(No Model.) 4 Sheets—Sheet 1.

A. C. CAMPBELL.

ROD SEPARATING AND FEEDING DEVICE.

No. 593,532. Patented Nov. 9, 1897.

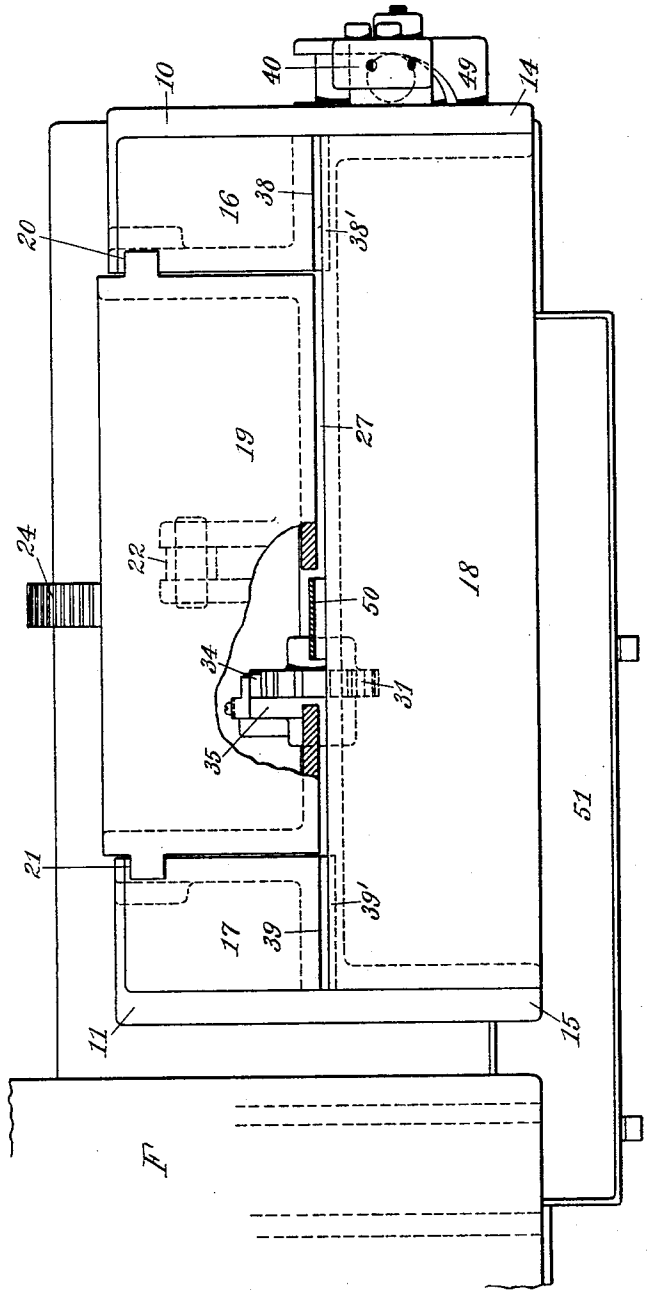


Fig. 1.

Witnesses:
H. Mallmer
F. A. Clemons

Inventor:
Andrew C. Campbell
By his Attorney
W. H. Honiss.

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A. C. CAMPBELL.

ROD SEPARATING AND FEEDING DEVICE.

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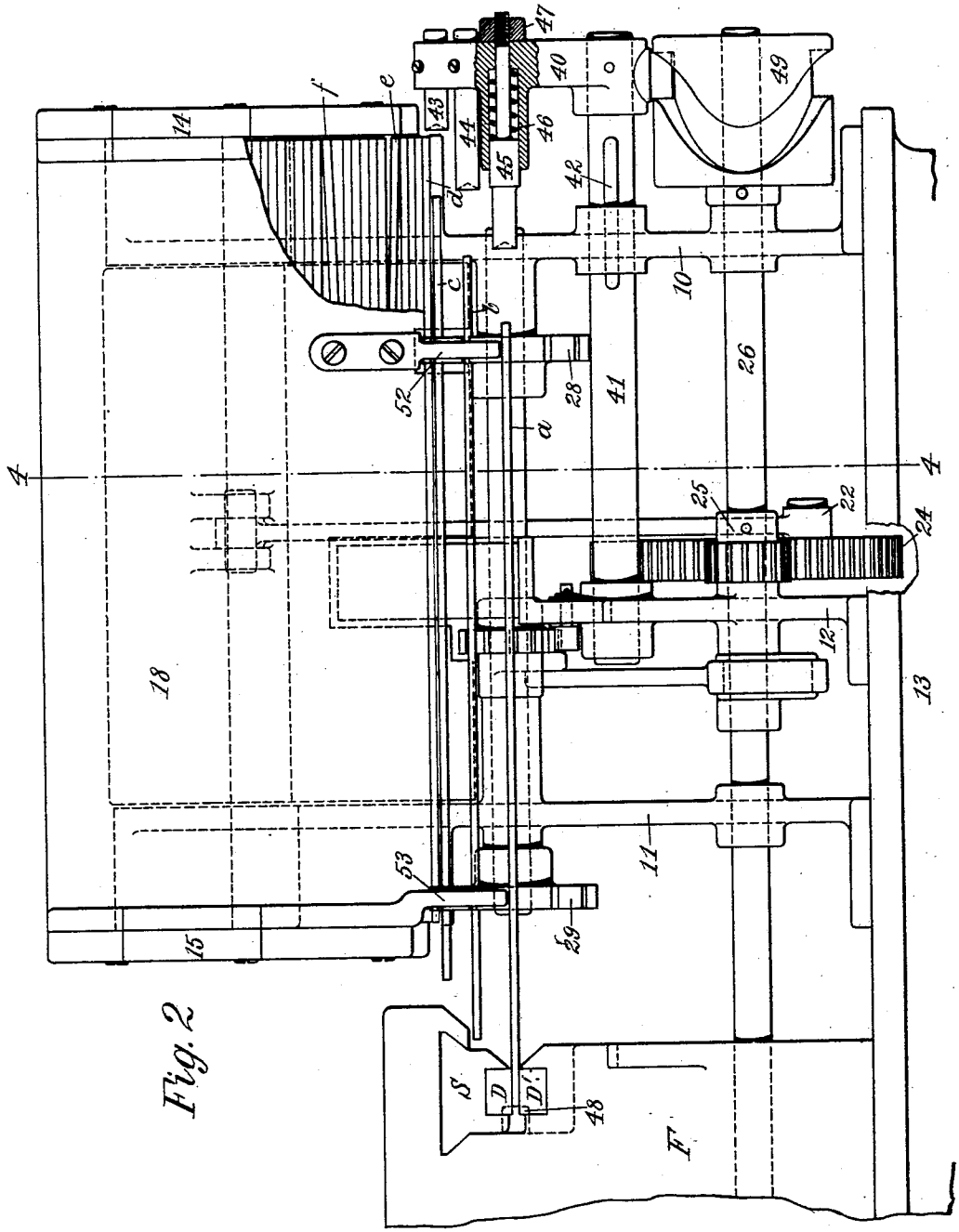


Fig. 2

Witnesses:
H. Mallmer
F. A. Clemons

Inventor:
Andrew C. Campbell
By his Attorney
W. H. Honiss.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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A. C. CAMPBELL.

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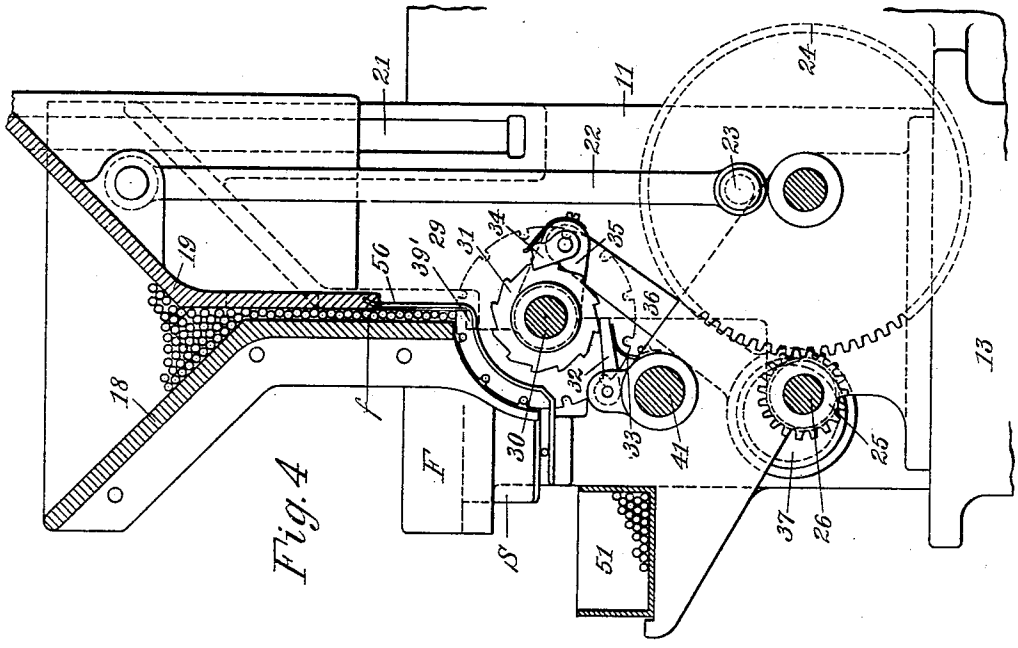


Fig. 4

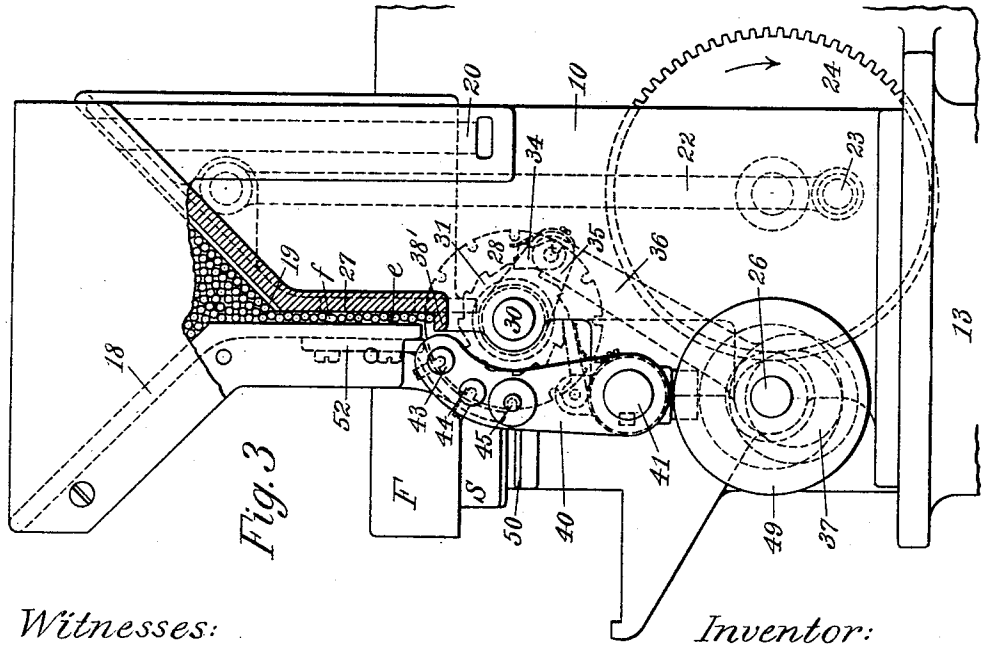


Fig. 3

Witnesses:
H. Maltner
F. A. Clemons

Inventor:
Andrew C. Campbell
By his Attorney
W. H. Honiss

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

A. C. CAMPBELL.

ROD SEPARATING AND FEEDING DEVICE.

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Fig. 8

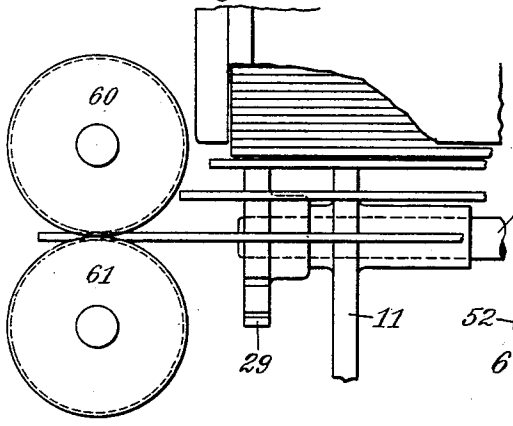


Fig. 5

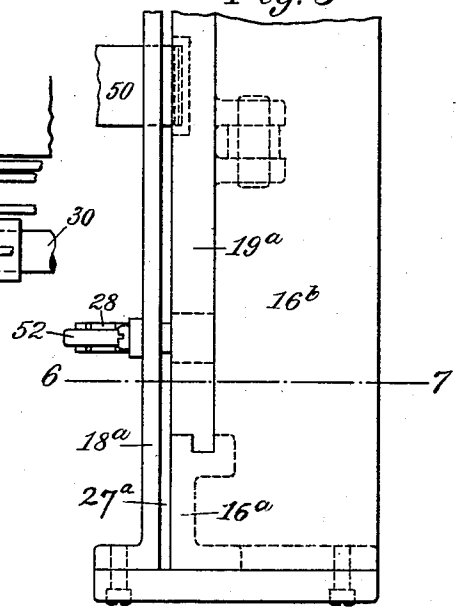


Fig. 7

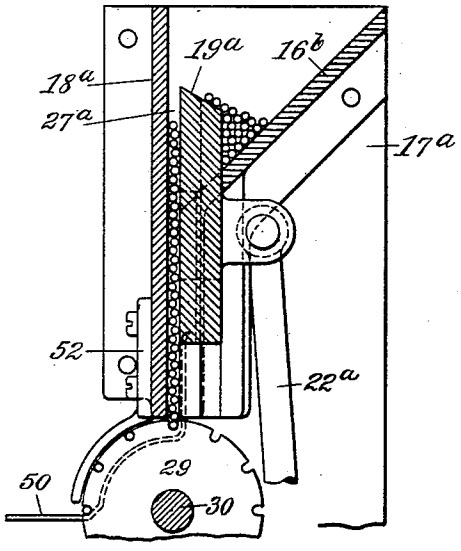
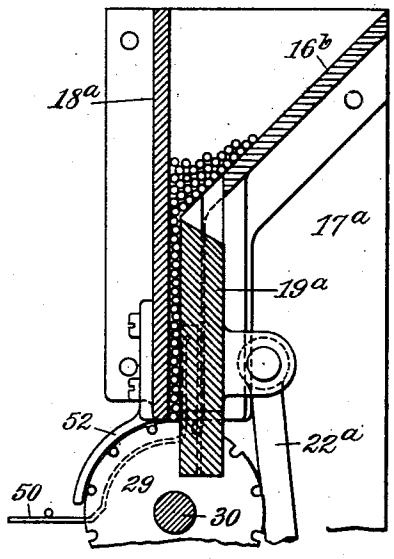


Fig. 6



Witnesses:
H. Mallmer
F. A. Clemons

Inventor:
Andrew C. Campbell
By his Attorney
W. H. Howes.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ANDREW C. CAMPBELL, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE E. J. MANVILLE MACHINE COMPANY, OF CONNECTICUT.

ROD SEPARATING AND FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 593,532, dated November 9, 1897.

Application filed February 1, 1897. Serial No. 621,437. (No model.)

To all whom it may concern:

Be it known that I, ANDREW C. CAMPBELL, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Rod Separating and Feeding Devices, of which the following is a full, clear, and exact specification.

This invention relates to improved means for separating and feeding rods or pins of various kinds singly from a pile or reservoir to dies, rolls, or other devices which may be adapted to receive or operate upon them.

Nearly all rods or pins employed in the arts, especially those of small size formed from metal, are cut from wire of indefinite length, which is received in the form of coils. It often happens that the wire is not properly straightened, so that when cut into the desired lengths it retains a portion of the original curvature due to its coiling. Even when properly straightened the rods or wires are liable to become bent or bruised by the cutting off or subsequent operations. Moreover, it often happens that oil, chips, and other foreign substances are coated upon or mixed with the rods. Each and all of these causes operate to render the operation of separating and feeding the rods with rapidity and certainty a difficult one.

The object of this invention is to provide improved and reliable means for positively separating and feeding such rods or wires with sufficient rapidity and certainty to various machines and devices adapted to perform subsequent operations upon them.

The embodiment of my invention, which is shown in the accompanying drawings and described herein, is represented as forming an auxiliary feeding device for use in connection with a machine for rolling the threads upon the ends of wire spokes, such as those which are employed in the wheels of bicycles, and I have shown only a sufficient portion of such a machine to enable the relation of my present invention thereto to be fully understood.

Figure 1 of the drawings is a plan view of my improved separating and feeding device, a portion of which is broken away so as to show more clearly some of the interior devices which cannot be as clearly shown elsewhere. Fig. 2 is a front view of the machine of Fig. 1, the lower front portion of the hopper being broken away at one side, so as to show a file of rods therein. Fig. 3 is a view of the right-hand end of the machine of Figs. 1 and 2, a portion of the end plate of the hopper being broken away so as to show the position of the rods. Fig. 4 is a view in cross-section taken on the line 4 4 of Fig. 2. Fig. 5 is a plan view, and Fig. 6 an end view, taken on the line 6 7 of Fig. 5, showing a modified construction of some of the features of my invention. In the latter figure the rod-arranger is shown in its lowest position. Fig. 7 is a view similar to that of Fig. 6, showing the arranger in its uppermost position. Fig. 8 is a fragmentary front view showing a pair of rolls for carrying away the wires as they are separated and fed forward by the devices of my invention.

In the preferred embodiment of my invention shown in the drawings the moving parts are mounted upon the frames 10 and 11 and the bracket 12, which are bolted or otherwise secured upon an extension 13 of the principal bed or column of the machine. The frames are provided with the end flanges 14 and 15 and with the inclined flanges 16 and 17, respectively. To and between the flanges 14 and 15 is secured the front plate 18 of the hopper, which at the upper portion thereof may be inclined toward the front of the machine, as shown in Figs. 3 and 4, or it may be vertical throughout, as shown by the plate 18 of Figs. 6 and 7. These plates and flanges together form the hopper or reservoir for receiving the supply of rods to be fed. The rod-arranger 19 is also mounted upon the frames 11 and 12, being fitted to slide vertically in the ways 20 and 21 thereof, (best shown in Fig. 1,) the extent of reciprocation being seen by a comparison of its extreme position represented in Figs. 3 and 4.

In the preferred form of my invention shown in Figs. 1 to 4, inclusive, of the drawings the upper portion of the arranger 19 is backwardly inclined to correspond with the inclined flanges 16 and 17 of the frames, being substantially coincident with those flanges when the arranger is in its lowest position,

(shown in Fig. 3,) thus forming a considerable extent of the rod-supporting surface of the hopper.

The right-hand face of the vertical portion of the front plate 18, as seen in Figs. 3 and 4, is adapted to form one side of the passage-way 27 for the rods, the other side of that passage-way being formed by the left side vertical face of the arranger 19 and the corresponding portions of the flanges 14 and 15, as best shown in Fig. 1, in which the passage 27 is shown to be substantially parallel, extending from the flange 14 to the flange 15. The width of that passage is slightly greater than the gage of the rods or wires to be fed, but considerably less than would be sufficient to permit two of those rods to pass by each other. Therefore the rods or wires must be so arranged as to fall or be fed into that passage-way in a substantially parallel relation to each other, so as to form a single vertical file therein.

The arranger 19 is caused to reciprocate vertically in the ways 20 and 21 by means of the connecting-rod 22 and the crank 23, fixed in the side of the gear 24. That gear is rotatably mounted on the bracket 12 and receives its motion from the pinion 25, fixed on the shaft 26. The relative sizes of the gear and pinion are herein shown to be substantially in the ratio of four to one, but that ratio may and should be varied to suit differing requirements.

The separating device, by means of which the wires are singly and successively separated from the arranged file resting in the passage-way 27, consists of the separators 28 and 29, herein shown in the form of a pair of circular disks secured upon the shaft 30, which is preferably located immediately below and parallel with the passage-way 27 from the hopper or reservoir. The separator-disks 28 and 29 are located at a suitable distance apart beneath the passage-way, so as to properly support the file of rods which rest upon their peripheries. Each of these disks is also provided with a series of transverse grooves or recesses of a form and depth suitable and sufficient for receiving a single one of the rods from the file. Those notches are preferably equally spaced around the peripheries of the disks, and those disks are so located upon their shaft as to bring a notch of each of them simultaneously into coincidence with the passage-way 27, so that the lowest rod of the file will drop into the coinciding notches of the disks and be carried away by the rotation thereof.

An intermittent rotary movement is imparted to the shaft 30 by means of the ratchet 31, fixed thereon. That ratchet is provided with teeth corresponding in number and position to the transverse grooves in the separator-disks. The detent 32 is pivotally mounted upon a hub of the bracket 12, and is pressed, by means of a spring 33, into engagement with the ratchet-teeth, that detent being so located as to normally hold the ratchet in the positions in which the corresponding transverse recesses of the separator-disks are in coincidence with the passage 27. The ratchet is actuated by means of the pawl 34, pivotally mounted on the arm 35, which is fitted to oscillate freely upon the shaft 30, adjacent to the ratchet 31. An oscillatory movement of suitable extent is imparted to the arm by means of the connecting-rod 36 and the eccentric 37, fixed on the shaft 26.

The shaft 26, by means of which motion is communicated to the mechanism of my invention, is journaled in the frames 10 and 11 and in the bracket 12, and is connected by suitable gearing with the driving mechanism of the machine with which the device is to coöperate in such a way as to cause the mechanism of my present invention to move in suitable time and relation thereto. In the arrangement shown in the drawings the separated wires are fed to and between the dies D and D′, the latter being fixed to the principal frame F of the machine, while the former is fixed in the slide S, that slide being caused to reciprocate in any of the well-known ways. In this arrangement a wire is supposed to be fed between the dies just before the commencement of each forward stroke of the slide S, and therefore in this case the shaft 26 is assumed to be so geared as to make one revolution for each complete stroke of that slide.

In order to utilize to best advantage the effect of gravitation in the feeding of the rods from the reservoir, and in order that the weight of the file of rods shall have the least effect upon the rotative action of the separator-disks, it is desirable to locate the passage-way 27 in the vertical plane of the axis of the separator-disks, and as the dies employed in this class of machines are usually made to reciprocate in a horizontal plane it follows that the rods upon being separated from the file must be carried substantially ninety degrees in order that the rolling lateral movement imparted to the rod by the action of the reciprocating die shall carry the rod radially out of its recesses in the separator-disks, as shown in Figs. 4 and 7.

On account of the space required for the supports for the slide S and its connections it is also necessary to locate the rod reservoir or hopper at some distance laterally from the face of the dies, as shown in Fig. 2, necessitating the use of means for moving each rod longitudinally to the proper depth upon its arrival in the plane of the opening between the dies. As the required amount of longitudinal movement is sometimes considerable, I provide means whereby the rods after being separated from the file are moved longitudinally to a portion of the desired extent at each intermission in their rotary movement, thereby providing for a very considerable amount of longitudinal movement by

easy stages and by the use of short and easy mechanical movements. My means for imparting this intermittent longitudinal stepped movement is best seen in Figs. 2 and 3, and consists of an arm 40, which is fixed on the shaft 41. That shaft is mounted for longitudinal movement in the frame 10 and the bracket 12, its rotary movement being prevented by means of a spline fitting in the groove 42. The arm 40 is provided with the series of pushers 43, 44, and 45, the centers of those pushers being located at points coincident with the stopping positions of the rods, as indicated in Fig. 3. The rod-engaging ends of the pushers are located in a stepped relation to each other, each succeeding pusher extending beyond the preceding ones, for reasons which will hereinafter appear. The pushers 43 and 44 may be adjustably secured in the arm 40 by means of screws, as shown, while the pusher 45 is fitted so as to yield longitudinally in its bearing in the arm 40, as shown in section in Fig. 2, being provided with a spring 46, which operates to press the pusher toward the left, as seen in that figure. The pusher is also provided with the nut 47, which serves as a stop for the action of the spring, and also serves as a means for adjusting the longitudinal position of the pusher. The function of the pusher 45 is to carry the leading ends of the rods against the fixed stop 48, (shown in dotted lines behind the dies in Fig. 2,) and it is thus resiliently mounted in order that it may yield to slight inequalities that may occur in the lengths of the succeeding rods.

As a means for moving the arm 40 in its feeding operation it is adapted to engage with the cam 49, fixed on the shaft 26. That cam is so shaped and so located in its rotary relation to the eccentric 37 as to cause the arm 40 to be moved forward or toward the left from the position shown in Fig. 2 and back again to that position during the time that the separator-disks 28 and 29 are standing still, and to hold the arm 40 in that rearward position during the forward movement of the separator, at the conclusion of which movement each of the rods *b*, *c*, and *d* will be moved by their respective pushers into the position previously occupied by the preceding rods. The time and extent of this longitudinal feeding movement may be varied to suit differing requirements by attaching a different cam upon the shaft 26, or that cam may be composed of a plain cylinder having detachable and adjustable cam-strips for engaging with the arm 40, as is usual with the operating-cams of automatic screw-machines.

By reference to Figs. 1, 3, and 4 it will be seen that both ends of the file of rods are guided between the ends of the front plate 18 of the hopper and the adjacent walls 38 and 39 of the frames 10 and 11, respectively, and the latter walls are also turned at an angle beneath the file of rods, so as to form guard-flanges 38′ 39′, which prevent the first of the rods from dropping through if in the operation of filling the hopper some of those rods should fall into the passage-way 27 at an angle. The guard-plate 50 is located at or near the center of the arranger 19, which is there cut away to admit the plate, so that when the arranger is in its uppermost position, as shown in Fig. 4, the middle reach of the file of rods shall be supported by the guard-plate, which thereby prevents the springing or bowing out of any of the rods of the file at the portions thereof which would otherwise be left unsupported while the arranger is in its uppermost position.

As a means of supporting the guard-plate 50 its lower end is attached to the bracket 12, as shown in Fig. 4, and it is preferably extended from its support along below the pathway of the rods, being thus adapted to guide and support the central portion of each of the rods from the time they reach the upper end of that guard-plate until they have passed through the dies.

As a convenient means for receiving the rods as they fall from the dies and from the guard-plate 50 a box 51 is shown in Figs. 1 and 4 resting upon the extensions of the bracket 12 and of the frame F of the machine. It is obvious, however, that any other suitable receptacle may be provided, or that the rods may be transferred to other devices for performing upon them whatever subsequent operations may be desired.

As a means for preventing the rods from being displaced from their position in the transverse recesses of the separator while passing to the dies I prefer to employ guard-fingers 52 and 53, located adjacent to and following the curvature of the separator-disks 28 and 29, from the lower end of the passage-way 27 to the point where the rods are carried away from those disks by the operation of the disks. Those guard-fingers may be attached to the front plate 18, or they may be integral therewith, both constructions being shown in Fig. 2.

The operation of this machine is as follows: Upon placing the rods or other articles in a pile in the hopper or reservoir the lower rods of the pile, if fairly straight, will drop down the passage-way 27 and rest upon the separator-disks 28 and 29, the lowest rod of all falling into whichever pair of transverse recesses of those dies may at that time chance to be in coincidence with the lower end of the passage-way. Upon putting the machine in operation the rods that thus drop into the grooves in the separator are carried intermittently by the operation of the ratchet toward the left, as viewed in Figs. 3 and 4, from the lower end of the passage-way 27 to the horizontal plane of the dies, each of these rods being moved longitudinally step by step toward the dies by the operation of the pushers 43, 44, and 45, as shown in Fig. 2 and as already described. The devices are so timed that the leading rod *a* is carried by its yield-

ing pusher 44 against the stop 48 at a time when the upper or moving die D is at the rearward end of its stroke. The forward movement of that die carries the end of the rod *a* into engagement with the lower die, and thus serves to roll the rod out of its grooves in the separator-disks 28 and 29 along the guard-plate 50, whence it drops into the receiving-box 51. Thus the rods are taken in succession from the lower end of the file in the passage-way 27, the file of rods dropping down to the extent of the thickness of one rod at each operation of the machine, and in order to keep the machine continuously supplied the rods in the reservoir must be so brought into position and arranged as to drop freely down that passage-way. Little difficulty is experienced in keeping the passage-way full of rods when all of them are straight and perfectly clean; but, as previously stated, these rods are very liable to become bent or burred by their previous manipulation, and they are also liable to become more or less coated with oil, dirt, chips, or other foreign substances, so that they do not drop readily down the passage. The reciprocating movements of the arranger 19, which forms a portion of one of the side walls of that passage, serve to roll the rods that rest against it back and forth, until those which were coated with foreign substances are freed therefrom, and those which were curved are so turned that the plane of their curvature is brought into coincidence with the plane of the passage 27, as shown by the rods *e f* in Figs. 2, 3, and 4, thereby permitting them also to drop freely down the passage. Those rods which are curved in more than one plane or which are in any way too much distorted or incrusted to pass through the passage are carried back and kept back by the upward movements of the arranger, which at each stroke turns the pile of unarranged rods from side to side in the hopper, as shown by a comparison of Figs. 3 and 4, thus clearing the mouth of the passage of all rods which are unsuited to pass through, while permitting all to pass that are straight, or that become so arranged that the plane of their curvature coincides with that of the passage.

It sometimes happens that two or more of the rods in the hopper may become crossed, in the form of the letter X, so that the lower end of each of them may enter the passage 27, and this may happen whether the rods thus crossed were originally bent or straight. It is obvious that they cannot possibly go through the passage 27 in this crossed position, since their combined thickness at the point of crossing is greater than the width of that passage. In such a case the arranger operates to push back the crossed rods by impinging, during its upward strokes, against those portions thereof which by reason of their crossed position are bowed or deflected into its plane of movement. This action of the arranger tends to carry the improperly-presented rods back into the hopper-space, where the repeated rolling and tumbling movement of the pile under the continued operation of the arranger serves to bring those rods into parallel relation to the others.

In the modified arrangement shown in Figs. 5, 6, and 7 the front plate 18^a is represented as being vertical, the arranger 19^a being also shown as a vertical slide having no inclined portion corresponding to that of the flange 16^b, which in this arrangement connects the frames 16^a and 17^a at their upper ends. That arranger is moved in vertical ways by means of the connecting-rod 22^a, as in the device already described. Its upper end is preferably beveled on the side away from the passage 27^a, so as to carry the unarranged rods away from the passage at the upper end of its stroke, as shown in Fig. 7. This form of my invention is provided with the separator-disks 28 and 29 and guard-plate 50, all of which are arranged and operate as previously described.

In Fig. 8 is shown a pair of rolls 60 and 61, adapted to carry away the rods which are fed to them from the hopper by the combined action of the devices already described.

It is not an essential feature of this invention that the arranger, separator, and pushers shall be arranged to coöperate as herein shown and described, inasmuch as either of them may under suitable conditions be made to serve alone or to coöperate with different devices in numerous combinations other than those herein set forth.

I claim as my invention—

1. In a device of the class specified, comprising a passage-way for the rods, an arranger forming a portion of one side wall of the passage-way, and having a reciprocating movement in its own plane.

2. In a device of the class specified, in combination with a supply reservoir or hopper, provided with a passage-way for the rods, a reciprocating arranger forming a portion of one of the walls of the passage-way.

3. A rod-feeding device provided with a passage for the rods of a width greater than the thickness of a single one of those rods, and substantially less than twice that thickness, provided with a reciprocating arranger forming a portion of one of the side walls of the passage.

4. A rod-feeding device, consisting of a reservoir or hopper for the rods, provided with a passage-way therefrom and having an inclined side or sides to enable the rods to gravitate toward the opening of the passage-way, and of a reciprocating arranger, arranged adjacent to, and forming a portion of, one of the side walls of the passage-way.

5. A rod-feeding device, consisting of a reservoir or hopper for the rods, having one or more inclined sides leading to a passage-way of substantially the length and width of the rods, and of a reciprocating arranger having an inclined upper portion substantially corresponding to and forming a portion of one

of the inclined sides of the hopper, and having a downwardly-extending member forming a portion of one of the side walls of the passage for the rods.

6. A feeding device, consisting of a hopper or reservoir for the objects to be fed, provided with a passage therefrom of a width suitable for maintaining the objects in single file, and a reciprocating arranger forming a portion of one of the side walls of the passage, and extending by its reciprocations into the hopper-space, for the purpose specified.

7. In a rod arranging and separating device, having a passage-way of a width suitable for maintaining the rods in single file, a reciprocating arranger forming a portion of one of the walls of the passage-way, with means for separating and feeding single rods from the lower or discharging end of the passage-way.

8. A rod arranging and separating device, consisting of a hopper or reservoir for the rods, having a passage leading therefrom of a width suitable for maintaining the rods in single file, the reciprocating arranger 19 forming a portion of one of the side walls of the passage, and of the hopper, and an intermittently-rotating separator located beneath and moving transversely to the passage-way provided with a series of recesses each suitable for receiving one of the rods, with means for rotating the separators so as to bring the recesses successively into coincidence with the passage.

9. In combination with means for separating rods and for moving them transversely, means for moving the separated rods longitudinally consisting of a series of pushers arranged in a stepped relation to each other and movable only in a direction longitudinally of the rods, with means for thus moving the series of pushers whereby each succeeding transversely-moving rod is moved longitudinally by each of the pushers.

10. In combination with an intermittently-rotating rod separator or carrier, means for moving the rods longitudinally, consisting of a series of pushers arranged substantially in line with the respective stopping positions of the rods, with means for actuating the pushers against their respective rods at each intermission in the rotation of their carrier.

11. In combination with an intermittently-rotating rod separator or carrier, means for moving the succeeding rods longitudinally toward and against a gage, consisting of a series of pushers arranged substantially in line with the respective stopping positions of the rods, with means for actuating the pushers against their respective rods at each intermission of the rotation of that carrier, the pusher which brings the rod against the fixed gage being resiliently mounted so as to adapt it to yield to the varying lengths in the succeeding rods, substantially as described.

ANDREW C. CAMPBELL.

Witnesses:
MARTIN H. BRENNAN,
ROSE E. WOOD.