No. 682,726. Patented Sept. 17, 1901.

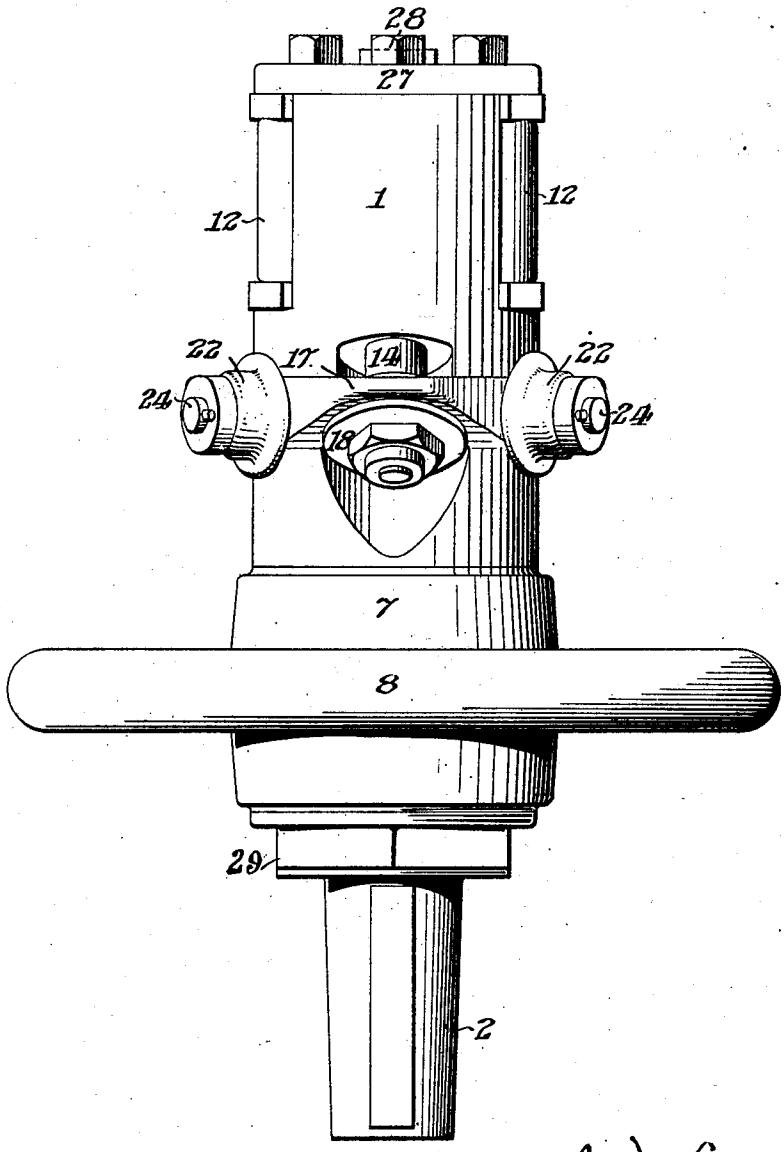
L. D. LOVEKIN.

FLANGING MACHINE.

(Application filed May 10, 1900.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.



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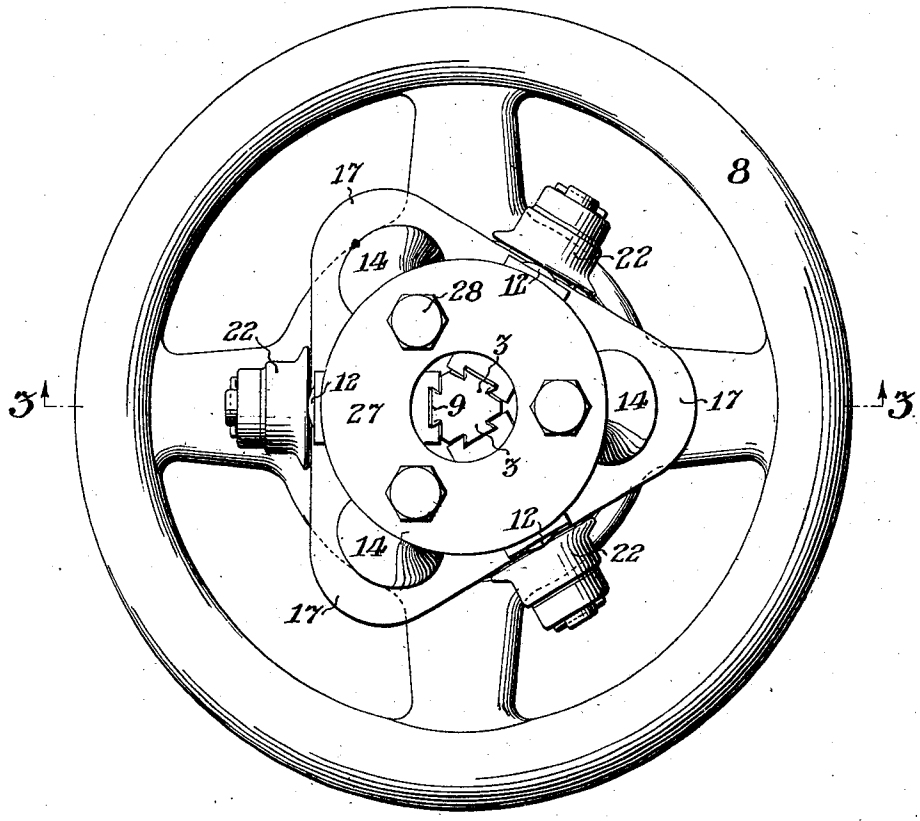
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FIG. 2.



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FIG. 3.

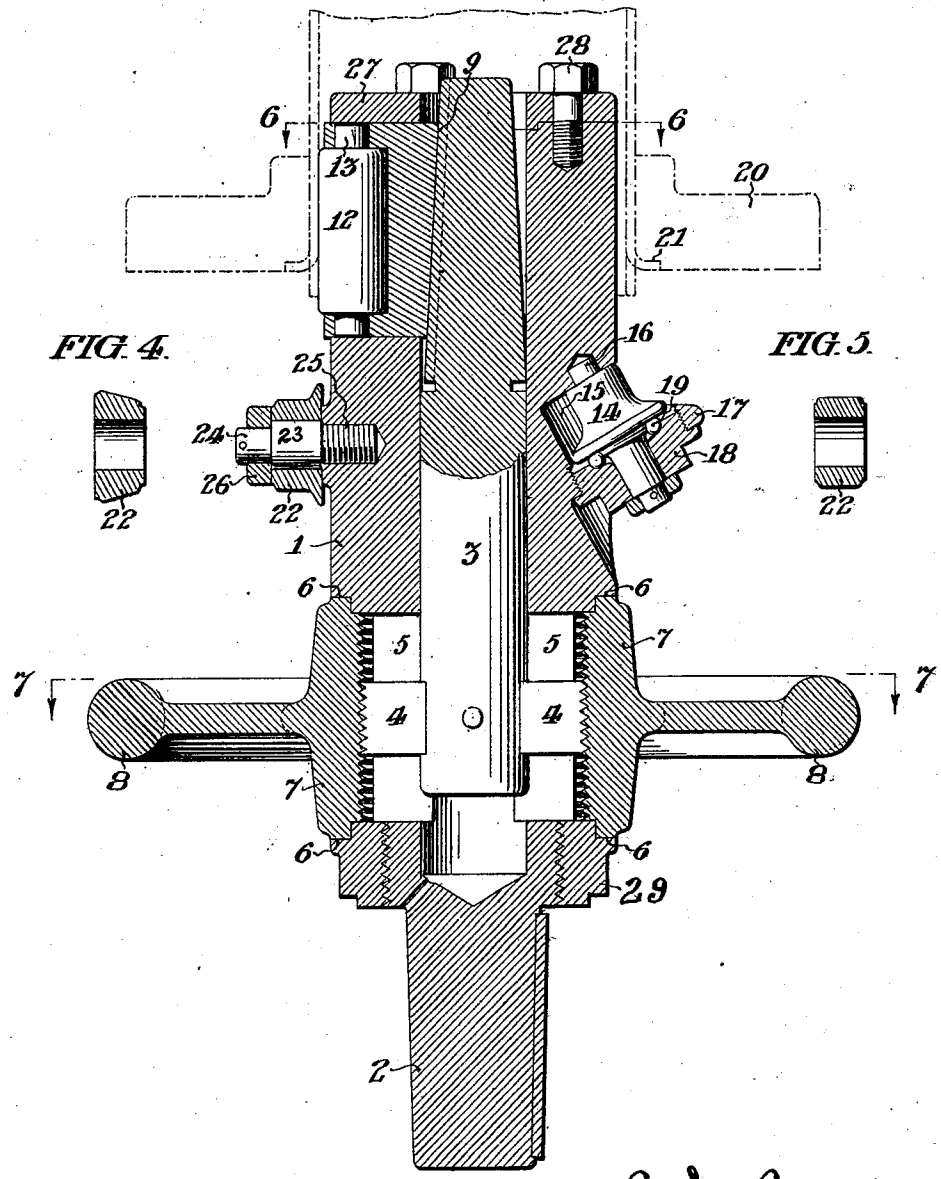


FIG. 4.

FIG. 5.

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(Application filed May 10, 1900.)

(No Model.) 4 Sheets—Sheet 4.

FIG. 6.

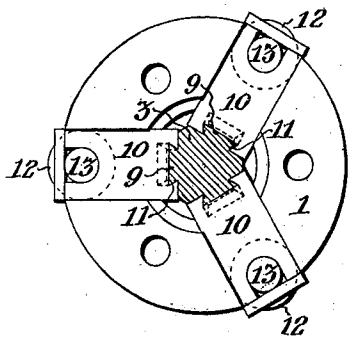
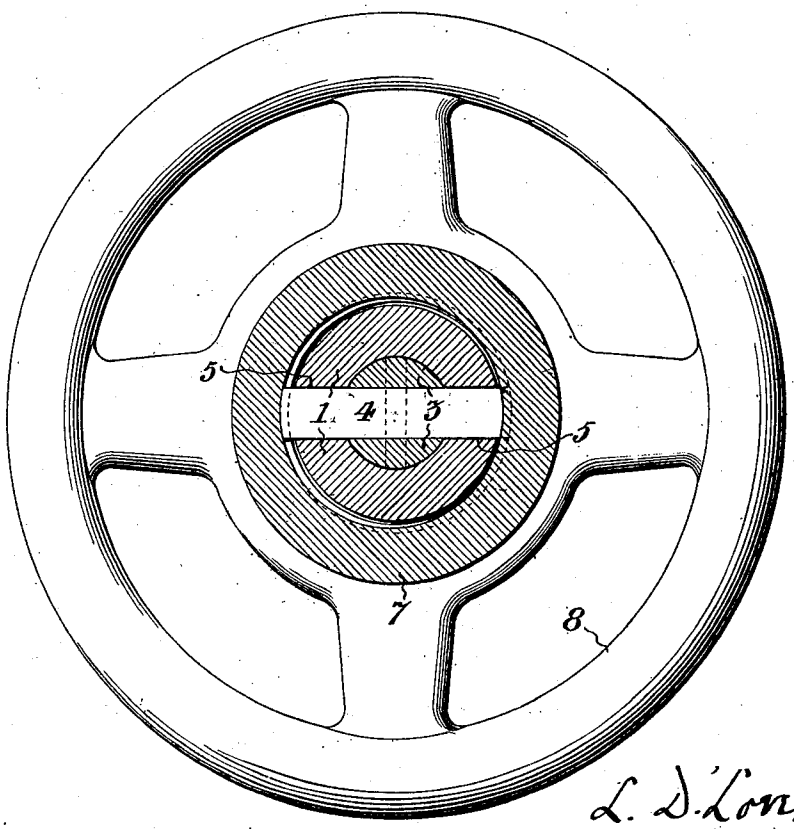


FIG. 7.



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UNITED STATES PATENT OFFICE.

LUTHER D. LOVEKIN, OF PHILADELPHIA, PENNSYLVANIA.

FLANGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 682,726, dated September 17, 1901.

Application filed May 10, 1900. Serial No. 16,167. (No model.)

To all whom it may concern:

Be it known that I, LUTHER D. LOVEKIN, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Machines for Operating upon the Ends of Pipes, of which the following is a specification.

It is the object of my invention to provide a simple, compact, and easily operated, device for expanding and flanging the ends or lips of pipes, and especially of pipes of small diameter.

In the accompanying drawings I show, and herein I describe a good form of a convenient embodiment of my invention, the particular subject-matter claimed as novel being hereinafter definitely specified.

In the accompanying drawings,

Figure 1 is a view in side elevation of an apparatus embodying my invention.

Figure 2 is a view of the same in end elevation, sight being taken from the advance end of the apparatus.

Figure 3 is a longitudinal sectional elevation of my apparatus, section being supposed on the dotted line 3—3 of Figure 2, the rear end of the follower being, however, shown in side elevation.

Figures 4 and 5 are illustrations in cross section of modified forms of deadening rollers, as I term them.

Figure 6 is a transverse sectional elevation of the apparatus on the line 6—6 of Figure 3, sight being taken in the direction of the arrows applied to said line.

Figure 7 is a transverse sectional elevation of the apparatus, section being supposed on the dotted line 7—7 of Figure 3, and sight being taken in the direction of the arrows applied to said line.

Similar numerals of reference indicate corresponding parts.

In the accompanying drawings,

1 indicates a mandrel, as I term it, in which the acting parts operative directly against the pipes subjected to their operation are mounted.

The mandrel, which is intended to be rotated and to such purpose provided with a shank 2 which may be engaged or mounted in a rotating chuck or other power operated device,—embodies a cylindrical bore opening through its front end and extending to a point in the vicinity of said shank, within which bore is mounted a longitudinally adjustable follower 3, operative to occasion the radial advance of the expanding rollers as hereinafter described.

The rear end of the follower is provided with a pair of laterally extending arms 4, which extend outwardly through and beyond longitudinally extending slots 5 formed in a portion of the body of the mandrel which is of reduced diameter, the protruding ends of said arms being threaded as shown particularly in Figure 3.

Within shoulders of the unreduced portions of the body of the mandrel adjacent to the reduced portion in which the slots 5 are formed, are provided circumferential recesses 6 in which is mounted what I term the controller ring 7, which incloses or bridges, so to speak, the reduced portion of the mandrel and is as to its inner face provided with a screw thread with which the correspondingly threaded ends of the arms 4 engage.

Manifestly the controller ring 7 and the follower 3 will in the ordinary operation of the apparatus rotate with and as a part of the mandrel.

When it is desired to occasion the advance or retraction of the follower, rotation of the ring 7 independently of the mandrel will as will be obvious through the engagement of the thread of the ring with the ends of the follower arms occasion the desired longitudinal movement.

This adjustment of the follower may, moreover, as will be understood, be occasioned during the operation of the apparatus and without in the slightest degree interrupting it, by causing said ring to rotate either faster or slower than the mandrel.

For convenience of manipulation of the controlling ring 7 I provide it with an annular handle 8.

The operator may, during the rotation of the mandrel, by placing his hand upon the handle 8, slightly brake the action of the ring and occasion the longitudinal movement of the follower in one direction, or he may by spinning said handle 8 cause it to move faster than the mandrel is rotating, thereby occa-

sioning the correspondingly opposite movement of said follower.

The advance end of the follower, which is inclined or tapered as shown particularly in Figure 3, is of triangular section, and each of its three faces is provided with a longitudinally extending undercut tongue 9, as shown particularly in Figure 6.

In the advance end of the mandrel are formed three radial recesses in which are mounted roller carrying blocks 10, the inner faces of which are as shown inclined from end to end in planes corresponding to the inclined or tapered faces of the follower, with which faces the inner faces of the blocks are shown as in contact.

The respective tongues 9 of the follower engage within correspondingly shaped grooves 11 formed in the blocks 10.

As a result of this arrangement the forward movement of the follower occasions the gradual but uniform and positive radial expulsion of the blocks 10, while its rearward movement occasions the gradual but positive and uniform retraction of said blocks.

Within recesses in the outer faces of the blocks 10 are mounted expanding rollers 12, the axles 13 of which are entered in suitable bearings in the ends of said blocks, the arrangement of said rollers being such in the form of apparatus shown that their axes are in parallelism with the axis of the mandrel.

14 are a series of flanging or cam rollers, the bodies of which may be described as bell-shaped, arranged in such positions that their axes are at acute angles with respect to the axis of the mandrel, said rollers being somewhat to the rear of, and in circumferential distribution alternated with, the straight or expanding rollers, 12.

In the construction illustrated, recesses 15 in the body of the mandrel are formed, in which the flanging or cam rollers are mounted in such positions that the greater part of their bodies are within or below the surface of the mandrel, the side faces of their projecting portions curving gradually away from the side face of the mandrel, as shown in Figure 3, so that in the advance of the mandrel their smaller ends are carried within the lip of the pipe operated upon with the result that said lip makes its first contact with the said side faces at a point intermediate of their length, and in the continued advance of the mandrel, said side faces act, so to speak, as inclined planes against said lip, and turn or bend it outward.

In the bottoms of the recesses 15 are small bearings 16 in which the inner ends of the axles of the cam rollers engage, while at the outer portions of said recesses are bosses 17 embodying circular threaded openings in which are mounted axle blocks 18 in which in turn the outer ends of the axles of the cam rollers find their bearing.

Balls 19 may be employed where desired to ease the rotation of the cam rollers, and in Figure 3, I show such balls as disposed between the rear ends of a cam roller and its axle block 18.

In expanding and flanging pipes it is usual and desirable to expand them within and seat them against a coupling ring such as that shown in dotted lines in Figure 3 and designated 20.

In Figure 3 a pipe is indicated in dotted lines as mounted within said coupling ring, and the lip of said pipe is illustrated in its first position, and also illustrated in the position it occupies after it has been flanged or bent to its final seat against the coupling ring.

In the operation of the apparatus, after the pipe has been entered within the coupling ring 20, the advance end of the mandrel is entered within the mouth of the pipe and the mandrel caused to rotate; and the controller ring 7 is operated to advance the follower to force the expanding rollers 12 into contact with the inner face of the pipe with such pressure as may be desired.

The operation of the rollers 12, of course, will be to expand the metal of the pipe against the coupling ring without forming a flange upon said pipe.

After the expanding rollers have imparted the desired expansion to the pipe, the follower 3 may be retracted if desired to occasion the corresponding inward movement of said rollers, and the rotating mandrel advanced to carry the cam rollers gradually against the lip of the pipe.

As the mandrel advances the flanging or cam rollers operate to gradually incline outward the lip of the pipe, causing said lip to conform to the profile of said rollers which, of course, have such predetermined configuration as may be necessary to impart the desired formation to the pipe lip.

Said rollers 14 tend to finally bear or press the lip of the pipe against the face of the coupling ring, or into a recess 21 formed therein.

In conjunction with the flanging rollers I prefer to employ what I term deadening rollers 22 removably applied to the mandrel at a point or points about abreast of the cam rollers.

I prefer to mount the deadening rollers by supporting them upon the cylindric protruding portions 23 of set screws 24 adapted to engage in suitably threaded apertures 25 formed in the body of the mandrel.

26 are devices to secure the deadening rollers in position upon the set screws.

The acting faces of the deadening rollers may, as illustrated in Figures 3, 4, and 5, be of any desired form according to the final shape it may be desired to impart to the flange formed in the pipe.

As will be understood from a consideration of the arrangement shown in Figure 3, the deadening rollers are adapted to bear strongly against the flange when formed or partly formed on the pipe by the cam roller, with a

more direct pressure than that imparted by the inclined cam roller, with the result that said flange in its final form is subjected to such heavy direct pressure as to overcome any tendency it may have to resume its original position.

By reason of the different inclinations of the axes of the flanging or cam roller or rollers on the one hand, and the deadening roller or rollers on the other, said flanging or cam roller or rollers tend in the rotation of the mandrel to flare or bend the lip of the pipe outward and rearwardly, while the deadening roller or rollers, following the rollers first named, and bearing upon the outwardly inclined lip, tend to flatten said lip down into its final position.

The one roller or set of rollers thus supplements the action of the other roller or set of rollers, and as said rollers travel around the lip of the pipe the mandrel is at the same time advanced, so that the lip of the pipe is formed into a very perfect flange the set and proportions of which are very accurately predetermined. The flanging or cam roller by the set of its axle, and its external contour, tends to form a flange, of course, but the deadening roller, with its axle at a right angle to the axis of the mandrel, forces the metal, bent into suitable shape by the cam or flanging roller, down into the final form desired, with much greater firmness than would be possible with the flanging or cam rollers alone, and produces a flange of better character than could be obtained by the use of the flanging rollers alone.

As will be understood, any desired number of expanding rollers, of cam rollers, and of deadening rollers, may be employed, and while I have herein illustrated three of each of said rollers it is manifest that this arrangement may be indefinitely varied.

It is quite possible to obtain good results by employing on the mandrel one flanging or cam roller and one deadening roller.

It is possible that the deadening rollers in some uses of the apparatus may be dispensed with, and to that end I connect them to the mandrel in such manner, as described, that they may with their supporting screws be easily removed.

As a matter of convenience of construction, the recesses in which the blocks 10 are mounted are closed as to their front ends by an annular plate 27, structurally independent of the body of the mandrel, secured, however, to said body by screws 28.

The arrangement of the flanging or cam roller or rollers and the deadening roller or rollers on the mandrel is preferably such that each deadening roller employed is in such position longitudinally of the mandrel that it encounters the metal just acted on by the flanging or cam roller immediately ahead of it in the rotation of the mandrel, and presses such metal a little farther down than it has been pressed by such preceding roller.

As will be understood, when the mandrel shank 2 has been engaged in a chuck, or kindred supporting and rotating device, and it is desired to free it therefrom, application of a wrench or suitable gripping tool, to the nut 29, to rotate it to the left, will, by reason of said nut bearing as to its outer face against the chuck, operate to draw the shank 2 out from the chuck, and so far loosen it that the mandrel may thereupon be readily withdrawn by hand.

As is obvious, my improved device is simple, strong, composed of few parts, and not liable to get out of order; and being self contained and compact, constitutes an apparatus for doing the work described, which is not only efficient but highly workmanlike.

Having thus described my invention, I claim—

1. The combination, to form a machine for operating upon the ends of pipes, of a rotatable mandrel embodying a bore, a follower mounted in said bore, a roller mounted in said mandrel and controlled as to its radial adjustment through the longitudinal movement of said follower, an arm connected to said follower and projecting through a longitudinal slot in said mandrel and having its outer end provided with a thread, a controller ring mounted on said mandrel and having a threaded face with which said threaded arm is engaged, said controller ring being rotatable independently of the mandrel, substantially as set forth.

2. The combination, to form a machine for operating upon the ends of pipes, of a mandrel body which has a bore and is for a portion of its length of reduced diameter, a roller mounted in said body, a follower mounted in said bore, the longitudinal movement of which follower controls the set of the roller, longitudinal slots formed in the reduced portion of the mandrel body, a controller ring seated on the mandrel body, free for rotation independently thereof and extending over the reduced portion of said body, arms extending from said follower through said slots and having their outer ends threaded and engaged with the threaded controller ring, substantially as set forth.

3. The combination to form a machine for operating upon the ends of pipes, of the mandrel body having the reduced portion, the axle bore, the slots formed in its reduced portion, and the slots for the roller blocks,—the threaded controller ring mounted on said body and bridging said reduced portion,—the tapered follower mounted in said bore having arms extending through the slots and engaged with the threaded controller ring,—and roller bearing blocks mounted in the slots in the mandrel and engaged by undercut tongue and groove connections with the upper portions of the follower, substantially as set forth.

4. The combination, to form a machine for operating upon the ends of pipes, of a rota-

table mandrel, an expanding roller mounted in said mandrel in approximate parallelism with its axis, a cam or flanging roller mounted on said mandrel with its axis at an acute angle with respect to the axis of the mandrel, and a deadening roller mounted on said mandrel, at a point approximately abreast the cam or flanging roller, and with its axis approximately perpendicular to that of the mandrel, said rollers being all idle rollers, substantially as set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 28th day of April, A. D. 1900.

LUTHER D. LOVEKIN.

In presence of—

F. NORMAN DIXON,

THOS. K. LANCASTER.