a belt pulley 28 is also fixed for the accommodation of a belt whereby the hammer is rotatably actuated, it being understood that the pulley 28 may be replaced by other types of driving devices. To permit the strength of the blows of the hammer upon the head 14 and the resultant forging effect upon the tube *a* or its equivalent to be varied, the hammer is preferably adjustable toward and away from said head 14. For this purpose the shaft 27 in the illustrated example, is journalled in bearing boxes 29 slidably mounted in guide frames 30 extending upwardly from the head 6 and secured thereto by means of bolts 31. Any suitable means may be provided for shifting said bearing boxes 29 coincidentally in said frames 30 to bring about the desired adjust-

ment of the hammer; for instance, as shown in the drawings, adjusting screws 32 rotatably mounted upon the frames 30 but fixed thereon against movements in axial directions, may be screw-threaded into the bearing boxes 29. These screws 32 carry pinions 33 which mesh with an intermediate pinion 34 journalled upon a cross-bar 35 extending between and secured to the frames 30 and whereby an actuation of either of the pinions 33 will result coincidentally in a corresponding operation of the other pinion 33. To facilitate the actuation of the pinions whereby the adjustment of the hammer 25 is brought about, the screw 32 of one of the pinions 33 may be extended beyond the same in the form of a shaft 36 upon which a hand wheel 37 is fixed.

In the preferred arrangement the hammer 25 is arranged slightly off centre with respect to the major axis of the impact member 12 so that the blows of the projections 26 are delivered slightly to one side of said centre. Because of this arrangement the action of said projection 26, in addition to the blows produced thereby, is such that the impact member 12 is rotated upon its axis to a slight extent each time a projection 26 engages the head 14. This is due to the fact that said projections 26 travel in a rotary path across said head in frictional contact therewith to one side of the axial centre and thereby exert a force tending to rotate the impact member. This results in distributing the wear over the head 14 and also over the active surface of the butt 16 with the result that these parts wear evenly and remain in an efficient condition for a maximum period of time.

If the article being acted upon by the forging machine is a tube *a* the latter is fed in any customary manner over a suitable plug 38 which fits within the tube *a* at a point in registry with the anvil die 19 and the impact member 12; the plug 38 may be of any well-known construction and mounted upon a rod 39 in the conventional way.

In practice the tube *a* is fed in the direction of its length through an opening 5ª in the support 5 and across the anvil die 19 which is adjusted to the proper height to provide a support for said tube, it being understood that the previously welded seam thereof is uppermost. As the feeding of the tube *a* proceeds the hammer 25 is coincidentally actuated and, through the medium of the projections 26, delivers successive blows upon the head 14 of the impact member 12; the effects of these blows are transmitted through the butt 16 upon the tube *a* and cause the previously welded seam to be hammered or forged. Because of the fact that the metal along the seam is still soft as a result of the welding operation, this hammering or forging augments the welding action to provide an efficient seam and at the same time obliterates all evidence of said weld and gives to the tube the appearance of seamless tubing. By adjusting the hammer toward and away from the impact member the strength of the blows delivered by the butt upon the tube *a* may be adjusted to produce the best results. Such adjustment may easily be brought about by simply manipulating the hand-wheel 37 to rotate the pinions 33 and 34 which produces a corresponding operation of the screws 32 and shifts the bearing boxes 29 in the guide frames 30 in one direction or the other to move the hammer 25 toward or away from the head 14 as the case may be. The rotative speed of the hammer 25 with respect to the speed at which the tube *a* is fed along, is such that the blows of the butt 16 will be delivered with the rapidity necessary to include every part of the welded seam which is thus completely and fully finished in the indicated way. The blows of the butt 16 upon the tube are resisted by the plug 38 which prevents collapse of said tube and by the anvil die 19 which supports it from below.

In the preferred arrangement the hammer 25 rotates about an axis transverse to the direction of feed of the tube *a* and in a path which registers with the seam in the direction of its length; while preferred it will be understood that the arrangement is not arbitrary and may be altered if desired. In any case as the blows of the hammer 25 are successively delivered upon the head 14 the impact member 12 will be reciprocated in the guide sleeve 7 within the limits prescribed by the co-operation of the flange 13 with the end of said sleeve and the guide plate 11 respectively.

The machine is simple in construction and efficient in operation and may be used independently or in conjunction with tubing and welding machines to perform its functions. While the machine is intended primarily for use in forging previously welded seams of metal tubing to give thereto the appearance of seamless tubing and to finish off the weld, it is obviously capable of being efficiently used in other connections where a forging action is desired.

Various changes in the specific form shown and described may be made within the scope of the claims without departing from the spirit of the invention.

I claim:—

1. A forging machine comprising an anvil for receiving the article on which forging is to take place, an impact member mounted in registry with said anvil and freely movable relatively thereto, both linearly and rotatably, and means for delivering successive blows upon said impact member to one side of its

major axis whereby said member is rotated about said axis to produce an even wear upon its impact receiving and impact delivering ends.

2. A forging machine comprising a support, an anvil die mounted thereon, guiding means on said support, an impact member loosely mounted in said guiding means in registry with said anvil die and a rotatable hammer for delivering successive blows upon said impact member and for rotating the same in said guiding means to cause said impact member to wear evenly.

3. A forging machine comprising a main support, a bearing head thereon, a sleeve fixed in said head, an impact member slidably and rotatably mounted in said sleeve, means for arresting the sliding movements of said impact member, a rotatable hammer for delivering successive blows upon said impact member and for rotating same in said sleeve and an anvil die adjustably mounted on said support in registry with said impact member.

4. A forging machine comprising a main support, a bearing head thereon, a sleeve fixed in said head, an impact member slidably and rotatably mounted in said sleeve, a guide plate for arresting a sliding movement of said impact member out of said sleeve, a rotatable hammer for delivering successive blows upon said impact member and for rotating it in said sleeve, means for adjusting said hammer toward and away from said impact member to vary the strength of the blows thereon and an anvil die adjustably mounted on said support in registry with said impact member.

5. A forging machine comprising a main support, a bearing head thereon, a sleeve fixed in said head, an impact member slidably and rotatably mounted in said sleeve, an impact head of relatively hard metal on said impact member at its active end, a blow-receiving head at the other end of said impact member, a guide plate through which said blow-receiving head projects and whereby a movement of said impact member out of said sleeve is arrested, a bearing support upon said main support, bearings slidable in said bearing support, a rotatable hammer journalled in said bearings and adapted to deliver successive blows upon said blow-receiving head and to rotate said impact member in said sleeve, means for shifting said bearings to adjust the hammer toward and away from said blow-receiving head and thereby vary the strength of the blows thereon and an anvil die adjustably mounted upon said main support in registry with said impact member.

In testimony whereof I have hereunto set my hand.

MAXWELL H. SUSSMAN.