Dec. 4, 1945. J. A. DAVIDSON 2,390,426

MACHINE FOR PERFORATING, SLITTING, OR SCORING SHEETS

Filed Nov. 18, 1944 3 Sheets-Sheet 1

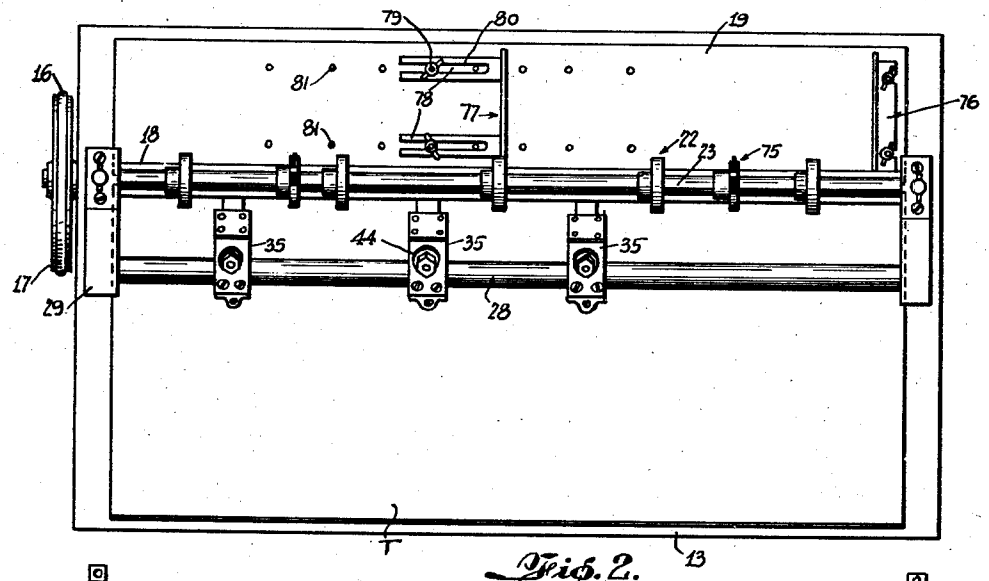


Fig. 2.

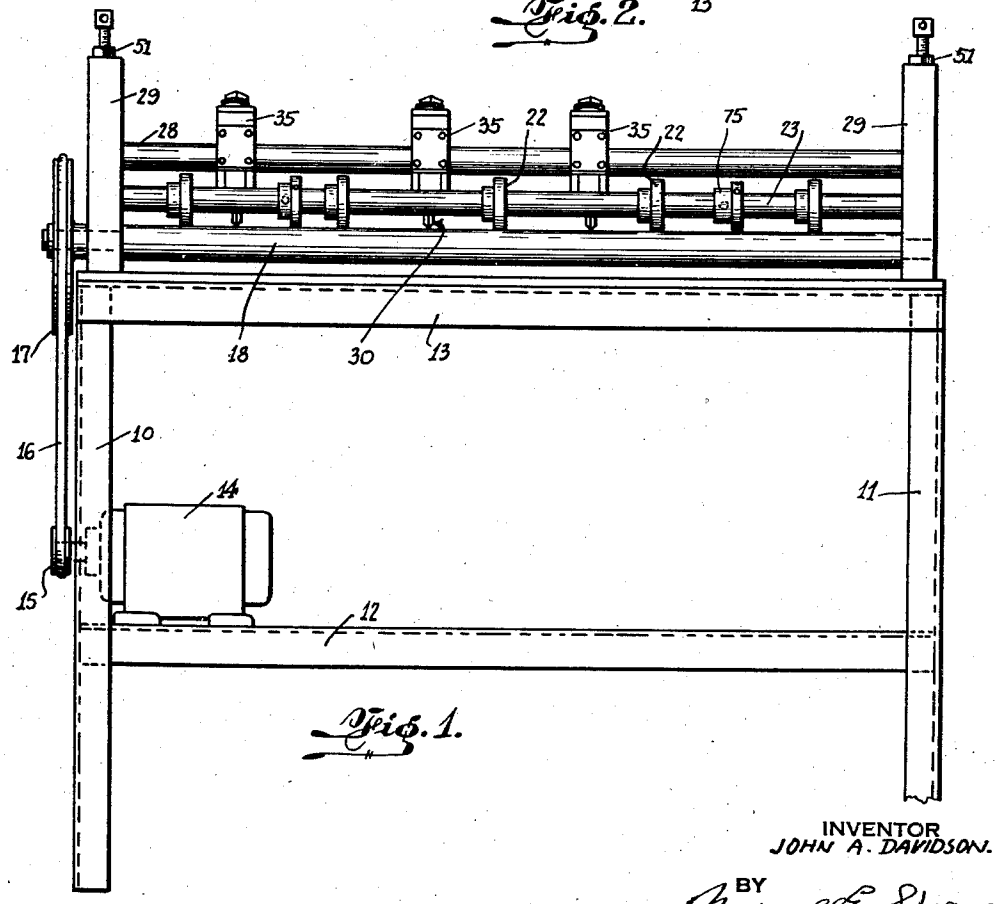


Fig. 1.

INVENTOR
JOHN A. DAVIDSON.

BY Maxwell E. Sparrow

ATTORNEY

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Fig. 5.

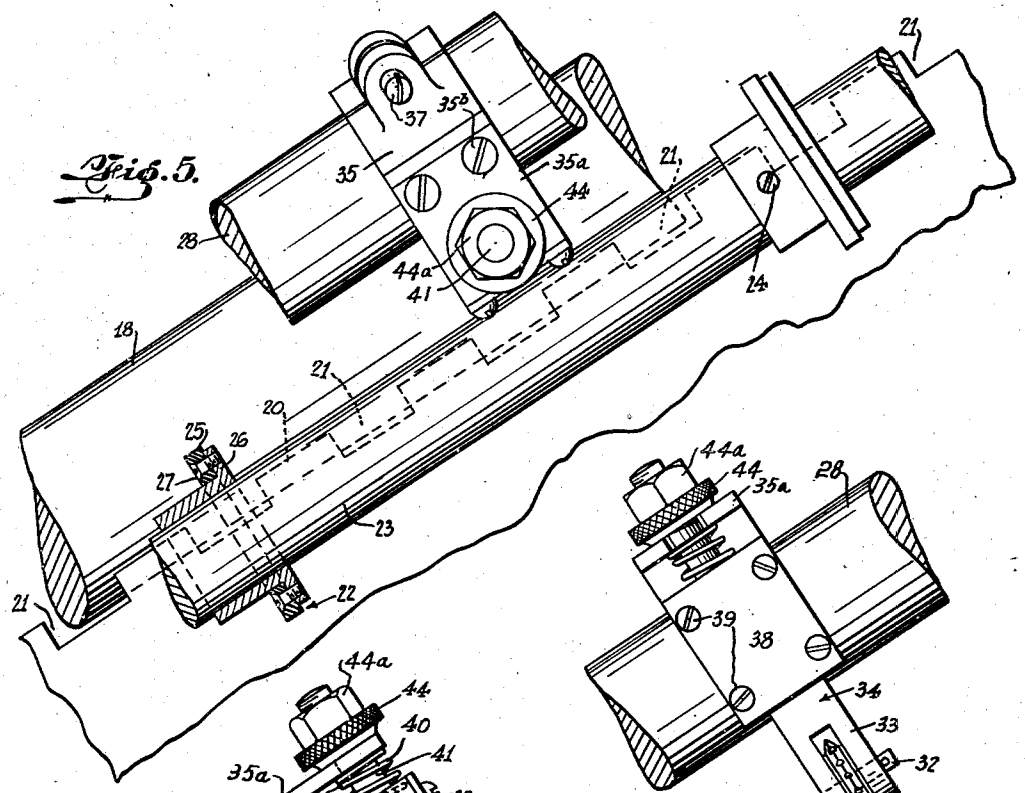


Fig. 4.

Fig. 3.

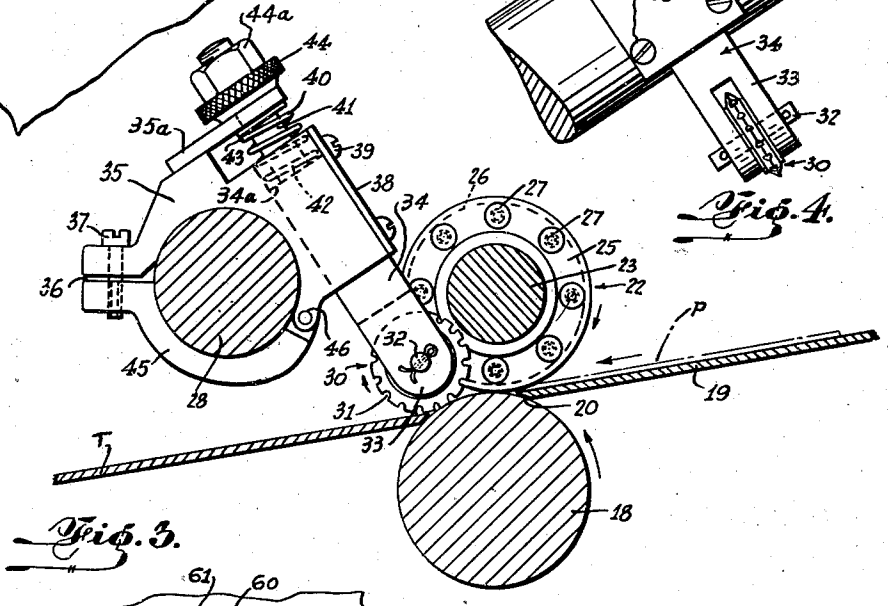
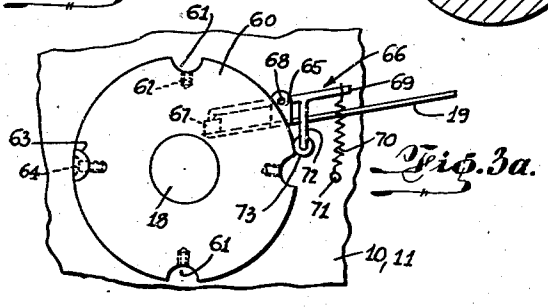


Fig. 3a.



INVENTOR
JOHN A. DAVIDSON.
BY
Maxwell E. Spooner
ATTORNEY

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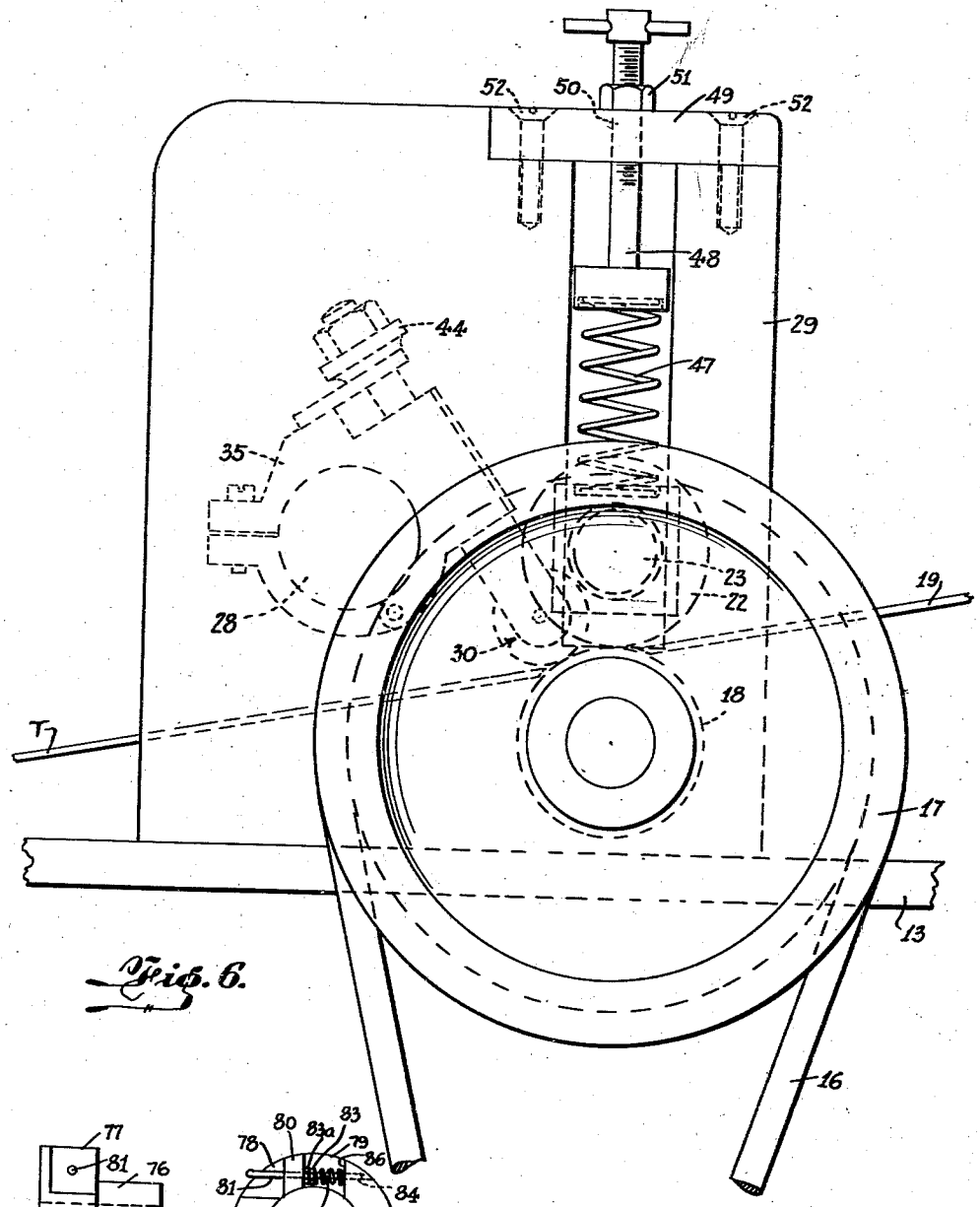


Fig. 6.

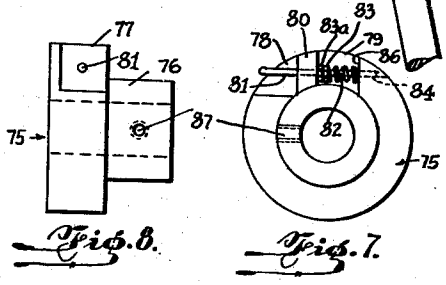


Fig. 8. Fig. 7.

INVENTOR.
JOHN A. DAVIDSON.

BY Nathaniel E. Sparrow

ATTORNEY.

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UNITED STATES PATENT OFFICE

2,390,426

MACHINE FOR PERFORATING, SLITTING, OR SCORING SHEETS

John A. Davidson, Brooklyn, N. Y.

Application November 18, 1944, Serial No. 564,022

13 Claims. (Cl. 164—99)

This invention relates to improvements in slitting, scoring and perforating machines.

It is an object of the present invention to provide an efficient, practical and economical machine which may be used for slitting, scoring, or perforating sheets.

It is a further object of the present invention to provide a rotary relatively high speed snap-out machine of the aforementioned type.

Another object of the present invention is to provide a machine for slitting, scoring or perforating sheets, in which the sheets are under control at all times and thus prevented from crawling, during operation of the machine.

Further objects of the invention are to provide left and right guides and drop guides on the aforementioned machine to enable the sheet to be fed straight to the feed rollers; which guides are made easily adjustable, for position of the sheet to be worked upon and impression of the cutter therein; to provide ball-bearing type perforating wheels which can be readily changed for longer or shorter dash impressions upon the sheet to be worked on.

Yet another object of the present invention is to provide means for controlling the feeding of the sheets to be worked to the perforating, scoring or slitting rolls.

Further objects and advantages of the invention will appear from the following disclosure thereof together with the attached drawings which illustrate a certain form of embodiment thereof. This form is shown for the purpose of illustrating the invention since the same has been found in practice to give satisfactory and reliable results. It is to be understood that the instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

In the drawings:

Fig. 1 is a front elevational view of a machine made in accordance with the invention;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is an enlarged sectional view showing the relation of the work wheels to the roller, in said machine.

Fig. 3a is a view showing controlling means embodied in the invention;

Fig. 4 is a right hand end view of the work wheel shown in Fig. 3;

Fig. 5 is a top plan view of Fig. 3;

Fig. 6 is an enlarged left hand view of a bearing and driving means employable in the invention;

Fig. 7 is a front elevational view; and

Fig. 8 is a side elevational view of a sheet push guide employable in the invention.

Referring now more particularly to the drawings, the machine in its preferred form has two side frame members 10, 11, tie member 12 and table portion 13. Secured to tie member 12 is a driving means, such as, motor 14, which drives by means of a pulley 15, an endless belt 16 trained over pulley 17, the latter being secured to main shaft 18.

A flat feed tray or table 19 is preferably disposed at a shallow angle of approximately fifteen degrees. Table 19 is omitted from Fig. 1, to more clearly show the essential parts constituting the invention.

Feed tray or table 19 approaches the shaft 18 with a series of spaced apart bevel edged projections 20 separated by the notches 21, the latter providing clearances for pressure rollers 22 mounted on shaft 23. Rollers 22 are adjustably held on shaft 23 by set screws 24 and are positioned, so that the rings 25 of rollers 22 may contact shaft 18 at zones within notches 21. Rings 25 may be made of rubber fibre or other material suitable for gripping paper during rotation of the rollers 22. Since rings 25 are subject to wear and, therefore, must be replaced, rollers 22 are each preferably provided with a flange 26 to which the ring 25 is secured by means of screws 27. A third shaft 28 is non-rotatably secured within bearing blocks 29; and is located in relation to shafts 18 and 23, such that the perforating, scoring or slitting wheels 30 will be maintained in proper relation to driver shaft 18.

Wheel 30 may have a continuous cutting edge or an interrupted cutting edge formed by the notches 31, thus providing the paper sheet P worked upon with intermittent slits ready for tearing when required; or wheel 30 may be a scorer.

Wheel 30 is preferably mounted by means of roller bearings (not shown) on a shaft 32 which is held within forked member 33 of a depending member 34, the latter being held within clamping member 35 on shaft 28.

Clamping member 35 is split as at 36 and is secured to shaft 28 in its proper location by means of screw 37, its adjusting portion 45 being hinged at 46.

Member 34 may readily be removed from clamping member 35 upon removal of plate 38 (having slot 38') secured to member 35 by screws

39. Wheel 30 is maintained in surface engagement with rotatable shaft 18 by a spring 40 encircling pin 41. One end 42 of spring 40 bears against shoulder 34a at the upper end of member 34, while its other end 43 bears against the underside of top plate 35a secured by screws 35b to member 35. A nut 44 bears against the upperside of plate 35a for pressure adjusting purpose and is locked by means of a lock nut 44a.

The rollers 22 are held in engagement with rotatable shaft 18' by means of an adjustable spring 47 secured within each bearing block 29, said adjustment being made by a spindle 48 threaded into block 49 of bearing block 29 as seen at 50 (Fig. 6), and being secured in its adjusted position by a nut 51. Blocks 49 are secured to bearing blocks 29 by means of screws 52.

Where it is essential to control the entry of each sheet of paper between the cutters 30 and rotating shaft 18, an auxiliary mechanism as indicated in Fig. 3a, may be applied. This mechanism comprises a wheel 60 having spaced notches 61, the bottom of each notch being provided with threaded extensions 62 for securing a plug 63 by means of screws 64. Wings 65 extend from table 19 and have mounted therein an arm 66, one end of the latter being provided with a bar 67, preferably made of felt, rubber or the like; the center 68 of said arm 66 being fulcrumed to wing 65, while the other end 69 of arm 66 is provided with a spring 70 secured at 71 to frame members 10 and 11. Between end 69 and fulcrumed partition 68 is an extension 72 carrying a wheel 73. Notched wheel 60 is preferably mounted on rotatable shaft 18. As can be readily seen, as the wheel 60 rotates with driven shaft 18, wheel 73 will enter a notch 61, not closed by the plug 63, thus causing the bar 67 to rise and thus permitting the paper P previously held back to pass between the cutting wheel 30 and rotating shaft 18. After the paper has passed from the table 19 between rollers 30 and rotating shaft 18, the paper moves onto a table T. It may be advisable to provide adjustable guides 76, 77, on table portion 19, having the guides 77 adjustable by means of arms 78 held to table 19 by thumb screws 79 within slots 80; a plurality of holes 81 in table 19 being provided to facilitate adjustability of guide 77.

In Figs. 7 and 8, the numeral 75 represents a sheet push guide comprising a collar portion 76 and flange 77 having cut-outs 78, 79, a wall 80' being formed providing a bearing for pin 81'. A spring 82 bears against nut 83 and surface 86 of cut-out 79. Pin 81' is slidably disposed in bores 84 and 85. Locknut 83a bears against nut 83. There are preferably two guides 75 which are secured in spaced relation to shaft 23 by set screws 87. These guides may be shifted along the shaft 23. The guides 23 are slightly smaller in diameter than the rollers or wheels 22 and are employed to guide and by means of the pins 81' to push the sheet of paper being perforated or otherwise worked upon, by the wheels 30.

It will thus be seen that there has been provided by this invention a machine for perforating, slitting or scoring sheets in which the various objects hereinabove set forth, together with many thoroughly practical advantages, are successfully achieved.

As many possible embodiments may be made of the above invention, and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new, and desire to be secured by Letters Patent, is:

1. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure at an angle with respect to a horizontal plane and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions provided with bevelled ends facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members; pusher means for moving said sheet forward, said pusher means comprising a rotatable member secured to said second shaft, an element projecting from said rotatable member and means urging said element outwardly; and means for controlling the feeding of said sheet to be worked on by said work wheel, said controlling means comprising a member fixed to said driver shaft to rotate therewith and being provided with spaced notches, an arm fulcrumed on said plate, said arm being provided at one end with a sheet engaging element and adjacent its other end with a spring secured to said plate and an extension adapted to be urged into one of said notches by said spring during rotation of said notched member whereby said sheet engaging element may be disengaged from the sheet, and covers for the other of said notches.

2. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure at an angle with respect to a horizontal plane and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions provided with bevelled ends facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means

for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members; pusher means for moving said sheet forward, and means for controlling the feeding of said sheet to be worked on by said work wheel.

3. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure at an angle with respect to a horizontal plane and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions provided with bevelled ends facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members; and pusher means for moving said sheet forward, said pusher means comprising a rotatable member secured to said second shaft, an element projecting from said rotatable member and means urging said element outward.

4. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure at an angle with respect to a horizontal plane and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions provided with bevelled ends facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members; and pusher means for moving said sheet forward.

5. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure at an angle with respect to a horizontal plane and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions provided with bevelled ends facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members, and means for controlling the feeding of said sheet to be worked on by said work wheel.

6. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure at an angle with respect to a horizontal plane and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions provided with bevelled ends facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members; and means for controlling the feeding of said sheet to be worked on by said work wheel, said controlling means comprising a member fixed to said driver shaft to rotate therewith and being provided with spaced notches, an arm fulcrumed on said plate, said arm being provided at one end with a sheet engaging element and adjacent its other end with a spring secured to

said plate and an extension adapted to be urged into one of said notches by said spring during rotation of said notched member whereby said sheet engaging element may be disengaged from the sheet.

7. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, pressure rollers adjustably mounted in spaced relation on said second shaft to rotate therewith, said rollers each having a member, said members being disposed respectively between adjacent projecting portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said rollers, said members being adapted to frictionally engage a sheet of paper to be worked upon for passage between said members and said driver shaft during their rotation, means for removably securing said members to said rollers, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, and adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said members.

8. A machine of the character described, comprising a frame structure, a horizontally disposed driver shaft rotatably mounted in said structure, means for rotating said shaft, a flat feed plate fixed to said structure and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions facing said driver shaft and in close proximity thereto, a second shaft disposed parallel to said driver shaft and rotatably mounted in said structure, a plurality of means adjustably mounted in spaced relation on said second shaft to rotate therewith, said plurality of means being disposed respectively between adjacent portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said plurality of means, said plurality of means being adapted to frictionally engage a sheet of paper to be worked upon for passage between said plurality of means and said driver shaft during rotation of said plurality of means, bearing means on said structure, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft, said device including a rotatable work wheel disposed in proximity to said driver shaft, and adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said first named means.

9. A machine of the character described, comprising a support, a rotatable driver shaft disposed on said support, means for rotating said shaft, a plate fixed to said support and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions facing said driver shaft and in close proximity thereto, a second rotatable shaft disposed parallel to said driver shaft and arranged on said support, rotatable devices fixed in spaced relation on said second shaft to rotate therewith, said device being disposed respectively between adjacent portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said devices, said devices being adapted to frictionally engage a sheet of material fed from said plate, for passage between said devices and said driver shaft, bearing means on said support, a third shaft non-rotatively mounted in said bearing means, a device fixed to said third shaft and including a rotatable work wheel disposed adjacent said driver shaft, and adjustable means in said bearing means for resiliently maintaining engagement between said driver shaft and said first-named devices.

10. A machine of the character described, comprising a support, a rotatable driver shaft arranged on said support, means for rotating said shaft, a plate fixed to said support and disposed adjacent said shaft, a second rotatable shaft disposed parallel to said driver shaft and arranged on said support, rotatable devices fixed in spaced relation on said second shaft to rotate therewith and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said devices, said devices being adapted to frictionally engage a sheet of material fed from said plate for passage between said devices and said driver shaft, a device arranged on said support and including a rotatable work wheel disposed in proximity to said driver shaft, a pusher for moving said sheet of material forward from said plate, and means for controlling the feeding of said sheet of material.

11. A machine of the character described, comprising a support, a rotatable driver shaft arranged on said support, means for rotating said shaft, a plate fixed to said support and disposed adjacent said shaft, said plate having a plurality of spaced apart projecting portions facing said driver shft and in close proximity thereto, a second rotatable shaft disposed parallel to said driver shaft and arranged on said support, rotatable devices fixed in spaced relation on said second shaft to rotate therewith, said devices being disposed respectively between adjacent portions of said projecting portions and contacting said driver shaft whereby rotative motion is transmitted from said driver shaft to said devices, said devices being adapted to frictionally engage a sheet of material fed from said plate for passage between said devices and said driver shaft, and a device arranged on said support, said device including a rotatable work wheel disposed in proximity to said driver shaft.

12. In a machine of the character described having a driver shaft, a feed plate disposed adjacent said driver shaft, a second shaft disposed parallel to said driver shaft and rollers fixed to said second shaft and in engagement with said driver shaft, whereby a sheet of material on said plate may be fed between said driver shaft and said rollers, of means for controlling the feeding of said sheet, said controlling means comprising a member fixed to said driver shaft to rotate therewith and being provided with spaced notches, an arm fulcrumed on said plate, said arm being provided at one end with a sheet engaging element and adjacent its other end with a spring secured to said plate and an extension adapted to be urged into one of said notches by said spring during rotation of said notched member whereby said sheet engaging element may be disengaged from said sheet of material.

13. In a machine of the character described having a driver shaft, a feed plate disposed adjacent said driver shaft, a second shaft disposed

parallel to said driver shaft and rollers fixed to said second shaft and in engagement with said driver shaft, whereby a sheet of material on said plate may be fed between said driver shaft and said rollers, of pusher means for moving said sheet of material forward, said pusher means comprising a rotatable member secured to said second shaft, an element projecting from said rotatable member and means urging said element outwardly, and means for controlling the feeding of said sheet, said controlling means comprising a member fixed to said driver shaft to rotate therewith and being provided with spaced notches, an arm fulcrumed on said plate, said arm being provided at one end with a sheet engaging element and adjacent its other end with a spring secured to said plate and an extension adapted to be urged into one of said notches by said spring during rotation of said notched member whereby said sheet engaging element may be disengaged from said sheet of material.

JOHN A. DAVIDSON.