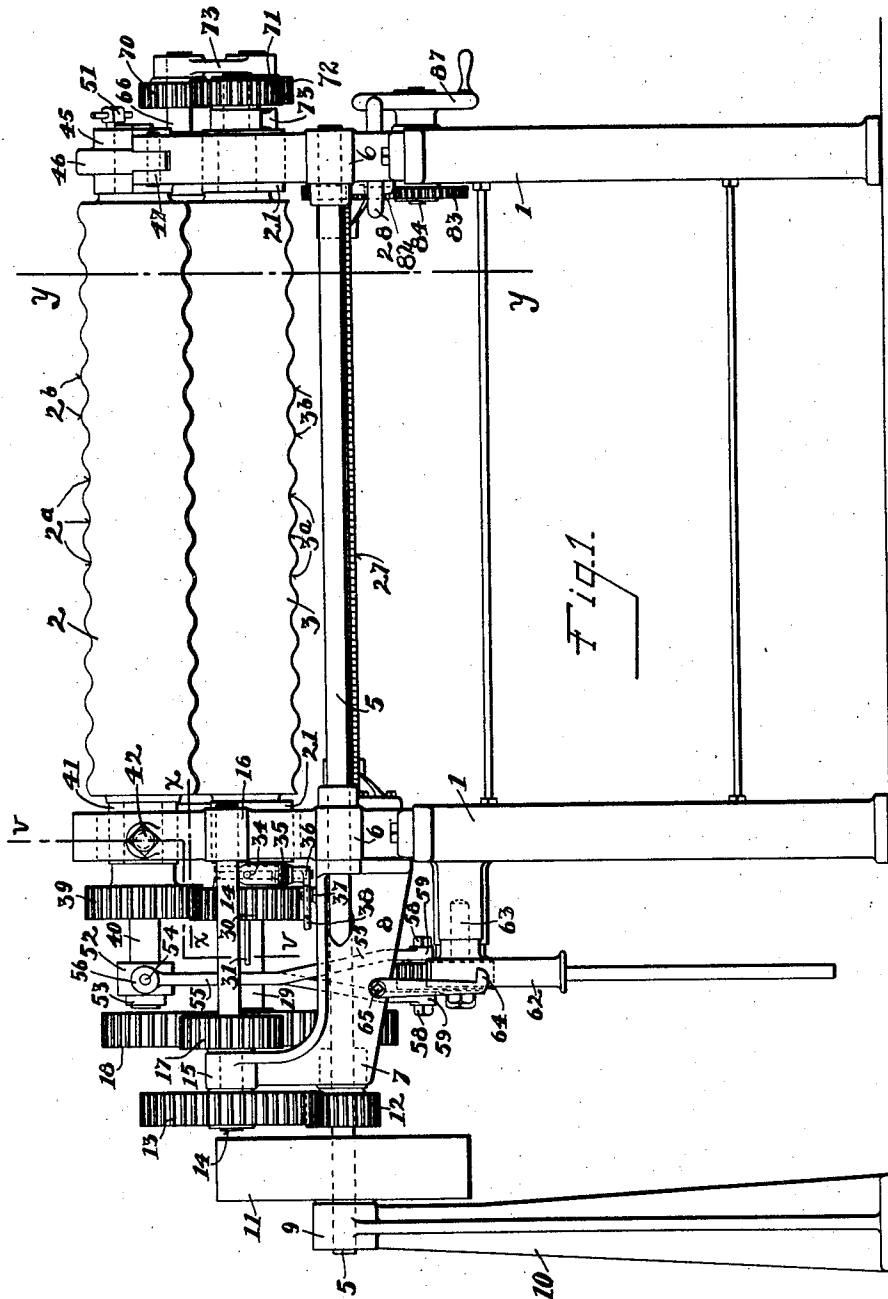


C. N. FREY.
CURVING MACHINE FOR SHEET MATERIAL.
APPLICATION FILED JULY 6, 1908.

938,751.

Patented Nov. 2, 1909.
3 SHEETS—SHEET 1.



Witnesses.
Homer Bradford.
Adèle Weininger

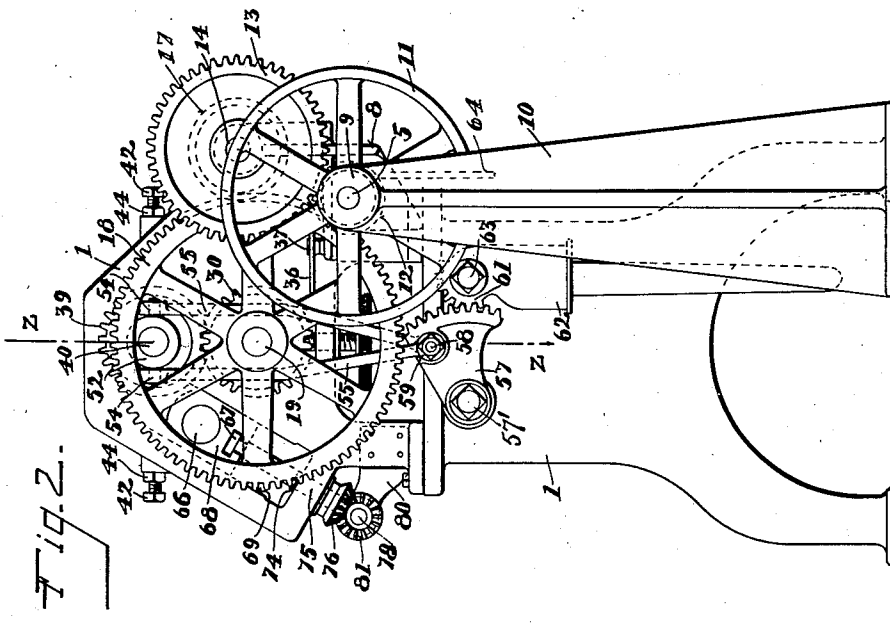
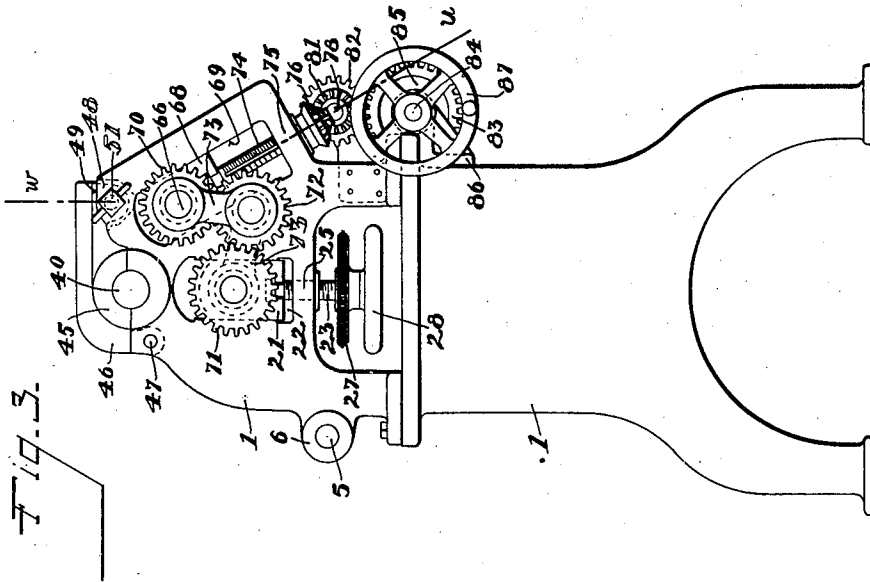
Inventor.
Clarence N. Frey,
by R. H. Heubel,
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3 SHEETS—SHEET 2.



WITNESSES.
Homer Bradford.
Adèle Menninger.

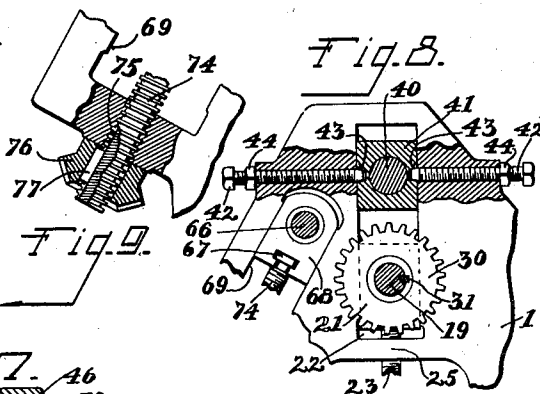
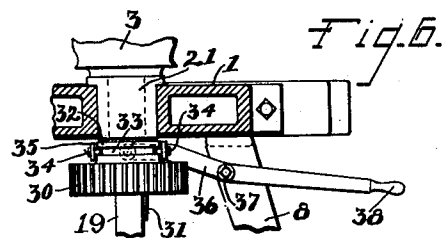
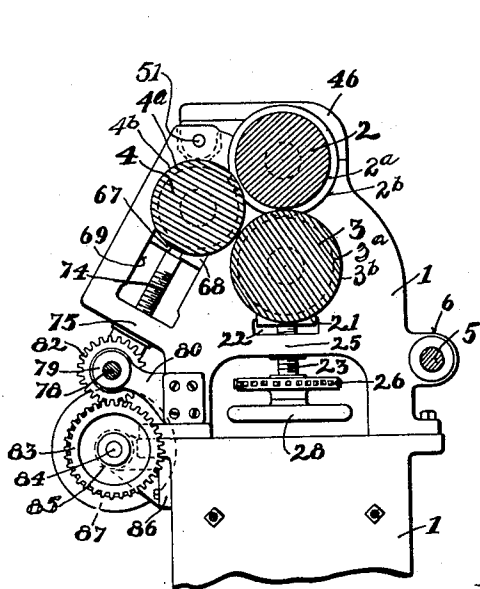
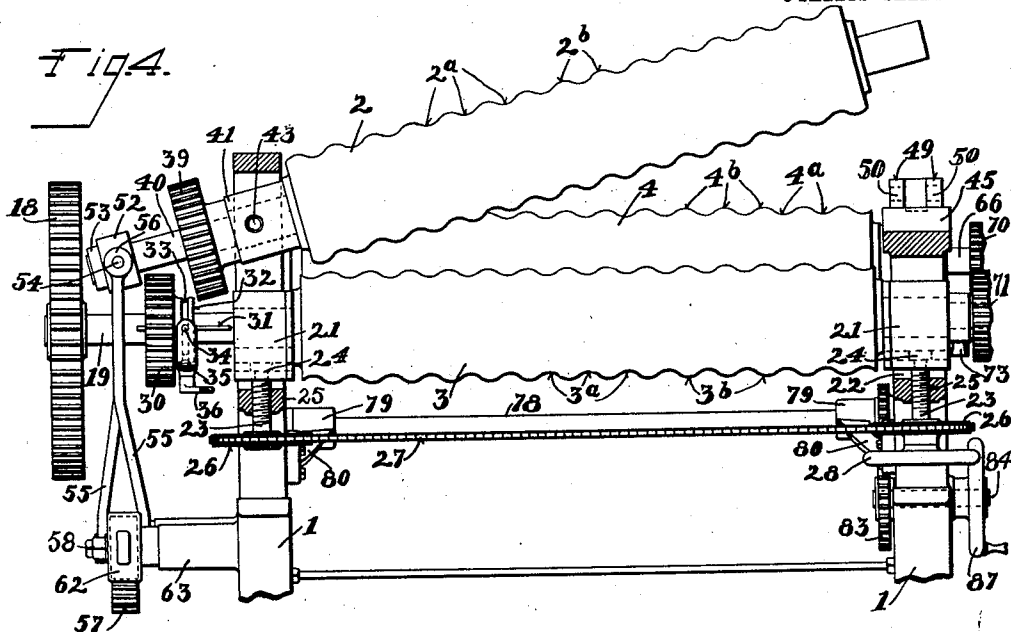
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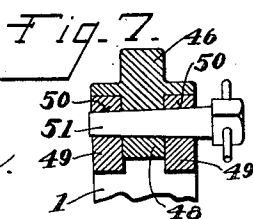
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Patented Nov. 2, 1909.

3 SHEETS—SHEET 3.



WITNESSES.
Norman Bradford.
Adèle Melinger.



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UNITED STATES PATENT OFFICE.

CLARENCE N. FREY, OF CINCINNATI, OHIO, ASSIGNOR TO THE J. M. ROBINSON MANUFACTURING COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

CURVING-MACHINE FOR SHEET MATERIAL.

938,751.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed July 6, 1908. Serial No. 442,163.

To all whom it may concern:

Be it known that I, CLARENCE N. FREY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Curving-Machines for Sheet Material, of which the following is a specification.

It is the object of my invention to provide new and useful improvements in machines for curving sheet material, the improvements embracing new and improved means for mounting and adjusting the rollers, and it is the further object of my invention to so mount the upper roller as to permit the same to be tilted in convenient manner for the purpose of inserting or taking off work and enabling the work to be readily slipped over the end of the roller.

The invention consists in providing a curving machine for curving sheet material with an upper roller arranged to swing from one end thereof to permit the insertion or removal of the work over the other end of the roller; in novel means of mounting and manipulating the rollers; and, further, in the parts, and in the construction, arrangement and combinations of parts hereinafter more fully described and claimed.

In the drawings: Figure 1 is a front elevation of my improved device. Fig. 2 is a head-end elevation of the same. Fig. 3 is a tail-end elevation of the same. Fig. 4 is a front elevation of my improved device, partly broken away, and partly in vertical longitudinal section on the line $z-z$ of Fig. 2, showing the upper roll swung into releasing position. Fig. 5 is a vertical cross-section of my improved device on the line $y-y$ of Fig. 1. Fig. 6 is a detail in horizontal section on the line $x-x$ of Fig. 1 showing the shifting means for the slidable gear. Fig. 7 is a detail in vertical section on the line w of Fig. 3, showing the locking means for the separable bearing. Fig. 8 is a detail in irregular section on the line $v-v$ of Fig. 1 showing the manner of pivoting the upper roll and connecting the shaft for the lower roll with its operating gear; and, Fig. 9 is a detail in section on the line u of Fig. 3 showing the manner of mounting and driving the adjusting screw for the bending roller.

1 represents the main frame of the machine in which rollers 2 3 and 4 are mounted

in manner to be hereinafter described, these rollers being respectively provided with annular grooves 2^a 3^a 4^a between which are annular beads 2^b 3^b 4^b , forming what I shall hereinafter term corrugated rollers, the annular beads 2^b registering with the annular grooves 3^a 4^a and the annular grooves 2^a registering with the annular beads 3^b 4^b .

5 is a driving-shaft, driven in suitable manner, and shown journaled in bearings 6 in the main frame, in a bearing 7 of a bracket 8 secured to the main frame, and in a bearing 9 of a standard 10. A pulley 11 is shown on the driving-shaft, which also carries a pinion 12 meshing with a gear 13 on an intermediate shaft 14 journaled in a bearing 15 on the bracket 8 and a bearing 16 in the main frame, the intermediate shaft also carrying a pinion 17 meshing with a gear 18 mounted on the roller-shaft 19 of the roller 3, and forming gearing for driving said shaft 19. The roller-shaft 19 is journaled in slide-blocks 21 slidable in slide-ways 22 of the main frame and adjustable up and down by means of having screw-rods 23 journaled in the lower ends of said slide-blocks, as shown at 24, and threaded into internally threaded bearings 25 of the main frame. There is one of these slide-blocks with adjusting means therefor at each end of the roller 3 and they are preferably adjusted in unison. For accomplishing this I mount a sprocket-wheel 26 on each of these screw-rods, a sprocket-chain 27 being received about these sprocket-wheels, the sprocket-wheels being fast on said screw-rods. One of the screw-rods may also be provided with a hand-wheel 28 for turning the same. The rollers 2 3 may be termed the feeding rollers, the adjustment between them accommodating different thicknesses of material, whereas the roller 4 may be termed the bending roller, its adjustment determining the degree of curvature imparted to the stock. The roller-shaft 19 also has a gear 30 thereon which is splined thereto and slidable lengthwise thereon for purposes hereinafter described. Thus 31 is a spline between the gear 30 and the shaft 19. The hub 32 of this gear is provided with an annular groove 33 into which pins 34 on a fork 35 are received. The fork is mounted on a lever 36 pivoted on the bracket 8 on a bolt 37, the lever having a handle 38 for its manipulation. The gear 30 normally meshes with a gear

39 secured to the roller-shaft 40 of the roller 2, the roller-shaft 40 being journaled in a bearing 41 adjacent its gear end, which bearing is preferably capable of swinging as on
 5 pivot-bolts 42 threaded into the main frame and received into sockets 43 in said bearing, jam-nuts 44 holding the pivot-bolts in adjusted positions. At its other end the roller-shaft 40 is journaled in a bearing 45. This
 10 latter bearing is preferably releasable or separable as by having one of its parts mounted on a swinging-block 46 pivoted on a pin 47 at one side thereof, its swinging side being provided with an ear 48 received be-
 15 tween ears 49 of the main frame, these ears being provided with a mating tapered hole 50 through which a tapered pin 51 is received for insuring that the respective parts of the bearing 45 shall be securely held and the
 20 movable part of said bearing firmly positioned with relation to the stationary part thereof and to the journal of the shaft. Means are provided at the gear-end of this shaft for tipping the other end of the roller
 25 2 away from its mate to permit the insertion or removal of work. For accomplishing this tipping I have shown the gear-end of the shaft 40 provided with a collar 52 loose thereon and held thereon by a collar 53
 30 secured to said shaft. The collar 52 is provided with pins 54. Links 55 have eyes 56 received about said pins. These links are at the respective sides of the collar 52 and are articulated with an arm 57, the respective
 35 links being shown received at the respective sides of said arm by bolts 58 with which the links are articulated by eyes 59. This arm is shown in the form of a segment-gear, journaled on a stud 57', the teeth whereof
 40 are meshed by segment-gear 61 on a lever-arm 62 pivoted on a stud 63 of the frame.

The roller 2 is normally parallel with the roller 3. If it is desired to tip the roller 2, the swinging-block 46 of the bearing 45 is released for releasing the journal at the tail-
 45 end of said roller. The lever 36 is also swung on its pivot for shifting the gear 30 sidewardly out of mesh and range of the gear 39 so as to permit the swinging of the roller-shaft 40 upon its pivot. The lever-
 50 arm 62 is raised, which causes the arm 57 to be depressed, thereby depressing the geared end of said swinging roller-shaft through the medium of the links 55 and collar 52 for
 55 tipping the swinging roller upwardly away from its mate for providing an opening laterally of its tail-end so that work may be inserted or removed conveniently. This swinging of the swinging roller is provided pri-
 60 marily for removal of the work, as this work is usually bent into curved form by my improved device, and is often caused to encircle the swinging roller in the bending thereof, the swinging of the roller and the freedom
 65 of its end permitting the removal of the

curved work to be conveniently accomplished. For holding the swinging roller in slanting position, the lever-arm 62 is received by a catch 64 pivoted on a bolt 65 on the bracket 8, this catch being released from
 70 the lever-arm when it is desired to again bring the rollers into parallel positions. The roller 4 is on a shaft 66 journaled in slide-blocks 68 slidable in slide-ways 69 of the main frame.

70 is a gear on the shaft 66 and 71 is a gear on the shaft of roller 3, between which gears there is an intermediate gear 72 held in mesh with said gears 70 71 by expansion links 73. For adjusting said roller 4 each of the slide-
 80 blocks 68 preferably has an adjusting screw 74 journaled therein, as shown at 67, and threaded through an internally threaded bearing 75 and received by a bevel-gear 76, the adjusting screw having splined connec-
 85 tion 77 with said bevel-gear for causing turning of the adjusting screw with the bevel-gear, but permitting the adjusting screw to slide lengthwise therein. A shaft
 78, journaled in bearings 79 on brackets 80 90 has bevel-gears 81 thereon which mesh with the respective bevel-gears 76. A spur-gear 82 is also shown mounted on the shaft 78 and is meshed by a gear 83 on a shaft 84 jour-
 95 naled in a bearing 85 of a bracket 86 secured to the frame. The shaft 84 is arranged to be turned by a hand-wheel 87, this construction permitting ready and convenient adjustment of the roller 4.

My improved device is especially applica- 100 ble for bending corrugated work into round, so-called ogee, and other curved forms, and is very powerful and capable of performing extremely heavy duty, and is convenient in
 105 manipulation and adjustment, and the insertion and removal of work is accomplished without disturbing previous adjustment of the rolls. The corrugated stock adapted to be curved by my improved device is received
 110 between the rollers 2 3, the roller 4 having been adjusted to proper position with relation to the rollers 2 3 for imparting the proper curve to the stock. The corrugated sheets are rounded or bent into curved form, the corrugations being received between the
 115 annular grooves and beads of the corrugated rollers 2 3 4.

My improved device is especially useful in curving corrugated sheet metal into round form for the purpose of use as pipes, culvert
 120 drains and similar work, the corrugated sheet metal being bent about the swinging roller 2, this roller having its swinging end released and the curved work slipped end-
 125 wise therefrom when the bending operation has been completed. My improved device is also applicable for bending reinforcing metal sheets for sea-walls and abutments, cement retaining arches for fire-proof build-
 130 ings, and the like.

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

1. In a curving machine for sheet material, the combination of feeding rollers having mating annular grooves and beads normally located at the points of closest approach between said rollers in common planes parallel with the rotary axes of said rollers, meshing gearing between said rollers for driving one of said rollers from the other of said rollers, means for slipping one of the gears of said gearing between said rollers endwise with relation to said collective rollers out of mesh with its mate, and means for tilting one of said rollers from its geared end, and constructed and arranged for moving said movable gear endwise out of range of its mate for permitting the tilting of said tilting roller directly from its operative position, for the purpose specified.

2. In a curving machine for sheet material the combination of mating feeding rollers, shafts therefor, gearing for driving one of said shafts, mating gears on said shafts for driving the other of said shafts, said first-named gearing and mating gears being spaced apart endwise at one end of said rollers, link-mechanism extending between said first-named gearing and mating gears and having connection with one of said shafts for tilting the roller thereon; and one of said mating gears being slidable endwise on its shaft during maintenance of longitudinal position of the roller on said shaft for positioning the said gear out of lateral range of its mating gear during tilting of said roller, substantially as described.

3. In a curving machine for sheet material, the combination of a pair of feeding rollers, shafts therefor having axial extensions at one end of said rollers, gears mounted on said extensions, one of said gears hav-

ing spline-connection with its extension for permitting the same to be moved endwise out of tilting range of its mating gear during maintenance of longitudinal position of said extension, a pivoted bearing in which the other of said shafts is journaled, and link-mechanism having connection with said extension of said last-named shaft for permitting tilting of said shaft and the roller thereon upon endwise movement of said endwise movable gear out of tilting range of its mating gear, substantially as described.

4. In a curving machine for sheet material, the combination of upper and lower mating feeding rollers, shafts therefor, a pivoted bearing and a multi-part bearing for the shaft of said upper roller, said multi-part bearing comprising a swinging block and securing means therefor, mating gears for said shafts, the pivotal axis of said pivoted bearing being between said mating gears and said rollers, the gear for said shaft of said lower roller being slidable endwise away from said roller out of range of the said gear for said shaft of said upper roller, and link-mechanism having connection with said shaft of said upper roller for tilting said upper roller upon said pivoted bearing and thereby swinging the gear thereon past said endwise movable gear when in shifted position, said link-mechanism comprising a segment-gear, a link articulated therewith and with said tilting shaft, a second segment-gear meshing with said first-named segment-gear, and a lever-arm for said second segment-gear, substantially as described.

In testimony whereof, I have signed my name hereto in the presence of two subscribing witnesses.

CLARENCE N. FREY.

Witnesses:

JOHN R. SCHINDEL,
ADELE MEININGER.