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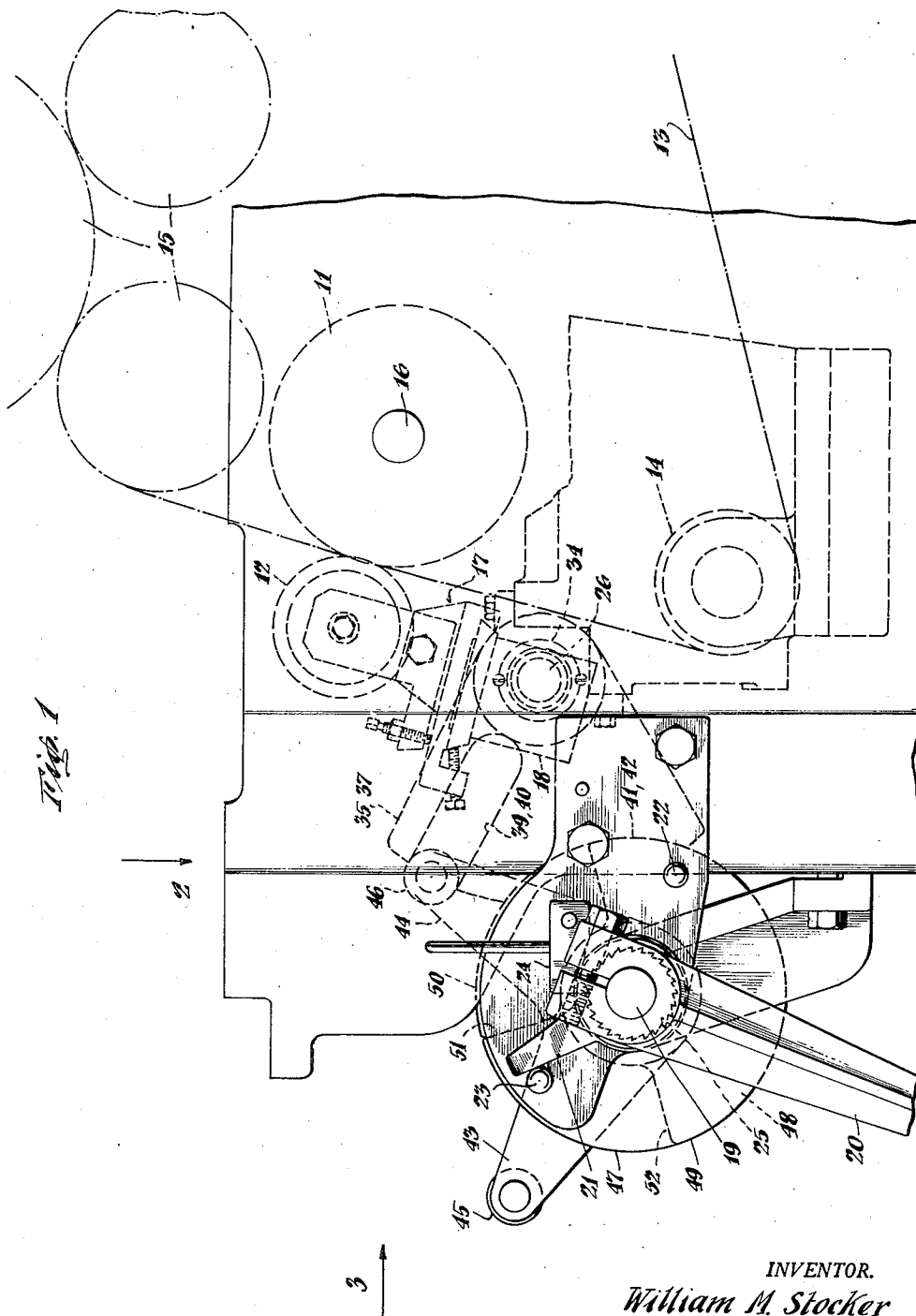
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2,367,974

SLITTING MACHINE

Filed Oct. 20, 1943

5 Sheets-Sheet 1



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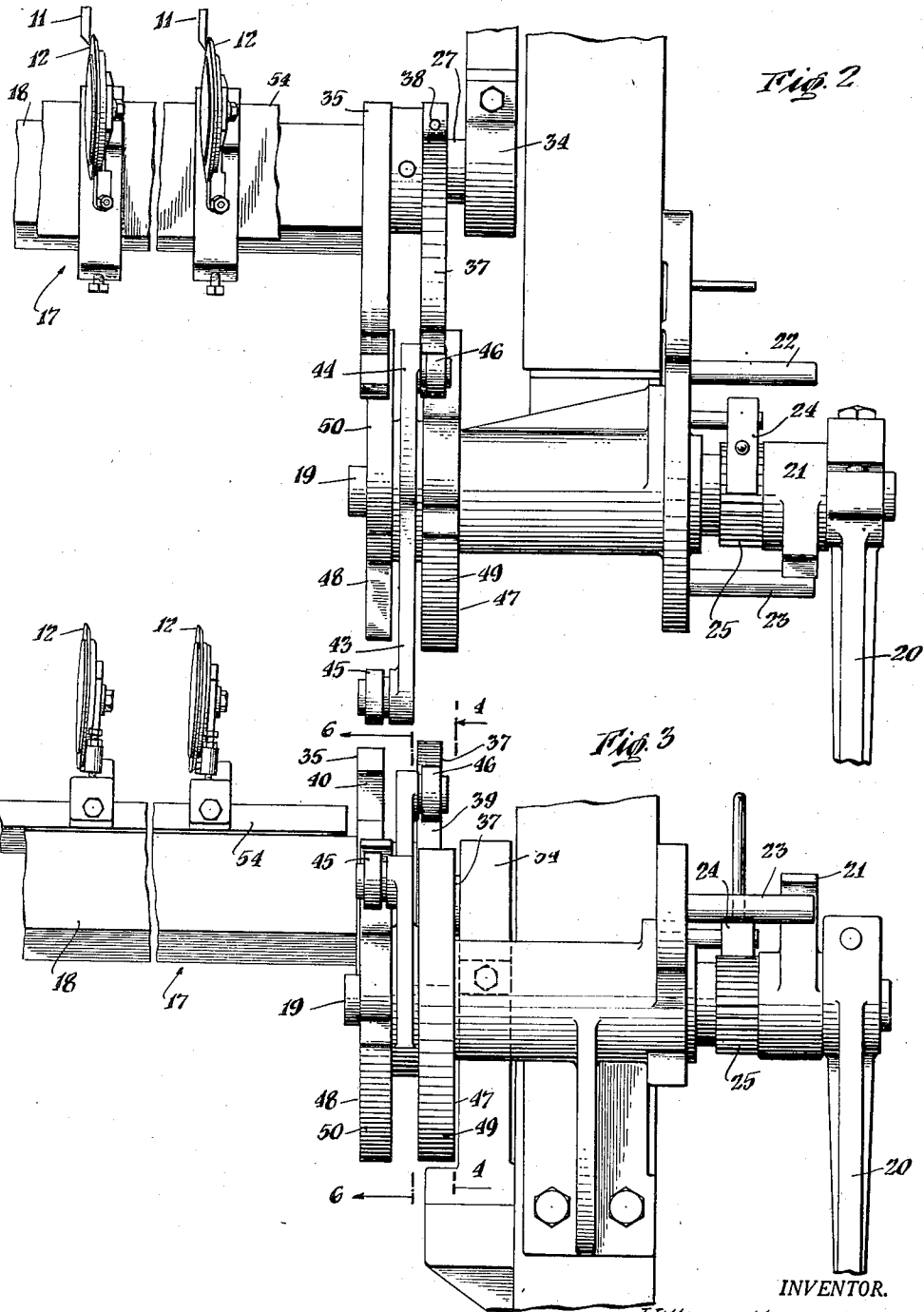


Fig. 3

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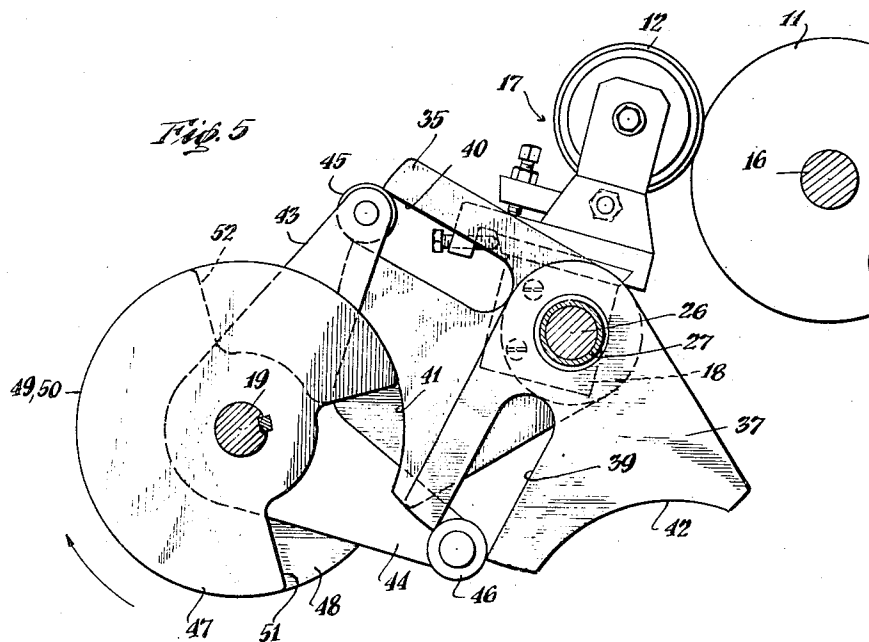
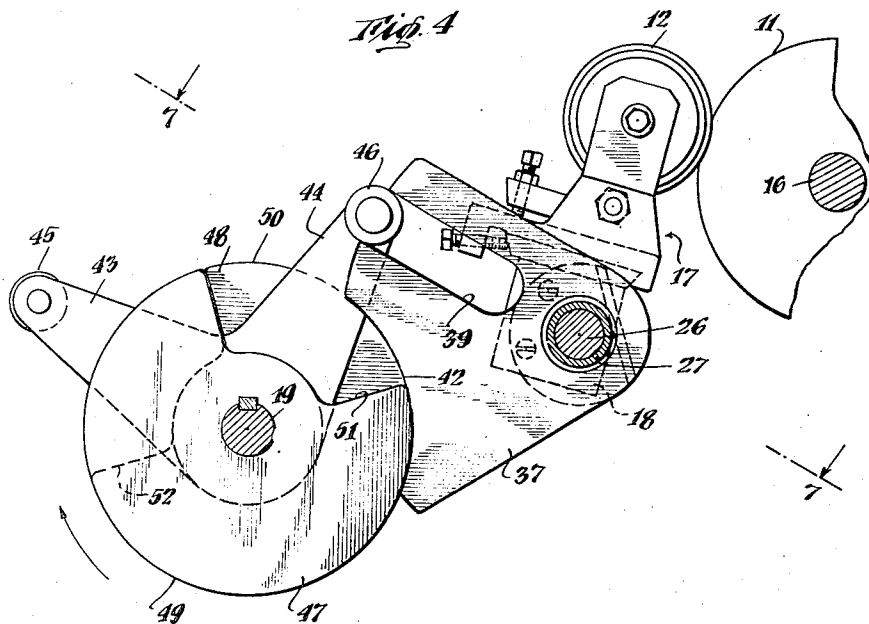
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Fig. 6

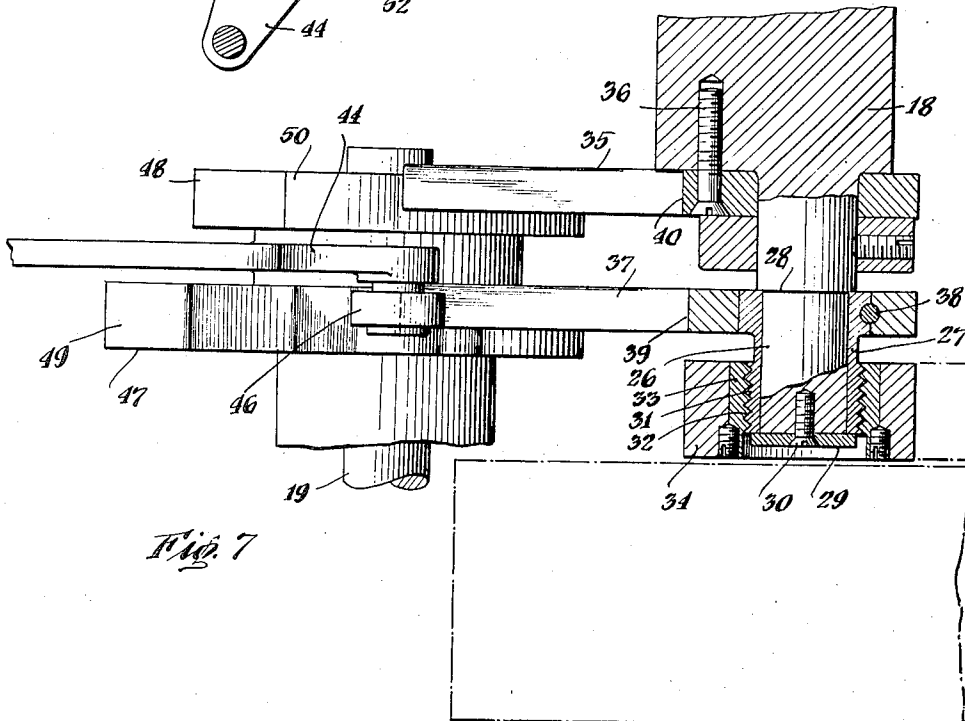
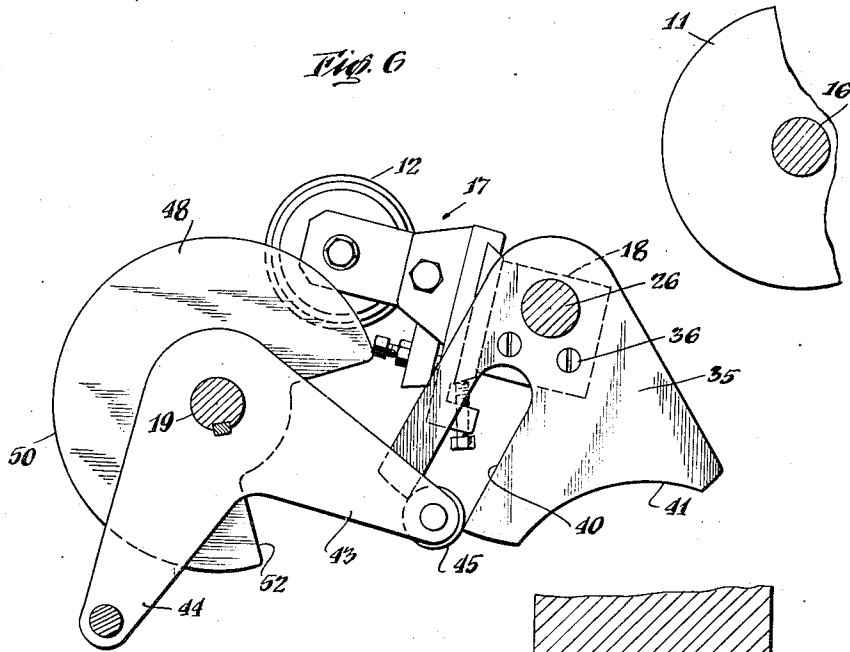


Fig. 7

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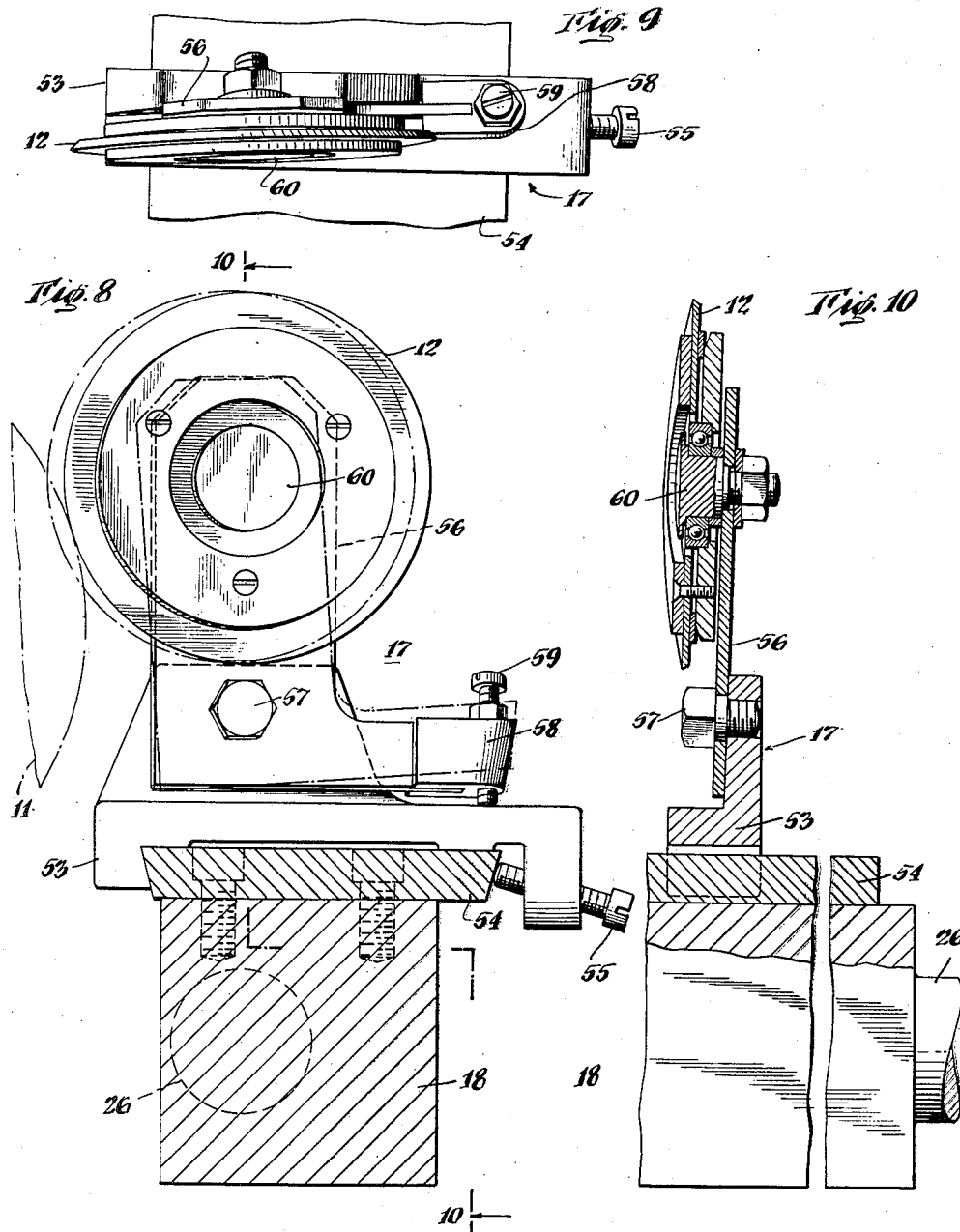
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5 Sheets-Sheet 5



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2,367,974

SLITTING MACHINE

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Application October 20, 1943; Serial No. 506,992

3 Claims. (Cl. 164—65)

This invention relates to slitting devices, for webs of paper or other flexible material, employing two rotatable and circular shears that engage sidewise under spring pressure in overlapping relation, and has more particularly reference to the means for bringing the shears into and out of sidewise engagement and into and out of overlapping relation.

It is well-known that, to prevent the edges of the shears from overriding and thereby becoming dulled or nicked, it is necessary, when disengaging the shears, first to move them out of sidewise engagement so that they will be free to be brought out of overlapping relation or, conversely, when engaging the shears, to first bring them into overlapping relation and thereafter to bring them into sidewise engagement.

In the prior art it has been customary to obtain this result by either of the following means: One way is to have separate instrumentalities for effecting the two movements, but this presents the difficulty that the operator may actuate the instrumentalities in the wrong order and so spoil the shears, and therefore it has been found necessary to provide interlocking means to prevent a wrong sequence of operations. But, even with such interlocking means, the disadvantage still remains that the operator has to actuate two instrumentalities and may waste time in attempting to operate them in improper sequence. Another way is to provide a single actuating means to effect both movements, but so arranged that before one movement is completed the other has begun. The objection to this above-mentioned second way is that different materials require different amounts of overlap of the shears to produce effective slitting, and it is therefore highly desirable to have means for adjusting the amount of overlap of the shears. But, in the construction under discussion, when the amount of overlap is changed, the cycle of the two movements is also changed because said movements take place, to some extent, concurrently, and therefore the amount of change in overlap that can be made is limited by the necessity of preventing overriding of the shears.

It is the main object of this invention to overcome the objectionable features associated with the above-described constructions, and to allow the overlapping of the shears to be altered without changing the cycle of the two movements and without sacrificing the advantage of having a single actuating means.

In the accompanying drawings, the invention is

disclosed in a concrete and preferred form in which:

Fig. 1 is a view in side elevation of a slitting device;

Fig. 2 is a top plan view looking in the direction of arrow 2 of Fig. 1;

Fig. 3 is a view in end elevation looking in the direction of arrow 3 of Fig. 1;

Fig. 4 is a sectional view substantially on the plane of line 4—4 of Fig. 3, showing the position of the parts when the shears are in overlapping relation and in sidewise engagement;

Fig. 5 is a view similar to Fig. 4, showing the position of the parts after the shears are out of sidewise engagement but while still in overlapping relation;

Fig. 6 is a sectional view substantially on the plane of line 6—6 of Fig. 3, showing the position of the parts when the shears are out of overlapping relation;

Fig. 7 is a sectional view substantially on the plane of line 7—7 of Fig. 4;

Fig. 8 is a detail view of one of the shears and the means for adjusting the same;

Fig. 9 is a top view of the parts shown in Fig. 8; and

Fig. 10 is a sectional view substantially on the plane of line 10—10 of Fig. 8.

11 and 12 indicate two rotatable and circular shears that engage sidewise in overlapping relation under spring pressure to slit web material 13. In this instance, said web comes from a source of supply (not shown), passes over roller 14, thence between the shears and, thereafter, to winding mechanism 15. Usually, there is a number of groups of shears, as indicated in Figs. 2 and 3, shears 11 being mounted on a driven shaft 16, and shears 12 being rotatably mounted in independent holders, generally indicated at 17, all of which holders are carried by a supporting bar 18. Supporting bar 18 is mounted to have two movements, one, an endwise movement to bring shears 11 and 12 into and out of sidewise engagement, and, another, a turning movement to bring said shears into and out of overlapping relation.

19 is an actuating member, such as a shaft, which can be turned in either direction as by means of operating handle 20, the turning movement of said shaft being limited by a stop arm 21, carried by said shaft, that engages with either of two stops 22 or 23 fixed on the framework. A pivotally supported pawl 24 and a ratchet 25 may also be used in connection with shaft 19, the chief usefulness of which is to hold the shaft in an intermediate position.

Means are provided whereby a throw or turning movement of shaft 19 will simultaneously actuate two reversible and simultaneously actuable trains of elements to separately and sequentially, in two intermittent steps, move supporting bar 18 endwise to separate shears 11 and 12 side- 5 wise and to thereafter turn bar 18 to bring said shears out of overlapping relation, or, conversely, to turn said bar 18 to bring said shears 11 and 12 into overlapping relation and to thereafter move said bar 18 endwise to bring said shears 11 and 12 into sidewise engagement. In the present instance, such means include two Geneva movement mechanisms, the details of which means will now be described.

Supporting bar 18 is provided with trunnions 26 at both ends (only one end being shown), the axis of said trunnions being the axis of the turning movement of said bar 18. Carried by trun- 10 nion 26 is a rotatable sleeve 27 mounted to turn independently of said supporting bar 18, but held against independent movement lengthwise thereof by being interposed between shoulder 28 and cap 29, the latter of which is secured to the end of trunnion 26 as by means of a screw 30. Sleeve 27 is provided with external screw threads 31 that interengage with internal screw threads 32 of stationary bushing 33 of the stationary bearing 34. It will thus be seen that independent rota- 15 tion of sleeve 27 acts, through the translating means just described, to produce an endwise movement of supporting bar 18 in one direction or the other, depending upon the direction of the turning movement of said sleeve 27. Two Geneva sectors are provided, one, 35, fixed to turn with supporting bar 18 as by means of a screw 36, and, another, 37, fixed to turn with the sleeve 27 as by means of pin 38. Each of said Geneva sectors has a slot, 39 or 40, that extends radially with respect to the axis of turning of bar 18, and each of said Geneva sectors also has a bearing surface, 41 or 42. Carried by actuating shaft 19 and moving therewith are two driving arms 43 and 44 that are in spaced relation circumferentially to one another, being 90° apart. Arm 43 carries a roller 45 to engage in slot 40 of Geneva sector 35 on bar 18, and arm 44 carries a roller 46 to engage in slot 39 of Geneva sector 37 on sleeve 27. Also mounted on actuating shaft 19, and moving therewith, are locking disks 47 and 48 having bearing surfaces 49 and 50 complementary to bearing surfaces 41 and 42 on Geneva sectors 37 and 35, said bearing surfaces 49 and 50 having gaps 51 and 52 therein, circumferentially offset one with respect to the other to admit of swinging movement of said Geneva sectors when the latter are moved by rollers 45 and 46.

When shears 11 and 12 are in sidewise engagement and overlapping relation, the two trains of elements will occupy the position shown in Figs. 1, 2, 3 and 4. In this position, the two Geneva sectors 37 and 35 will lie in alignment one behind the other, arm 43 will be in its extreme left-hand position and its roller 45 will not be in en- 65 gagement with slot 40 of Geneva sector 35; roller 46 of arm 44 will lie at the entrance of slot 39 of Geneva sector 37; and complementary bearing surfaces 49, 50, and 41, 42 will be in engagement so that the parts are locked in position. Also, operating handle 20 of actuating shaft 19 will be in the position best indicated in Fig. 1, and stop arm 21 will be against stop 23. If it is now desired to separate shears 11 and 12 side- 70 wise and to bring them out of overlapping rela-

tion, actuating shaft 19 is turned clockwise with an uninterrupted movement until stop arm 21 encounters stop 22. The effect of this movement of actuating shaft 19 is to simultaneously move 5 driving arms 43 and 44 and locking disks 47 and 48. Roller 46 of arm 44 therefore immediately enters slot 39 more fully and turns Geneva sector 37, such movement being permitted by gap 51 in locking disk 47, and such movement continuing until roller 46 leaves slot 39 of Geneva sector 37. The turning movement of Geneva sector 37 turns sleeve 27 of supporting bar 18 and, by the translating means previously described, moves said bar 18 endwise, thereby bringing shears 11 and 12 out of sidewise engagement. The parts at this time occupy the position shown in Fig. 5. As roller 46 leaves slot 39 in Geneva sector 37, roller 45 of driving arm 43 enters slot 40 of Geneva sector 35. There is, however, a slight interval between the end of the turning move- 20 ment of Geneva sector 37 and the beginning of the turning movement of Geneva sector 35, owing to the circumferential disposition of slots 39 and 40 and of driving arms 43 and 44, and the turning movements of Geneva sectors 37 and 35 take place in what is virtually two intermittent steps. The continued movement of driving arm 43 now causes roller 45 to turn Geneva sector 35, this movement being permitted by gap 52 of locking disk 48 until the position shown in Fig. 6 is 30 reached, when said roller 45 is part-way out of slot 40. The turning movement of Geneva sector 35 turns supporting bar 18 and moves shear 12 out of overlapping relation with shear 11. If it is now desired to restore the shears to their interengagement, actuating shaft 19 is turned uninterruptedly in a counter-clockwise direction, thereby bringing stop arm 21 from stop 22 to stop 23. This action causes roller 45 to return 35 Geneva sector 35 from the position shown in Fig. 6 to the position shown in Fig. 5, thereby bringing the shears into overlapping relation, said Geneva sector 35 being held in position by surface 50 of locking disk 48 engaging bearing surface 42 of Geneva sector 35. Thereafter, as an intermittent step, roller 46 of driving arm 44 by engagement with slot 39 moves Geneva sector 37 from the position shown in Fig. 5 to the position shown in Fig. 4, bearing surface 49 of locking disk 48 engaging bearing surface 41 of Geneva sector 37 to lock the latter in position. Turning movement of Geneva sector 37 causes a turning movement of sleeve 27 and moves support- 40 ing bar 18 endwise to engage shears 11 and 12 sidewise under spring pressure.

It will be noted that the endwise movement of supporting bar 18 carries both Geneva sectors 35 and 37 with it, and thus shifts the position side- 60 wise of slots 39 and 40 slightly with respect to rollers 45 and 46, but not to such an extent as to interfere with the proper functioning of the parts.

In the present instance, the mounting for shears 12 is as follows: As previously pointed out, each shear 12 is carried by a separate holder generally indicated at 17. Referring now particularly to Figs. 8, 9 and 10, 53 indicates a bracket slidably adjustable on dovetail plate 54 of support- 65 ing bar 18, and adapted to be held in position by a set-screw 55. 56 is a spring support which is held clamped in position against bracket 53 by means of bolt 57. By loosening said bolt 57, spring support 56 can be adjusted to effect more or less overlap of shears 11 and 12, and the amount of such adjustment as may be desired can be accurately determined by means of adjusting 75

screw 59, passing through tail stock 58 of support 56, and bearing against bracket 53. After the adjustment has been made, bolt 57 is tightened to retain support 56 in position. Spring support 56 carries a bearing 60 on which shear 12 is rotatably mounted. There can, of course, be as many shears as may be desired, as indicated in Figs. 2 and 3, and each mounting is individually adjustable on dovetail plate 54 of supporting bar 18. It will also be understood that the amount of overlap of shears 11 and 12 can be independently adjusted with respect to each pair of shears, by the means previously explained, and that this adjustment in no wise affects the movements of the two trains of connections previously described.

I claim:

1. In a slitting device in which two rotatable and circular shears engage sidewise under spring pressure in overlapping relation, the combination with a supporting bar for one of said shears mounted to have two movements, one, an endwise movement, and, the other, a turning movement, means, including two reversible and simultaneously actuatable trains of elements, to separately and sequentially, in two intermittent steps, move said bar endwise to separate the shears sidewise and to thereafter turn said bar to bring said shears out of overlapping relation or, conversely, to turn said bar to bring said shears into overlapping relation and to thereafter move said bar endwise to bring said shears into sidewise engagement; and an actuating shaft mounted to turn with an uninterrupted movement in either direction to thereby simultaneously actuate both of said trains of elements in either direction.

2. In a slitting device in which two rotatable and circular shears engage sidewise under spring pressure in overlapping relation, the combination with a supporting bar for one of said shears mounted to have two movements, one, an endwise movement, and, the other, a turning movement; means, including two reversible and simultaneously actuatable Geneva movement mechanisms, to separately and sequentially, in two intermittent

steps, move said bar endwise to separate the shears sidewise and to thereafter turn said bar to bring said shears out of overlapping relation or, conversely, to turn said bar to bring said shears into overlapping relation and to thereafter move said bar endwise to bring said shears into sidewise engagement; and an actuating shaft to simultaneously actuate both Geneva movement mechanisms in either direction.

3. In a slitting device in which two rotatable and circular shears engage sidewise under spring pressure in overlapping relation, and in which a supporting bar for one of said shears is mounted to have two movements, one, an endwise movement to bring the shears into and out of sidewise engagement, and, the other, a turning movement to bring the shears into and out of overlapping relation, means to cause the two movements aforesaid including: in combination with said supporting bar; a rotatable sleeve mounted to turn independently on said supporting bar but held against independent movement lengthwise thereof; translating means to effect a lengthwise movement of said supporting bar in response to the independent turning movement of said sleeve; two reversible Geneva sectors, one fixed to turn with said supporting bar, and the other fixed to turn with said sleeve, said Geneva sectors having each a slot extending radially with respect to the axis of turning of said supporting bar, and having each a bearing surface; an actuating shaft; two driving arms, in spaced relation circumferentially to one another, mounted to move with said actuating shaft; two rollers, one on each arm, one to engage the slot of one Geneva sector and the other to engage the slot of the other Geneva sector; and two locking disks, also mounted to move with said actuating shaft, having bearing surfaces complementary to, and engageable with, those of the Geneva sectors, and having gaps in said bearing surfaces circumferentially offset one with respect to the other to admit of swinging movements of said Geneva sectors when moved by said rollers.

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