T. F. LAMB.

COILING MACHINE.

APPLICATION FILED NOV. 4, 1919.

1,395,190.

Patented Oct. 25, 1921.

3 SHEETS—SHEET 1.

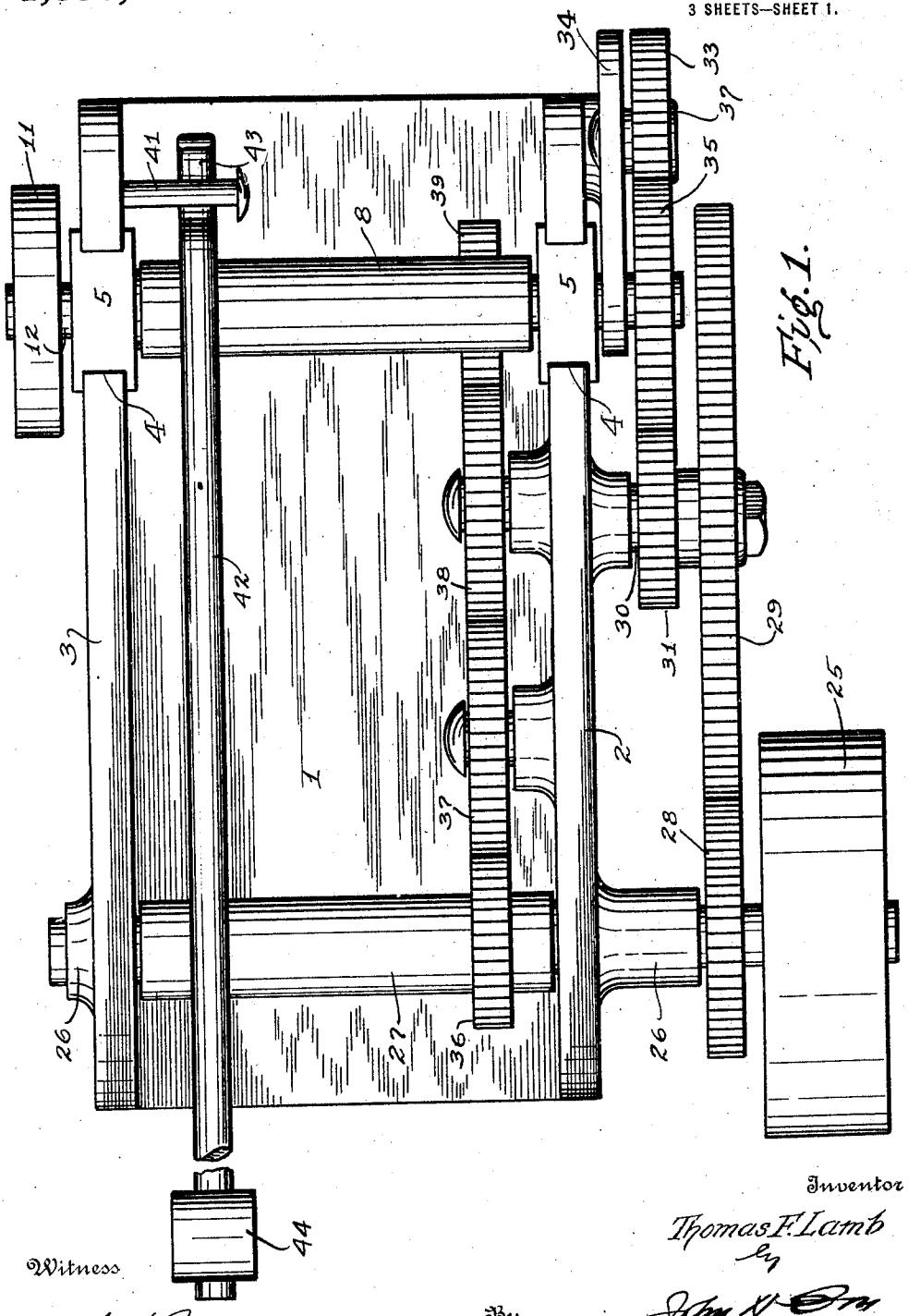


Fig. 1.

Witness

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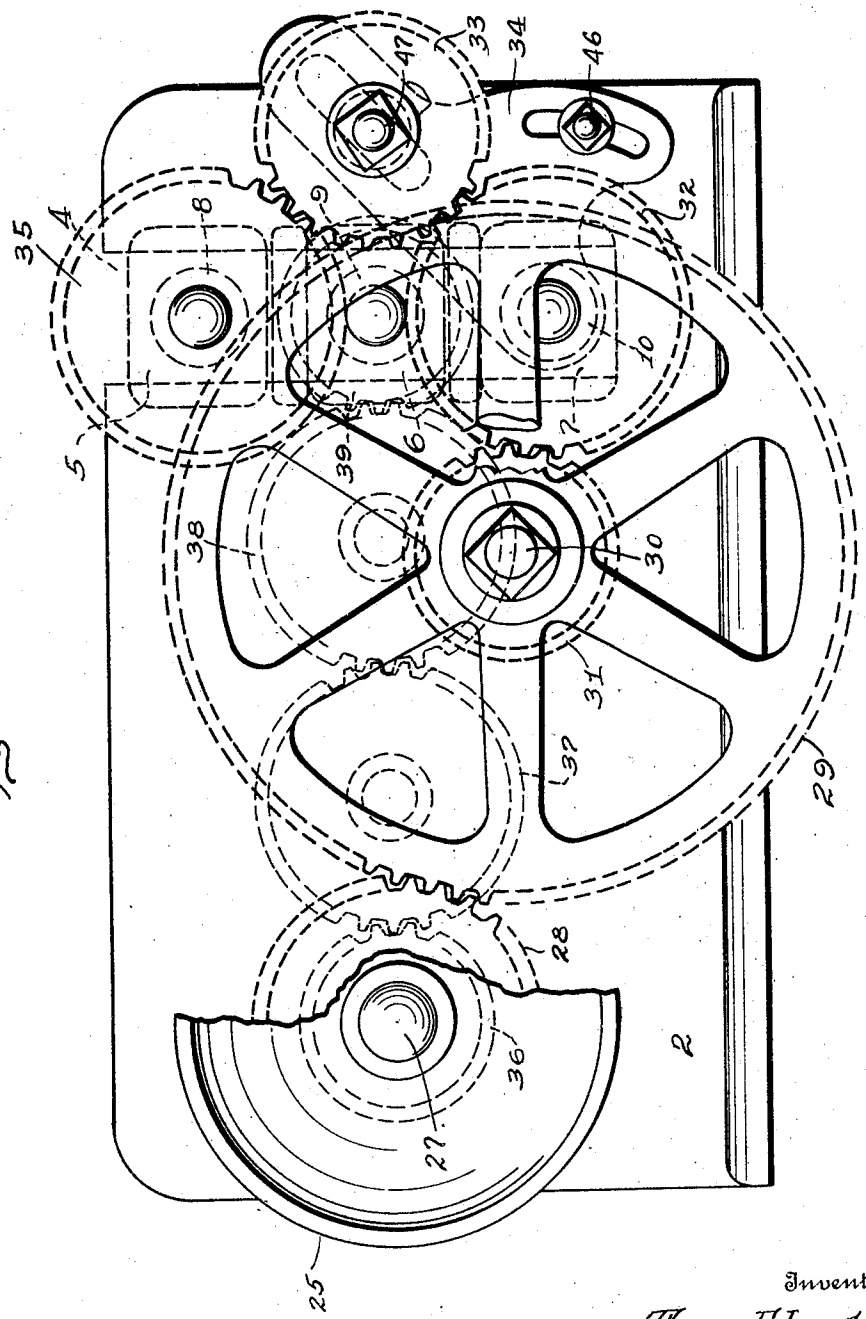


Fig. 2.

Witness

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3 SHEETS—SHEET 3.

Fig. 3.

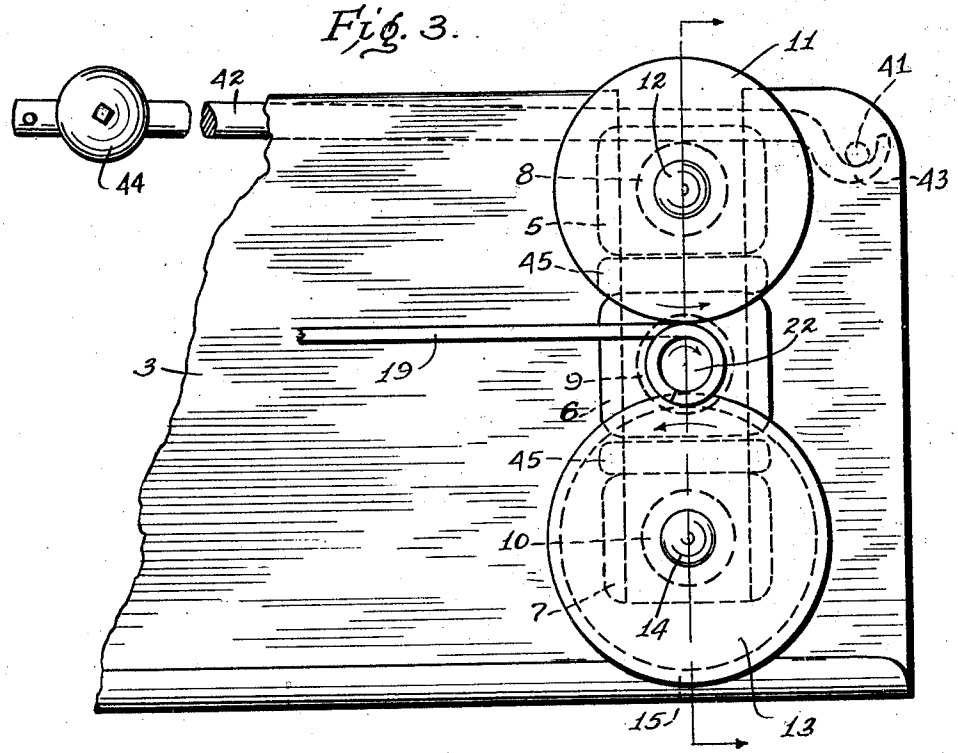


Fig. 4.

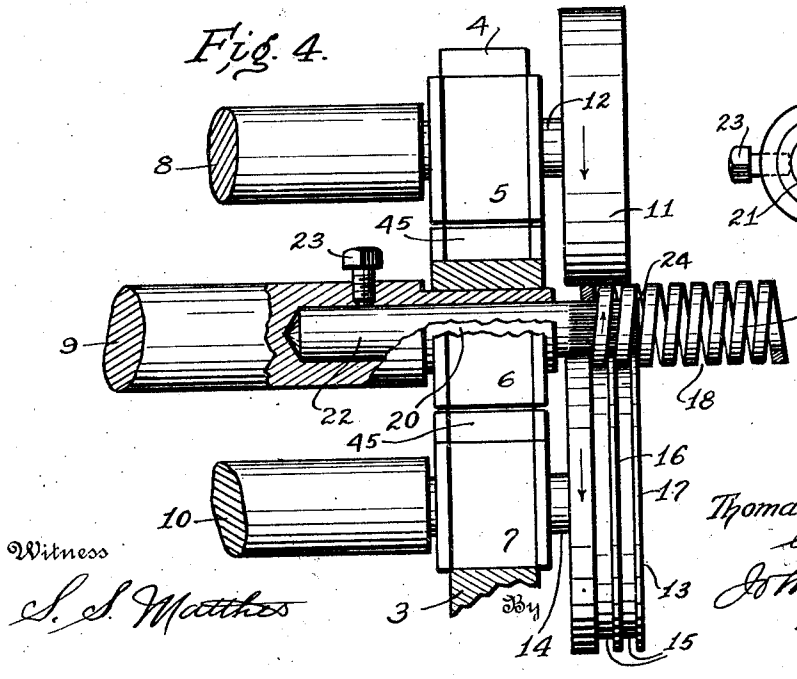


Fig. 5.



Witness

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UNITED STATES PATENT OFFICE.

THOMAS F. LAMB, OF MANSFIELD, OHIO.

COILING-MACHINE.

1,395,190. Specification of Letters Patent. Patented Oct. 25, 1921.

Application filed November 4, 1919. Serial No. 335,702.

To all whom it may concern:

Be it known that I, THOMAS F. LAMB, a citizen of the United States of America, residing at Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in a Coiling-Machine, of which the following is a specification.

This invention relates to a coiling machine which is especially adapted for use in the manufacture of lock washers and the like.

The primary object of this invention is to construct a coiling machine with means of rotating a mandrel and means of feeding stock thereto consisting of feed rollers which can be arranged and positioned to continuously feed and force the stock to coil around and off of mandrels of predetermined sizes without fracturing or otherwise injuring the fibers of the metal.

Further objects are to provide means of rotating the perimeters of the feed rollers and the mandrel so as to rotate the perimeters of the coils being formed on the mandrel at a speed or ratio to the feed rollers that will equal the travel of the perimeters of the rolls to prevent slippage of the stock between the rollers and mandrel.

A further object is to provide means of forming coils of different diameters or sizes from the same or different sizes of stock without changing the driving means of the feed rollers or mandrel, but in lieu thereof changing the diameters of the feed rollers to correspond with the diameter of the coil it is desired to make or size of the stock used, thereby providing for accurate, precise, uniform and equal travel of the perimeters of the feed rollers and mandrel for making any and all sizes of coils without slippage between the stock and the parts operating on the stock.

Another object of this invention is to provide means of adjustably and slidably mounting the bearings of the shafts to which the feed rollers and the mandrel are secured to afford facilities for varying the friction applied to the stock by the feed rollers that coöperate with the mandrel to perform the functions of feeding and coiling the stock.

Another object is to provide a means of adjustably mounting an intermediate gear to mesh with and operate between the driving gears of the feed roller shafts to permit of the adjustment of the intermediate gear to correspond with the adjustment of the shaft bearings.

These and other objects are attained by the mechanism illustrated in the accompanying drawing in which:

Figure 1 is a plan or top view of a coiling machine.

Fig. 2 is a side elevation of Fig. 1 showing diagrammatically the means of transmitting and imparting movement to the coiling mechanism.

Fig. 3 shows a side elevation of the coiling mechanism.

Fig. 4 is a front elevation of the coiling mechanism showing some of the parts in sections.

Fig. 5 shows the end of the rotating shaft modified in construction to receive and permit the removal of split bushings for different sizes of mandrels.

Reference numerals 1, 2 and 3 respectively represent a conventional type of frame work upon which the coiling mechanism is mounted. Portions of the members 3 and 2 of the frame work are cut away at 4 to provide guide ways to receive and slidably engage the shouldered or grooved portions of bearings 5, 6 and 7 to journal the shafts 8, 9 and 10 which are shown in the drawing and arranged in vertical parallel relation to each other.

A frictional feed roller 11 is mounted upon the projecting end portion 12 of the shaft 8 and its perimeter is preferably formed smooth. A similar roller 13 is journaled on the projecting end 14 of the roller 10 and alined directly underneath the roller 11. The perimeter of the roller 13 is provided with one or more grooves 15, the bottom diameter of which corresponds with the diameter of the frictional feed roller 11 to provide for the same speed of rotation or travel of the perimeter of the frictional roller 11 and bottom of groove 15 of the roller 13. One or more grooves 15 can be formed in the roller 13 to provide ribs 16 and 17 to regulate and govern the spread or space 18 between the coils or stock 19.

A suitable aperture is provided in the end 20 of the shaft 9 to receive a split bushing 21 into which a mandrel 22 is fitted and rigidly secured to the shaft by a set screw 23. The end 24 of the mandrel preferably projects beyond the end 20 of the shaft 9

flush with the outer sides of the feed rollers 11 and 13.

It will be observed that the feed rollers and rotatable mandrel are arranged in vertical alinement with each other so that the axis of all shafts can be varied with respect to each other by adjusting the sliding journal boxes 5, 6 and 7 for a purpose which will be described hereinafter.

The means for actuating the mechanism described is as follows:

A drive pulley 25 is preferably mounted and rigidly secured to the projecting end of a shaft 27 which is journaled in bearings 26. When movement is imparted to the pulley 25 the pinion 28 is actuated transmitting movement to a gear 29 which is loosely mounted upon a shaft 30. The pinion 31 which is rigidly connected to the pinion 29 meshes with and imparts movement to a gear 32 thereby rotating the shaft 10 and feed roller 13 in the directions indicated by the arrow.

An intermediate gear 33 is secured to a bracket 34 which is pivotally secured to the shaft 10 and is adapted to be adjusted to properly mesh with the gear 32. Movement is transmitted from the gear 33 to a gear 35 which in turn rotates the shaft 8 and the feed roller 11 in the same direction and at the same speed as the shaft 10 and roller 13.

In order to transmit movement to the shaft 9 and the mandrel 22 secured thereto a gear 36 is mounted on and rigidly secured to the shaft 27 which transmits movement to the gears 37 and 38 which are loosely mounted on suitable shafts. A gear 38 meshes with a gear 39 which is rigidly secured to the shaft 9 thereby driving or rotating the shaft 9 and mandrel 22 and the feed rollers 11 and 13 in a counter clockwise direction (see arrow). To perform the functions of feeding the stock to the mandrel and coiling same around the mandrel it has been found in practice that the coiling operations are performed more efficiently when the mandrel is rotated substantially upon the ratio of 5 to 1 with respect to the speed of rotation of the feeding rollers as it permits of the use of larger feeding rollers.

The stock 19 is drawn from any source of supply and bent in the first instance at its free end to conform with the size of the mandrel used and is placed thereon preparatory to commencing the operation of continuous coiling of the stock as shown in Figs. 3 and 4. The frictional feed roller 11 in its rotation in the direction shown by the arrow frictionally contacts more or less with the perimeters of one or more coils and continuously draws and feeds the stock 19 from the source of supply and forces it to form around the projecting end 24 of the mandrel 22 in coöperation with the feed roller 13 which is rotated in the same direction as the feed roller 11 (as indicated by the arrows). The contact of the bottom of the groove 15 with the perimeter of the coil assists in feeding and forming the stock around the mandrel and at the same time the ribs 16 and 17 formed on the roller 13 actuates each coil to wind off the convolution thereof in sequence at the end 24 of the mandrel continuously during the operation of the coiling mechanism.

In order to vary the pressure or friction of the feed rollers upon the stock 19 means are employed to exert a pressure on the shafts carrying the feed rollers which are mounted in adjustable journals. A conventional means of exerting such pressure is shown on the drawings and consists of a pin 41 secured to the frame work of the coiling mechanism and a lever bar 42 which has its end 43 formed to pivotally engage the pin 41. The lever bar is adapted to contact with and rest at one end upon the shaft 8 exerting a pressure thereon forcing the feed rollers 11 and 13 in more or less frictional contact with the perimeter of the coil that is being formed.

The pressure or friction exerted by the rollers upon the perimeter of the coils is varied more or less by adjusting the weight 44 back and forth upon the lever rod 42 as shown in Fig. 1.

In order to provide against excessive sliding movement of the bearings toward each other spacing blocks 45 are fitted between the bearings to provide positive stops or supports. The blocks, however, are made of such size as will permit of the desired frictional contact between the perimeters of the feed rollers and the perimeters of the coil before they stop or support the sliding bearings.

To feed stock of different sizes or make coils of different diameters (without slippage) the feed rollers 11 and 13 are changed in diameter or other rollers of different diameters are used to maintain the proper ratio of travel of the perimeters of the feed rollers with respect to the perimeters of the coils.

The diameters of the feed rollers are determined by the size of the stock and diamter of the coils it is desired to make figured on a basis to equalize the travel of the perimeters of the coil and feed rollers.

It will be noted that in the use and operation of feeding rollers of different diameters the use of different sizes of mandrels and of feeding different sizes of stock for the purpose intended that the journal boxes or bearings of the shafts 8, 9 and 10 will be arranged or positioned farther apart or in closer relation to each other thereby changing the relation of the driving gears

in which event the intermediate gear 33 is adjusted to correspond with any change made and is held in place by the clamping bolts 46 and 47.

I claim:

1. In a coiling machine, a frame, vertically alined guideways formed in said frame, journal boxes slidably fitted to said guideways, shafts journaled in said boxes in spaced relation to each other, rollers secured to two of said shafts in alinement with each other, means to impart movement to said shafts in the same direction, a third shaft interposed between the first-mentioned shafts and in direct vertical alinement therewith, a mandrel fitted to the third shaft, means to impart movement to the third shaft in an opposite direction to that of the first-mentioned shafts as and for the purpose described.

2. In a coiling machine, a frame, vertically alined guideways formed in said frame, journal boxes slidably fitted to said guideways, shafts journaled in said boxes in spaced relation to each other, rollers secured to two of said shafts in alinement with each other, means to impart unisonal movement to said shafts in the same direction, a third shaft interposed between the first-mentioned shafts and in direct alinement therewith, a mandrel fitted to the third shaft, means to impart movement to the third shaft in an opposite direction to that of the first-mentioned shafts and means to exert a pressure upon one of the shafts to hold the sliding journal boxes of all of the shafts in predetermined yielding positions.

3. In a coiling machine, a frame, vertically alined guideways formed in said frame, journal boxes slidably fitted to said guideways, shafts journaled in said boxes in spaced relation to each other, rollers secured to two of said shafts in alinement with each other, means to impart movement to said shafts in the same direction, a third shaft interposed between the first-mentioned shafts and in direct alinement therewith, a mandrel fitted to the third shaft, means to impart movement to the third shaft in an opposite direction to that of the first-mentioned shafts, means to exert a pressure upon one of the shafts to hold the sliding journal boxes of all of the shafts in predetermined yielding positions and means to impart movement to all of the shafts irrespective of the size of the rollers.

4. In a coiling machine, rollers vertically adjustable arranged in spaced relation and in vertical alinement with respect to each other, a mandrel adjustably arranged between said rollers and in axial vertical alinement with said rollers, means to rotate said rollers in the same direction, means to rotate the mandrel oppositely to the rollers and adjustable weighted means to force the rollers to exert a predetermined pressure on the stock to coil same around the mandrel.

5. In a coiling machine, rollers vertically adjustable arranged in spaced relation and in vertical alinement with respect to each other, a mandrel adjustably arranged between said rollers and in axial alinement with said rollers, means to rotate said rollers in the same direction, means to rotate the mandrel in an opposite direction to that of the rollers, adjustable means to force the rollers to exert a predetermined pressure on the stock to coil same around the mandrel, the operating means for rotating the mandrel and rollers being operable to impart movement thereto irrespective of the size of the mandrel or rollers.

6. In a coiling machine, a frame, vertical guideways formed therein, slidable boxes fitted to said guideways, two shafts journaled in said boxes in spaced relation and in vertical alinement with each other, rollers mounted on said shafts in alinement with each other in combination with another shaft provided with a mandrel which is journaled in slidable boxes and interposed between said rollers and means to rotate the shaft of the mandrel and the shafts of the rollers in opposite directions.

7. In a coiling machine, a frame, vertical guideways formed therein, slidable boxes fitted to said guideways, two shafts journaled in said boxes in spaced relation and in vertical alinement with each other, rollers mounted on said shafts in alinement with each other in combination with another shaft, provided with a mandrel which is journaled in said slidable boxes and interposed between said rollers and in alinement therewith, means to rotate the shaft of the mandrel and the shafts of the rollers in opposite directions and a weight to exert a pressure on one of said shafts which is adapted to be adjusted to exert different pressures thereon.

8. In a coiling machine, means for adjustably journaling three shafts in vertical alinement with each other, rollers secured to two of said shafts, a mandrel secured to one of said shafts which is arranged to operate between said rollers and in axial alinement therewith, means to rotate the rollers in unison in one direction, means to rotate the mandrel in an opposite direction with respect to the rollers, a weight and means to exert different pressures upon one of said shafts through the medium of the weight to force the feed rollers in contact with the stock and coil same on the mandrel.

In testimony whereof I affix my signature.

THOMAS F. LAMB.