

Sept. 6, 1938.

O. KIND

2,129,063

WIRE TYING MACHINE

Filed May 21, 1937

4 Sheets-Sheet 1

Fig. 1

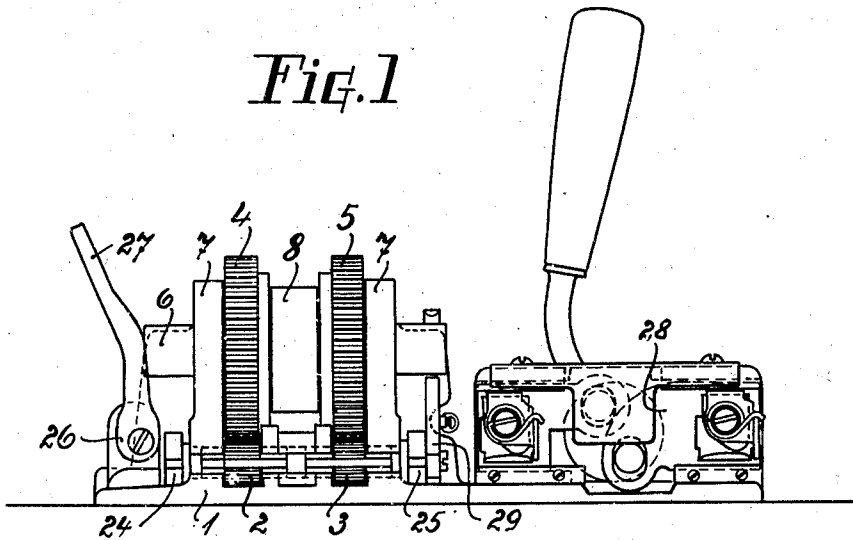
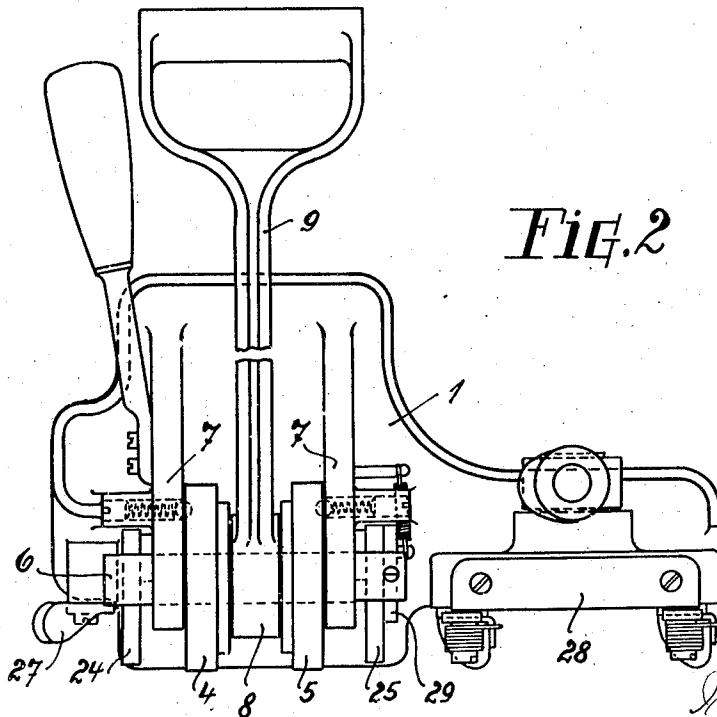


Fig. 2



Inventor.

*Oscar Kind,
by Frank S. Appleman,
attorney.*

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FIG. 3

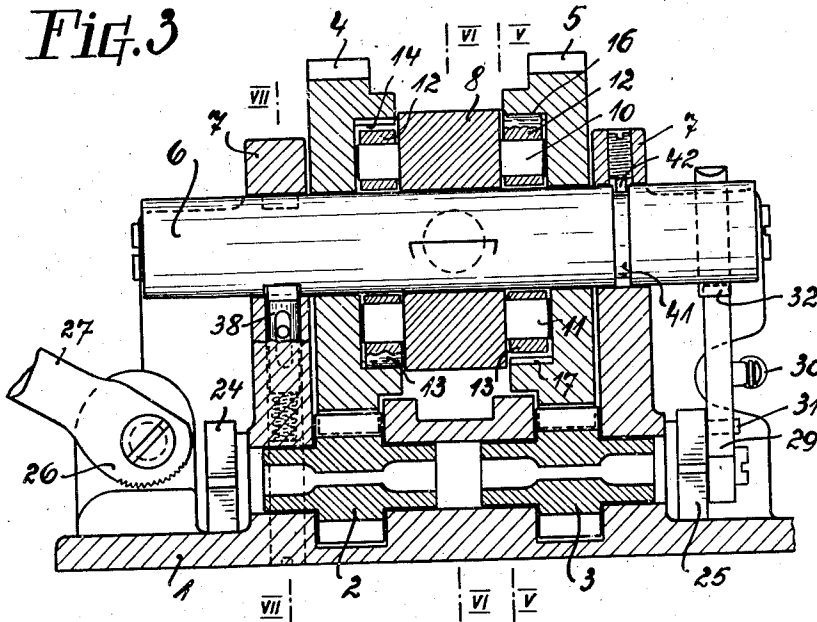
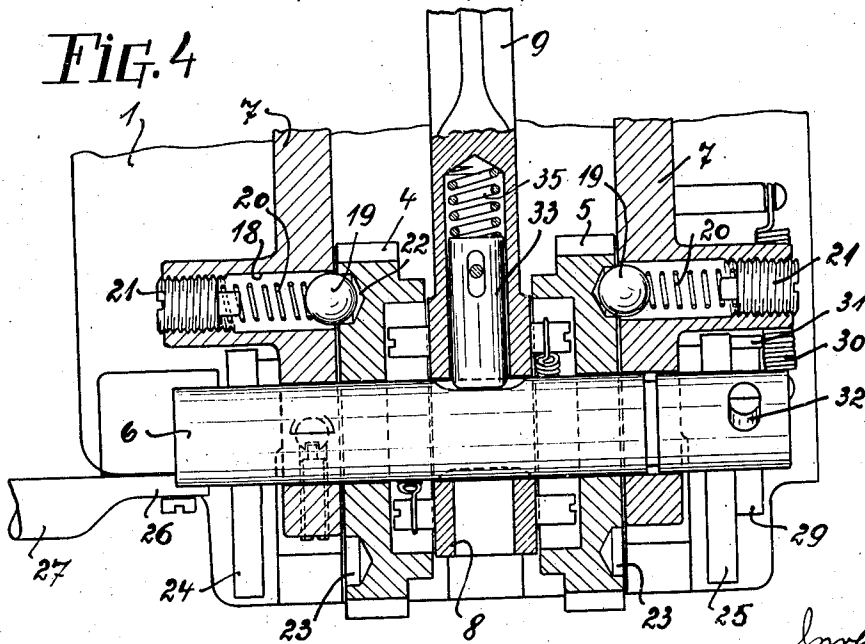


FIG. 4



Inventor,
Oscar Kind,
by Frank S. Ahlmann
attorney.

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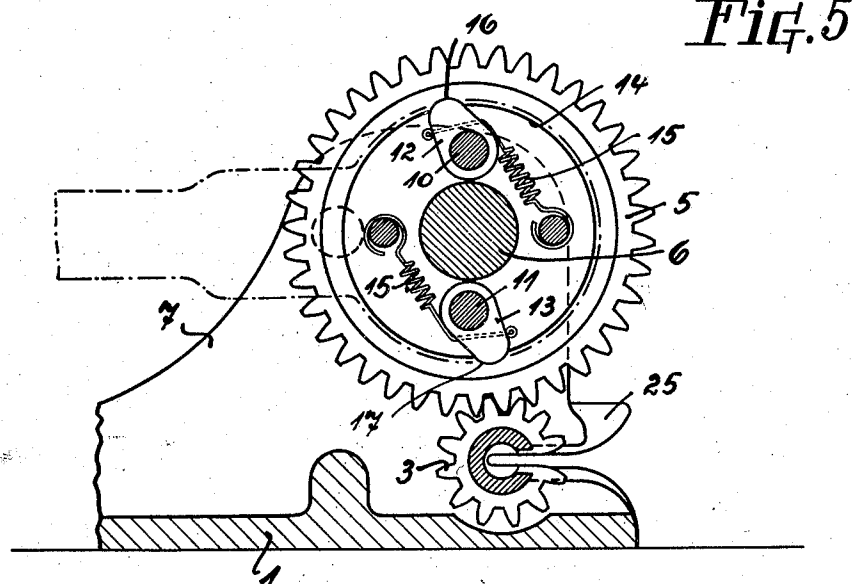
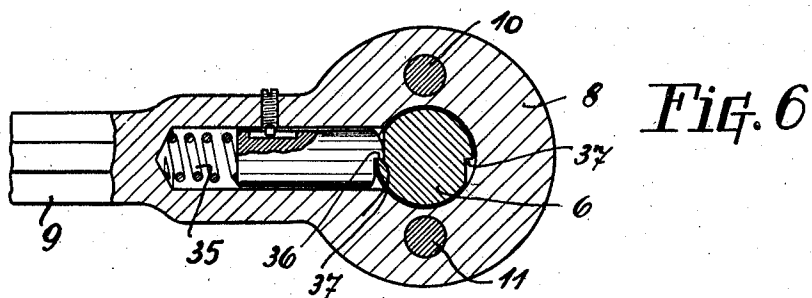
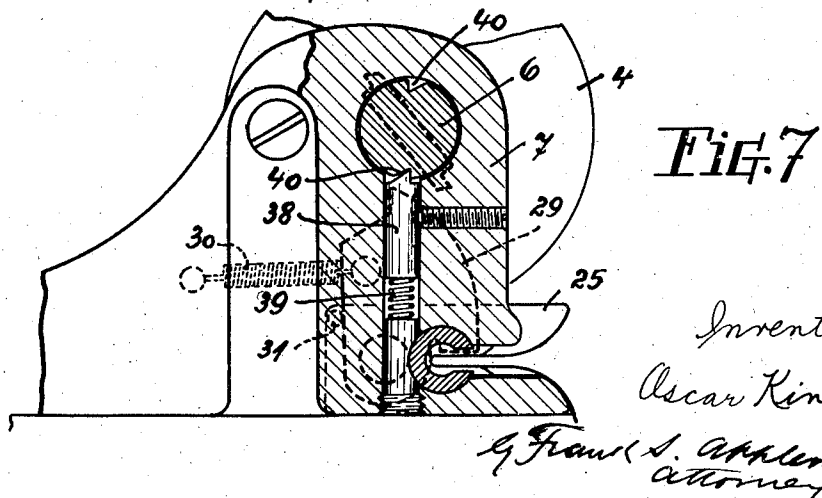
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Inventor,
Oscar Kind,
by *Frank S. Appleman*
Attorney

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Fig. 8

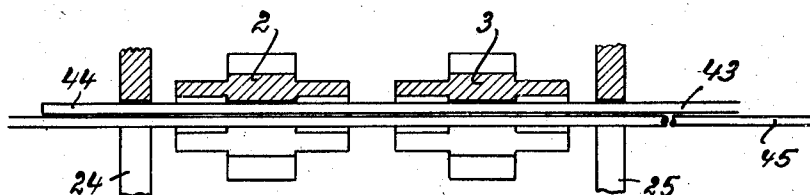


Fig. 9

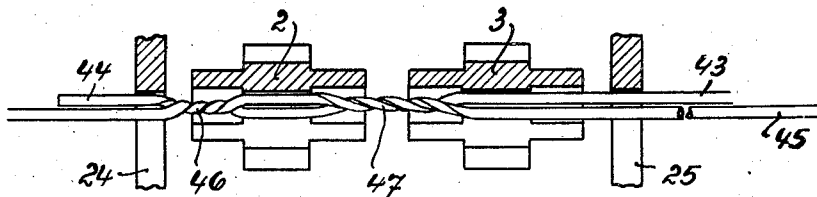
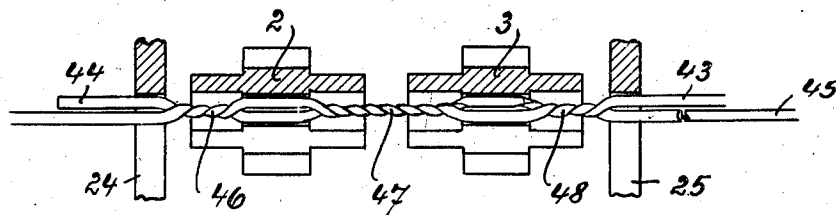


Fig. 10



Inventor,
Oscar Kind,
by Frank S. Appelman
Attorney.

UNITED STATES PATENT OFFICE

2,129,063

WIRE TYING MACHINE

Oscar Kind, Eodenkirchen, near Cologne,
GermanyApplication May 21, 1937, Serial No. 144,100
In Germany March 25, 1937

13 Claims. (Cl. 140—93)

This invention relates to machines for the production of a twisted fastening on the wire bindings of packages, in which the fastening instead of being formed in the usual manner by means of a single twisting pinion provided with a longitudinal slot, is produced by two such pinions spaced from each other, so that the sections of wire to be united are twisted with each other at four successive points with a screw pitch inclination, the directions of twisting at each two points being opposed.

In the previously known twisting machine of this type, both twisting pinions are rotated together and in the same direction by a common hand lever. In this way the resistance to operation is approximately double that in the known machines operating with one twisting pinion. Moreover, the increase in the resistance of the fastening which is to be attained by doubling the twisting sections is comparatively small.

In order to avoid these disadvantages the machine forming the subject of the present invention is constructed in such a way that, of the two twisting pinions, only one is rotated with each of the two swinging movements of the hand lever, whilst the other is fixed. The two pairs of double twists are therefore not produced simultaneously but successively and with an opposite direction of twisting so that without the co-operation of a central retaining slot between the two twisting pinions of the twisting slot the pinion which is held fixed serves as a holder for the twisting of the section of wire lying between the pinions. By dividing the resistance to operation on the two oscillating strokes of the twisting lever a considerable decrease is effected in the force which must be exerted by the operator. Moreover, the conditions of the formation and strength of the two central twisting sections contacting directly adjacent each other in the same direction are substantially improved so that the resistance of such twisted fastenings can be approximated very closely to the tensile strength of the wire.

Reference will now be made to the accompanying drawings which show one form of construction according to the invention and in which:—

Fig. 1 shows a front elevation of the fastening machine according to the invention,

Fig. 2 shows a corresponding plan,

Fig. 3 shows on a larger scale a vertical section through the twisting device of the machine,

Fig. 4 is a horizontal section corresponding to

Fig. 5 shows a vertical cross section on the line V—V of Fig. 3,

Fig. 6 is a similar cross section on the line VI—VI of Fig. 3, and

Fig. 7 is a section on the line VII—VII of Fig. 3.

Fig. 8 shows in a schematic sectional elevation through the two twisting pinions and shows the initial stage for the formation of the fastening,

Fig. 9 shows these parts in a similar way after the formation of the first twist, and

Fig. 10 is a similar view after the formation of the second twist.

The two twisting pinions 2, 3 are supported coaxially and at a suitable distance from each other on the base plate 1. These pinions are provided with the usual longitudinal slots, opened towards the outside in the position of rest for introducing and discharging the ends of the wire to be twisted, and each engages with one of the two driving gear wheels 4, 5 which are rotatably disposed above the pinion on an axle 6 which is supported on both sides by carrying bars 7 integral with the base plate 1. Between the two driving gear wheels the hub 8 of the twisting hand lever 9 is rotatably disposed on this axle independently of the latter and of the driving gear wheels. The hub 8 carries on both sides a pair of pins 10, 11, diametrically opposite each other, on which each of a pair of coupling pawls 12, 13 is so arranged that these engage with the pins 10 in circular recesses 14 of the side of the driving gear wheels 4, 5 facing the hub 8. The two pawls are obliquely disposed in opposite directions and are pressed against the cylindrical edge surface of the recesses 14 under the action of the springs 15. Symmetrically opposite engagement grooves 16, 17 are provided in said recesses and the ends of the coupling pawls can fall into the former so that on rotation of the hand lever they can each positively engage one of the driving gear wheels, whilst the points of the pawls of the other driving gear wheel can slide freely on the cylindrical inner surface of the recess.

For fixing the twisting pinions in their introductory and retaining position there is provided a spring check stop consisting of a ball 19 under the action of a spring 20 and movably supported in a transverse aperture 18 of each of the carrying walls 7 and which, by means of the adjusting screw 21 supporting its outer end can be suitably tensioned. Within the range of the balls check holes 22, 23 are provided at opposite points in the adjacent circular surface of the corresponding driving gear wheel in which the balls

can penetrate to a certain depth when the check holes are axially opposite them. The tension of the loading spring 20 of this spring check stop is determined so that the corresponding twisting pinion can be fixed with a laterally open slot against the rotary twisting force whilst on the other hand the force exerted by hand on the hand lever at the end of the stroke is sufficient to overcome the resistance of this spring check stop whilst pressing back the balls 19.

In order to fix the ends of the wire which are to be twisted during the twisting operation, there is disposed at a certain distance from each of the outer ends of the two twisting pinions 2, 3 one of the usual retaining forks 24, 25 the slots of which, open in front, lie in the path of the longitudinal slots of the two twisting pinions. In front of the left outer side of the holding fork 24 there is provided, as is usual, the end clamping device operated for example by means of a clamp eccentric 26 and a hand lever 27 whilst on the opposite side there is disposed a tensioning device 28 suitable for tensioning the binding. Between the said device and the twisting pinion a knife 29 is rotatably disposed on the outside of the holding fork 25 and is normally held out of reach of the binding wire on the detent pin 31 by means of a spring 30. Two catch pawls 32 serve to effect the downward movement of this knife with the cutting action separating the projecting tensioning end of the wire, and are disposed on the end of the axle 6 within reach of the upper end of the cutting knife. The rotation of the axle 6 necessary to operate this catch pawl which is carried by said axle is provided by means of a control pawl 33 movably supported radially to the axle 6 in the body of the hand lever 9, and which under the action of a spring 35 can drop with its edge 36 into one of the two tooth checks 37 if the hand lever is swung out backwards.

During the forward swinging of the lever the axle is fixed by a catch pawl 38 which by means of the spring 39 can engage in correspondingly disposed stop checks 40 of the axle. On the other hand the control pawl 33 as well as the catch pawl 38 allow forward rotation of the hand lever. The longitudinal movement of the axle with respect to the parts carrying it can be prevented for example by means of a holding pin 42 projecting into an annular groove 41.

When operating the machine, the binding wire 43 conveyed around the package has its end 44 held in position by the eccentric clamp 26 which holds the end 44, as well as the portion 45 of the wire to be tensioned, and these are applied in the slot of the twisting pinions 2, 3 as well as in the retaining forks 24 and 25. The tensioning end 45 is then connected in any suitable manner with the tensioning device 28 and by operation of the latter is tightened so that the package is surrounded with the binding wire at the desired tension. The hand lever is then changed from its backwardly directed initial position and moved forward and takes with it the driving gear wheel 4 by means of the coupling pawl 12. By means of the twisting movement of the twisting pinion 2 on the left side which is thus produced, the two overlapping ends of the section of wire passing through this are twisted around each other. In this case the holding forks 24 on the left side and slot of the twisting pinion 3 on the right side serve as a holder, said twisting pinion being fixed during this period by the spring stop check acting on the corresponding driving gear wheel 5, as shown in Fig. 9.

If the hand lever is now swung back into its initial position the left hand twisting pinion 2 is fixed with the driving gear wheel 4 by means of the left hand spring stop check whilst the right hand driving gear wheel 5 is taken along by the coupling pawls 13 coming into operation with this rotation, and in this way the right hand twisting pinion 3 is rotated about itself twice, for example, until it again passes into the open position illustrated in Fig. 10. Whilst the section of the two wires lying between the twisting slot of the pinion 3 and the right hand holding fork is twisted, for example, to the extent of two pitch movements in accordance with the number of rotations, the section lying between the two twisting pinions 2, 3 is twisted by double the amount of the twisting previously given. By means of a suitable selection of the distance of the effective slot parts of the two twisting pinions it is possible to produce a very tight twisting of the wires and therefore a very high resistance to unwinding in this central part of the entire twisted fastening, common to both double twisted parts, whilst decreasing the screw pitch of the two wires.

I claim:—

1. In a machine for making a twisted fastening on the wire binding of packages including a base plate, two twisting pinions coaxially and rotatably disposed on the said base plate, two driving gear wheels each engaging one of the two twisting pinions, an axle rotatably mounting both driving gear wheels, said axle being disposed on the base plate above the twisting pinions means for successively and alternately rotating said pinions in opposite directions.

2. In a machine for making a twisted fastening on the wire binding of packages including a base plate, two twisting pinions coaxially and rotatably disposed on the said base plate, two driving gear wheels each engaging one of the two twisting pinions, an axle rotatably mounting both driving gear wheels, said axle being disposed on the base plate above the twisting pinions; means for alternately turning each of said driving gear wheels in a direction opposite to that of the other driving gear wheel and means for alternately holding one driving gear wheel stationary while the other is turned.

3. In a machine for making a twisted fastening on the wire binding of packages including a base plate, two twisting pinions coaxially and rotatably disposed on the said base plate, two driving gear wheels each engaging one of the two twisting pinions, an axle rotatably mounting both driving gear wheels, said axle being disposed on the base plate above the twisting pinions; a hand lever rotatably disposed on said axle and means for transferring the swinging motion of the hand lever in one direction to the one driving wheel and means for transferring the motion of said lever in the other swinging direction to the other wheel whereby to alternately rotate said wheels in opposite directions.

4. In a machine for making a twisted fastening on the wire binding of packages including an axle, a hand lever rotatably disposed on said axle, said handle having oppositely disposed circular hub faces two driving gear wheels rotatably mounted on said axle on opposite sides of said handle, a pair of axially aligned twisting pinions operatively engaged with said wheels; coupling pawls disposed on both opposite circular faces of the hub of the hand lever said pawls being disposed obliquely to the radii of said faces, said

pawls on one face being disposed obliquely to the radius of said hub face in a direction opposite to that of the pawls of the other side, and coupling notches disposed in each of said faces in the path of the ends of said pawls.

5 5. A wire tying machine, comprising a base plate, two axially aligned twisting pinions rotatably mounted on said plate, an axle mounted by said plate and spaced from said pinions, a pair of driving gears rotatably mounted on said axle, each of said gears having a driving engagement with one of said pinions, a hand lever including a hub freely mounted on said axle between said gears, at least one coupling pawl substantially radially pivoted to each side face of said hub, a spring for each pawl, each spring engaging its pawl to incline the same obliquely in a direction opposite to the pawl on the other side of said hub, the inner faces of said gears providing cylindrical pawl engaging faces, said face of one gear being formed to provide coupling notches for engaging the respective pawl when said lever is rotated in one direction, said face of the other gear being formed to provide coupling notches for engaging said other pawl when said lever is rotated in the opposite direction, whereby rotation of said lever in one direction rotates one gear and pinion, and rotation of said lever in the opposite direction rotates said other gear and pinion in the opposite direction.

6. A wire tying machine, comprising a base plate, two axially aligned twisting pinions rotatably mounted on said plate, an axle mounted by said plate and spaced from said pinions, a pair of driving gears rotatably mounted on said axle, each of said gears having a driving engagement with one of said pinions, a hand lever including a hub freely mounted on said axle between said gears, at least one coupling pawl substantially radially pivoted to each side face of said hub, a spring for each pawl, each spring engaging its pawl to incline the same obliquely in a direction opposite to the pawl on the other side of said hub, the inner faces of said gears providing cylindrical pawl engaging faces, said face of one gear being formed to provide coupling notches for engaging the respective pawl when said lever is rotated in one direction, said face of the other gear being formed to provide coupling notches for engaging said other pawl when said lever is rotated in the opposite direction, whereby rotation of said lever in one direction rotates one gear and pinion, and rotation of said lever in the opposite direction rotates said other gear and pinion in the opposite direction, and means associated with each gear for holding it stationary while the other gear is rotated.

7. A wire tying machine, comprising a base plate, two axially aligned twisting pinions rotatably mounted on said plate, an axle mounted by said plate and spaced from said pinions, a pair of driving gears rotatably mounted on said axle, each of said gears having a driving engagement with one of said pinions, a hand lever including a hub freely mounted on said axle between said gears, at least one coupling pawl substantially radially pivoted to each side face of said hub, a spring for each pawl, each spring engaging its pawl to incline the same obliquely in a direction opposite to the pawl on the other side of said hub, the inner faces of said gears providing cylindrical pawl engaging faces, said face of one gear being formed to provide coupling notches for engaging the respective pawl when said lever is rotated in one direction, said face of the other

gear being formed to provide coupling notches for engaging said other pawl when said lever is rotated in the opposite direction, whereby rotation of said lever in one direction rotates one gear and pinion, and rotation of said lever in the opposite direction rotates said other gear and pinion in the opposite direction, upstanding portions of said base plate being positioned adjacent the outer side faces of said gears, said outer faces of said gears being formed to provide keepers, inwardly projecting latches carried by said upstanding portions of said base plate and engageable with said keepers, said latches and keepers being operative to maintain one of said gears stationary while permitting rotation of the other.

8. A wire tying machine, comprising a base plate, two axially aligned twisting pinions rotatably mounted on said plate, an axle mounted by said plate and spaced from said pinions, a pair of driving gears rotatably mounted on said axle, each of said gears having a driving engagement with one of said pinions, a hand lever including a hub freely mounted on said axle between said gears, at least one coupling pawl substantially radially pivoted to each side face of said hub, a spring for each pawl, each spring engaging its pawl to incline the same obliquely in a direction opposite to the pawl on the other side of said hub, the inner faces of said gears providing cylindrical pawl engaging faces, said face of one gear being formed to provide coupling notches for engaging the respective pawl when said lever is rotated in one direction, said face of the other gear being formed to provide coupling notches for engaging said other pawl when said lever is rotated in the opposite direction, whereby rotation of said lever in one direction rotates one gear and pinion, and rotation of said lever in the opposite direction rotates said other gear and pinion in the opposite direction, upstanding portions of said base plate being positioned adjacent the outer side faces of said gears, said outer side faces of said gears being formed to provide recesses therein, spring pressed balls carried by said upstanding portions of said base plate and engageable in said recesses whereby to permit rotation of but one gear at a time.

9. In a wire tying machine, including a pair of axially aligned and rotatably mounted twisting pinions, means for separately and alternately rotating each pinion in an opposite direction, and means for maintaining one pinion stationary while the other is rotated.

10. In a wire tying machine including a pair of axially aligned and rotatably mounted twisting pinions, swingable means for rotating said pinions, said means being operative when swung in one direction to rotate one pinion in one direction, and being operative when swung in the other direction to rotate said other pinion in the opposite direction.

11. In a wire tying machine including a pair of axially aligned and rotatably mounted twisting pinions, swingable means for rotating said pinions, said means being operative when swung in one direction to rotate one pinion in one direction, and being operative when swung in the other direction to rotate said other pinion in the opposite direction, and means for maintaining one pinion stationary while the other pinion is rotated.

12. In a wire tying machine including a pair of axially aligned and rotatably mounted twisting pinions, swingable means for rotating said pinions, said means being operative when swung in

one direction to rotate one pinion in one direction, and being operative when swung in the other direction to rotate said other pinion in the opposite direction, means for maintaining one pinion stationary while the other pinion is rotated, wire
5 severing means carried by said machine, and an operative connection between said severing means and said swingable means, said connection being operative upon the swinging of said swingable
10 means in said second direction to actuate said severing means.

13. A wire tying machine, comprising a base plate, two axially aligned twisting pinions rotatably mounted on said plate, an axle mounted by
15 said plate and spaced from said pinions, a pair of driving gears rotatably mounted on said axle, each of said gears having a driving engagement with one of said pinions, a hand lever including
20 a hub freely mounted on said axle between said gears, at least one coupling pawl substantially radially pivoted to each side face of said hub, a spring for each pawl, each spring engaging its

pawl to incline the same obliquely in a direction opposite to the pawl on the other side of said hub, the inner faces of said gears providing cylindrical pawl engaging faces, said face of one gear being formed to provide coupling notches
5 for engaging the respective pawl when said lever is rotated in one direction, said face of the other gear being formed to provide coupling notches for engaging said other pawl when said lever is
10 rotated in the opposite direction, whereby rotation of said lever in one direction rotates one gear and pinion, and rotation of said lever in the opposite direction rotates said other gear and pinion in the opposite direction, a wire cutter
15 carried by said base plate, ratchet means carried by said lever and axle for rotating said axle when said lever is swung in said opposite direction, cam means carried by said axle adjacent said cutter, said cam means being engageable with said cutter to actuate the same upon the rotation of said
20 axle.

OSCAR KIND.