June 26, 1945. S. EDELS 2,378,989

PRINTING MACHINE

Filed Oct. 8, 1941 6 Sheets-Sheet 1

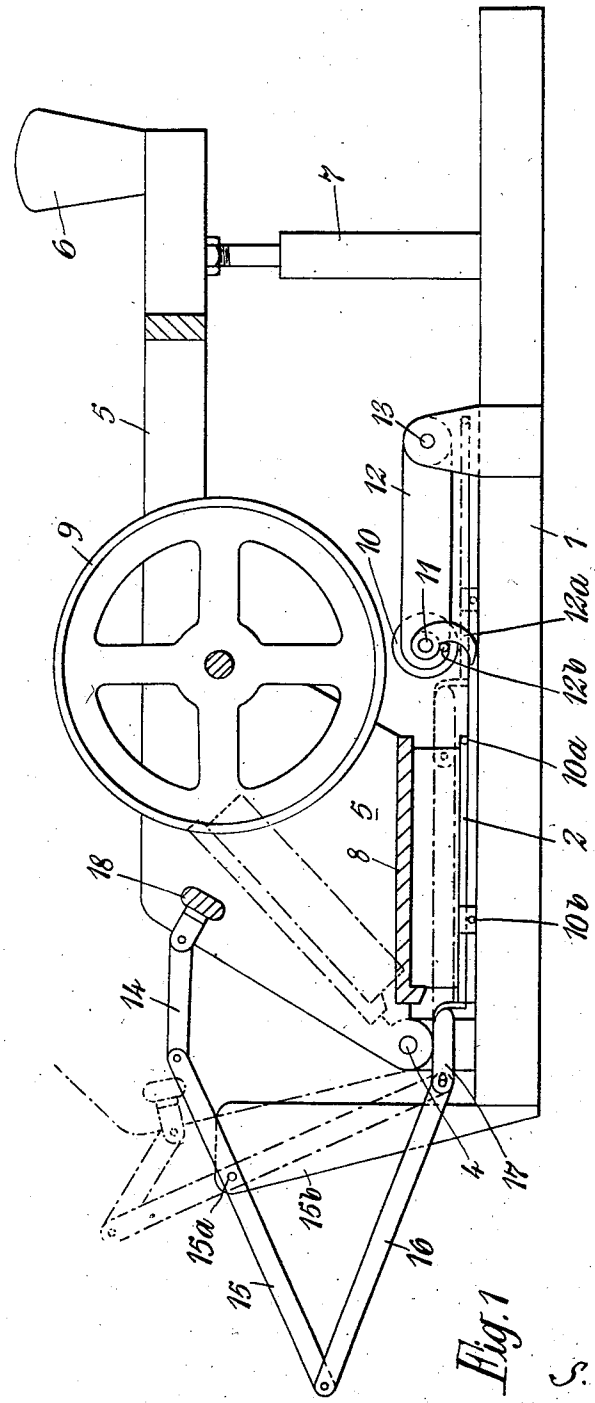


Fig. 1

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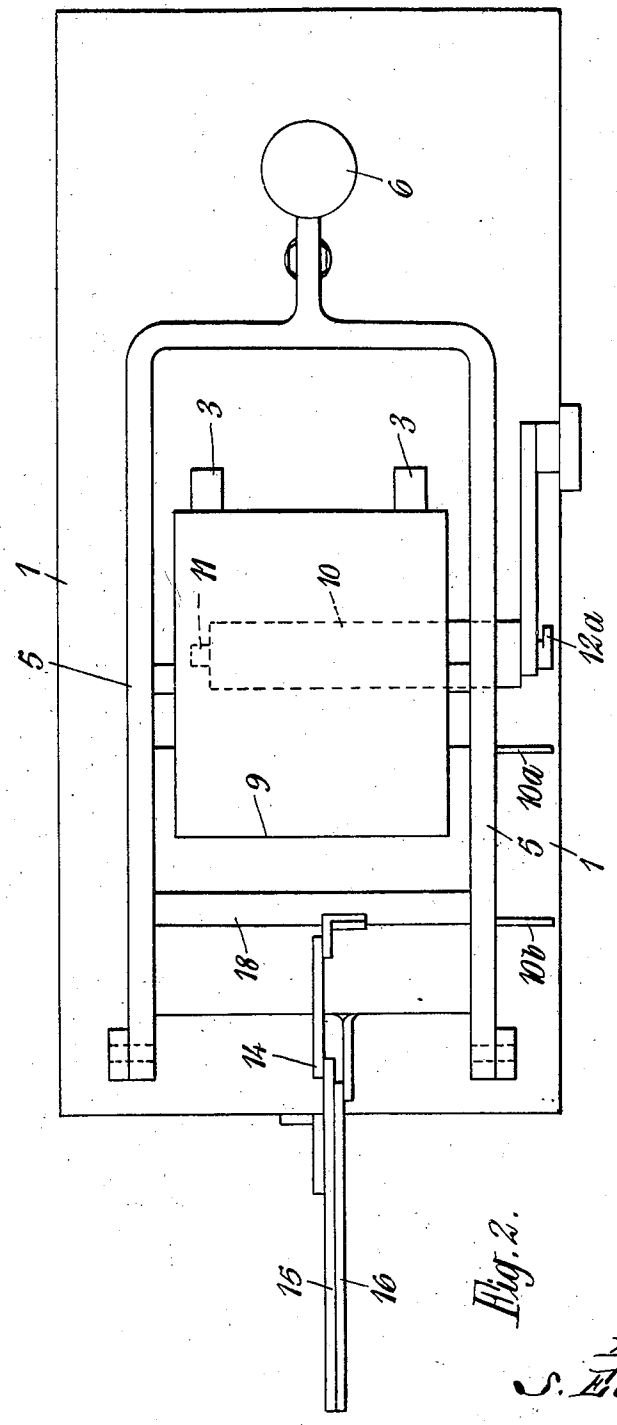


Fig. 2.

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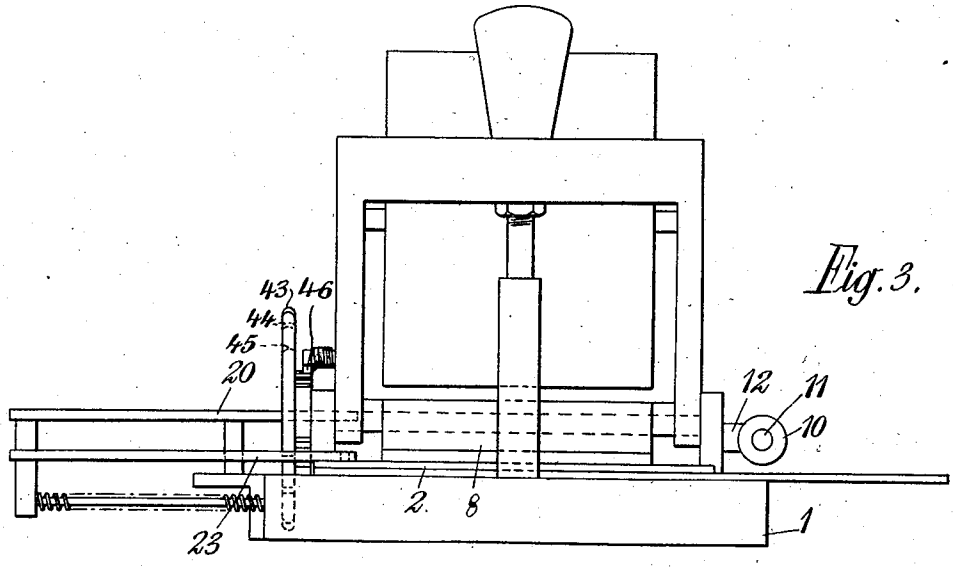


Fig. 3.

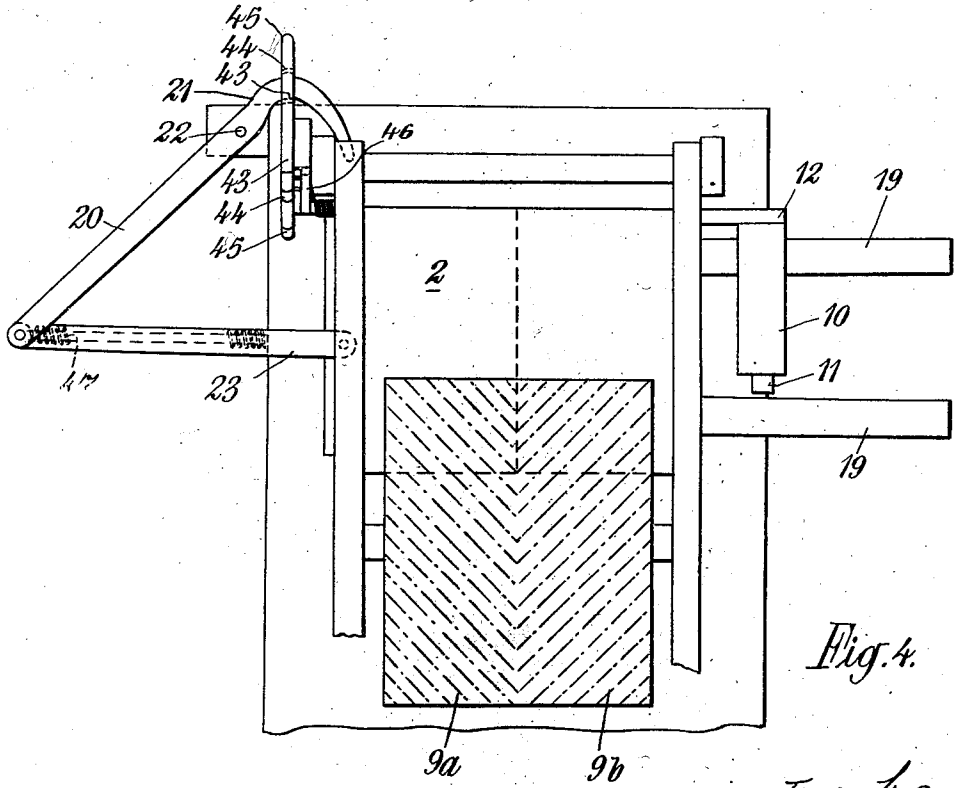


Fig. 4.

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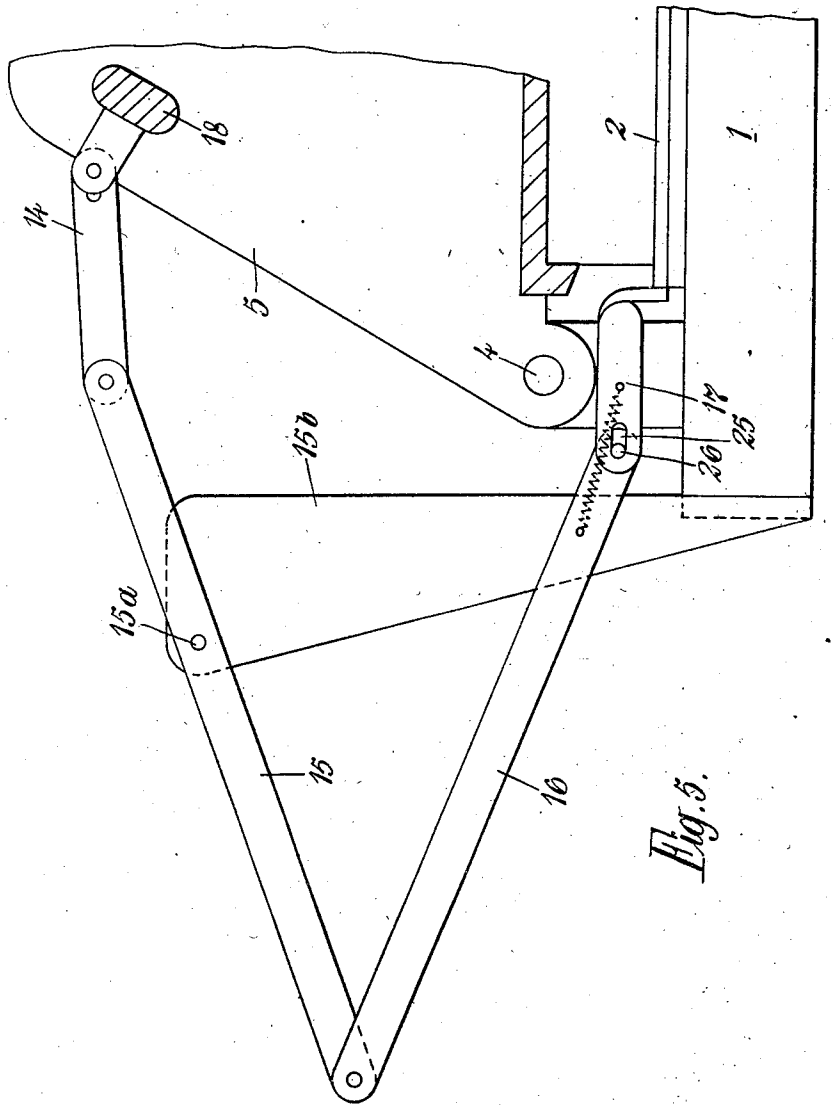


Fig. 5.

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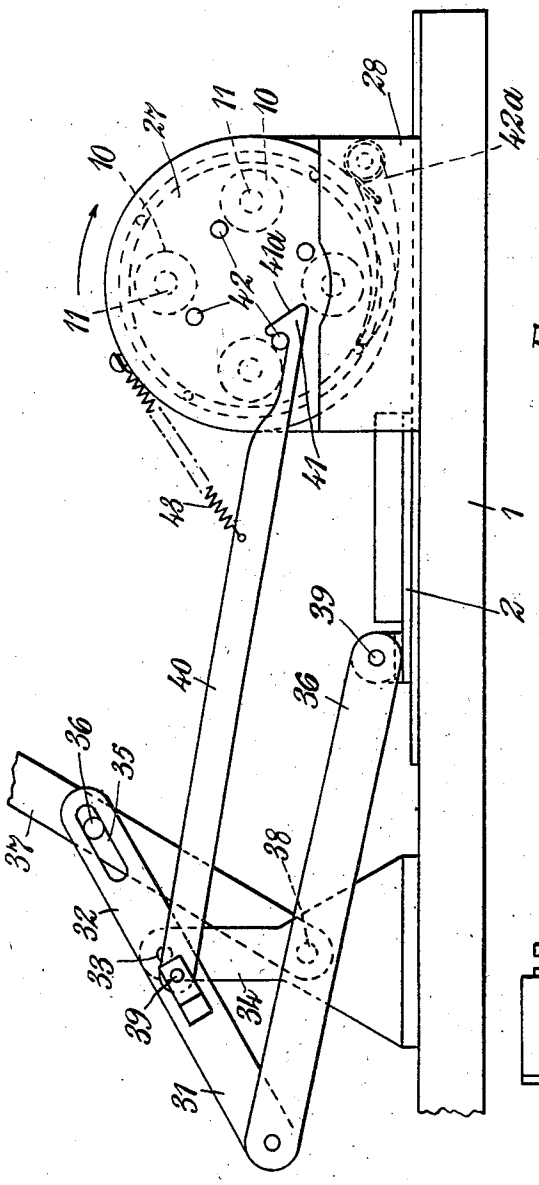


Fig. 6.

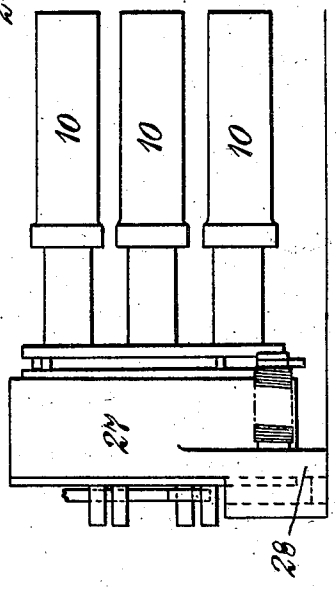


Fig. 7.

Inventor,
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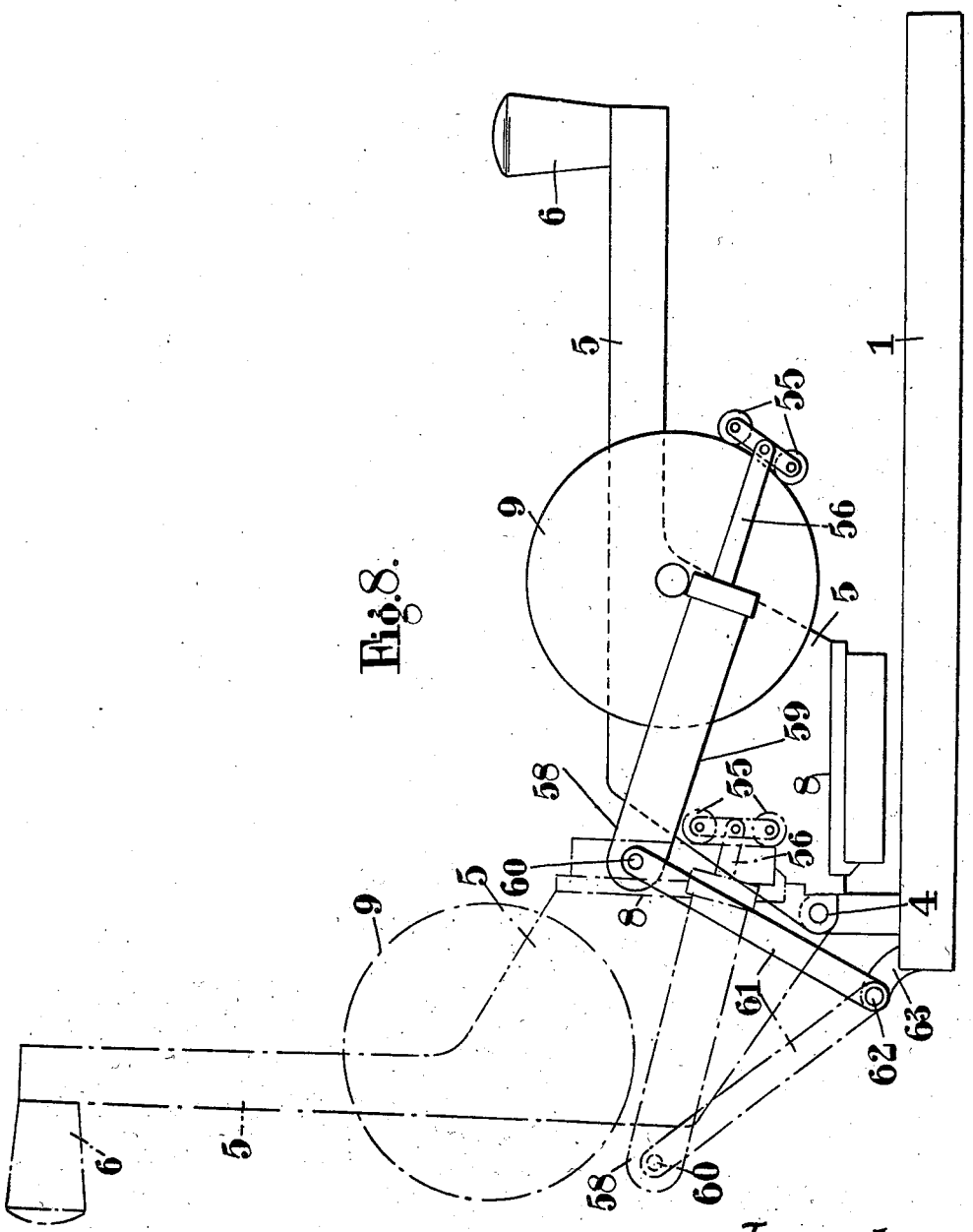
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Fig. 8.



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Patented June 26, 1945 2,378,989

UNITED STATES PATENT OFFICE

2,378,989

PRINTING MACHINE

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Application October 8, 1941, Serial No. 414,178
In Great Britain November 16, 1940

12 Claims. (Cl. 101—38)

This invention relates to printing machines, namely to hand- or pedal-operated printing presses as well as to mechanically or motor driven printing presses, special advantages being provided by the invention, particularly in the case of printing presses for offset and multi-colour printing. Various constructions of printing machines for offset printing are known, in which the impression is not directly made by the printing forme on to the surface to be printed such as paper or the like, but the impression is first made upon an intermediate element, i. e. a transfer pad which transfers the inked impression to the article or work which is to be printed. The interposition of such a transfer element in printing presses and particularly that kind which is of an elastic or yielding character permits of paper being printed on one or both sides or of printing upon articles or surfaces which cannot readily be printed upon by the usual printing forme. The use of an elastic and yielding intermediate transfer pad has the effect that the printing owing to the elasticity of the pad can penetrate into all the irregularities of the surface to be printed on, whereby pictures and letter press with the finest details can be printed on the roughest paper or other rough faced materials. Most offset printing presses are constructed as rotary machines, and rotary machines are also known for multi-colour work. Offset printing machines of other types are also known, in which the printing forme co-operates with an intermediate element in the form of a transfer plate usually made of elastic material or having an elastic surface, the transfer plate which receives the impression from the inked printing forme being capable of being applied entirely freely to the surface to be printed on, so that not only level surfaces, such as paper, box surfaces and the like can be printed upon but also curved surfaces, such as bottles, tubes, handles and the like, and the printing is effected by sliding the transfer plate in contact with and so causing the tube or the like to roll or rotate as it receives the impression. Machines for multi-colour printing are also known having printing elements in the form of a plate and transfer intermediate elements also of plate form, in which machines a printing plate is provided for each colour which can be manipulated individually but all the printing plates, however, cooperating with a transfer element common to all the printing plates in such a manner that the various printing plates and the transfer element are mounted on swinging levers, so that all the printing plates can be successively applied to the transfer element.

The printing machine forming the subject of the invention to be hereinafter described differs from all the previously known machines in that it is characterized by a hand or power operated swinging frame, the movement of which causes relative movement between the printing block, and the transfer pad in one of two lateral directions so that the machine is adapted for direct printing, offset printing, and multi-colour printing.

The machine is thus capable of a number of adaptations and also possesses advantages in manipulation which will be hereinafter described in detail.

Reference will now be made to the accompanying drawings, in which:

Figure 1 shows a diagrammatic elevation of a constructional form of an offset printing machine,

Figure 2 is a plan view,

Figure 3 is an end elevation of a modified form of machine for colour printing.

Figure 4 is a plan view of Figure 3,

Figures 5, 6 and 7 show details hereinafter referred to.

In the constructional form shown in Figures 1 and 2 Figure 8 is a diagrammatic elevation showing an inking mechanism of the drawings, the printing machine, which e. g. is constructed as a hand-operated printing machine for offset printing, consists of a base plate 1 carrying the transfer pad 2 which is adapted to be slidden laterally on rails 3 provided on the base plate. Hinged upon, and towards one end of the base plate at 4, is a frame 5 which is extended over the base plate and terminates in a handle 6 and an adjustable stop leg 7. Such frame may be raised and lowered and a part of the frame is shown in dotted lines in Figure 1 in the raised position. Forming part of the frame 5, is the printing block 8 (or a forme or chase for letterpress or other set up matter) and this is pressed down upon the transfer pad in the position shown in Figure 1, by means of the handle 6 or a treadle, this pressure being relieved when the frame 5 is raised into the dotted line position by means of the handle 6. Suitable means are provided by which as the frame is raised, inking rollers will apply ink to the lower surface of the printing block 8, so that when the frame is lowered an inked impression is produced upon the transfer pad 2. These inking means however do not form part of the invention, but are briefly hereinafter referred to for the sake of clearness.

After receiving the printing impression, and while the frame is being raised, the transfer pad is caused to slide toward the right in Figure 1 along the rails 3, so that the transfer pad may impart the inked impression thereon to the article or object which is to be printed. If the article to be printed consists of a tube 10, such tube 10 is freely mounted upon a mandrel 11 carried by an arm 12 pivoted at 13 to the base

plate. As shown in Figure 1 the tube 10 is held by being weighted in such a position that as the transfer pad is moved to the right, so that upper surface of the pad in passing under the tube will frictionally rotate the tube so that the inked impression on the pad is rolled off upon the tube. If however the print desired is to be flat, then the tube and the mandrel are swung out of action by pivoting the arm 12 around its pivot 13. A flat print can now be obtained by pressing a sheet of paper or the like upon the pad. During this time the frame 5 and the inking cylinder 9 are still in the raised dotted line position and this affords a clear open space at the handle end of the machine, so that the operator has a considerable space to manipulate different kinds of printing. A flat print may be obtained as stated above, but a print upon a circular, oval or angular sided article may be obtained by the operator rolling it upon the flat transfer pad. Such an article may be of any size owing to the space obtained by the upraised frame, and large jars or similar articles may be printed in this way.

When the transfer pad has been moved to the right to roll off the inked impression on the tube 10, it is necessary on the return stroke to the left, that the tube 10 should be raised out of contact with the pad. For this purpose the frame carrying the pad is formed with two projecting pins 10*a* and 10*b* and a weighted arm 12*a* depends from the axis of the mandrel carrying the tube, which arm in the position shown in Figure 1 is acting as a strut to slightly raise the workpiece 10 from above the level of the upper surface of the transfer pad 2. When the pad is now moved to the right the pin 10*a* thereon strikes against the arm 12*a* and swings it in an anticlockwise direction so that it no longer acts as a strut to raise the tube 10 but allows it to drop so that the inked impression on the pad will be rolled off on the tube. At the completion of the pad movement the pin 10*b* moves past the arm 12*a* and swings it idly back. On return stroke of the pad to the left the pin 10*b* moves the depending arm 12*a* in a clockwise direction so that its end is forced down against the base and against a stop pin 12*b* and so lifts the mandrel clear of the pad. Towards the end of the movement to the left of the pad, the pin 10*a* strikes the arm 12*a* and idly lifts it and the workpiece in passing.

For laterally moving the transfer pad backward and forward in unison with the movements of the frame, a linkage mechanism 14, 15, 16, is arranged between a fixed cross bar 18 near the pivoted end of the frame, and one end of a frame 17 which carries the transfer pad 2. The link 15 in this linkage is pivoted at about its centre at 15*a* upon a fixed bracket 15*b*. In the full line position of this linkage as shown in Figure 1, the transfer pad is receiving the inked impression, and the dotted position of the links corresponds with the pad in the printing position.

The machine shown in Figures 1 and 2, permits not only of offset printing in one colour, but may be used for direct or letterpress printing when the yielding transfer pad would be replaced by a hard plate, and the linkage 14, 15, 16 would be disconnected. Again the hand operation of the frame 5 may be replaced by a power drive as from an electric motor not shown. In a further alternative use of this machine, the mandrel 11 may serve to support an impression roller by means of which a web of paper, fabric or other material may be pressed against the inked impression on the transfer pad.

With reference to Figure 8 it may be stated that the transfer of ink from the ink distributing cylinder 9 to the printing block 8 is effected by a linkage mechanism which is additional to that by which the transfer pad is reciprocated and is here omitted for the sake of clearness, but which is actuated by the raising and lowering movement of the frame 5 as before. For this purpose, a pair of ink transferring rollers 55 are supported by rods 56 and 58 of which only those on one side of the apparatus are shown. The rods 58 are pivoted at 59 on the frame 5 and in the position shown by full lines in Figure 8 the rollers 55 engage the cylinder 9. The end of each rod 58 opposite the rollers 55 is pivoted at 60 to one end of a link 61, the other end of which is pivoted at 62 on a bracket 63 fixed to the base 1, and eccentric relatively to the centre 4 upon which the frame 5 is hinged. When the frame and cylinder 9 are raised into the dotted line position, the movement causes the rods 56, 58 and link 61 to double up as shown so that by the two different centres 62 and 4, the rods 56, 58 are oscillated about its pivot 59 and move the inking rollers 44 from the cylinder 9 down over the printing block 8, and so inking the latter.

In the modification shown in Figures 3 and 4, multicolour printing may be effected by a machine similar to Figures 1 and 2. For this purpose the base plate 1, frame 5, printing block 8 and transfer pad 2 remain the same, but instead of the latter being laterally moved at a right angle to the axis of the inking cylinder 9, it is moved laterally and parallel with the axis of such cylinder, along rails 19 as shown in Figure 4, to beyond one side of the frame 5. This movement is effected by a double armed lever 20, 21 fulcrumed at 22 on the base 1, and a link 23 which is connected to the transfer pad 2. The nose end of the lever arm 21 is pressed against a cam 24 which is designed to be actuated by the rising movement of the frame 5. The inking cylinder in this case is made with two sections 9*a*, 9*b* for two colours, these being indicated by the two sets of cross hatched lines. When desired three or four colours may be provided for. As shown in Figure 4, it is assumed that a two-colour imprint is to be made upon a tube 10 similar to that shown in Figure 1.

The cam 44 is made as an edge cam having three separate and similar cam groups on its periphery. Each cam 24 is made with three steps 43, 44, 45 of progressive height and the cam is adapted to be always turned in one direction by a pawl 46 pivoted on the swinging hub of the frame. At each upward movement of the frame so the pawl 46 by engaging notches on the cam 24 will rotate it for a distance of one step in one of the cam groups. As each step 43 to 45 is brought into position so the nose on the end of the double armed lever pressing against the steps, is actuated to move successively through its two-colour receiving stages and then beyond the frame to print the work piece. At each down stroke of the frame the pawl 46 moves freely over the notches on the cam disc. After the final printing operation the pad is returned to its starting position by the spring 47, the next cam group being now in position ready for the next series of operations. The first rising movement of the frame is preferably a full one, but the two subsequent rising movements corresponding to the steps 44 and 45 may be relatively short.

Referring to Figure 5 which shows on an enlarged scale the linkage 14, 15 and 16 between the frame and the transfer pad, a slot 25 is pro-

vided with which engages the pivot pin **26** between the part **17** and the link **16**, the slot allowing for a certain amount of lost motion before the sliding movement of the transfer pad commences. This will have the effect that the transfer pad will not receive any sliding movement before the printing block is raised clear of its surface and so prevent any distortion of the inked impression on the transfer pad, as the sliding of the pad will only be picked up after the pin **26** has reached the further end of the slot.

The modification shown in Figures 6 and 7, shows an arrangement whereby a rotary magazine **27** is adapted to carry four tubular containers **10** on mandrels **11** and is mounted on the base plate **1**, the magazine being turned stepwise by the movement of the frame **5**, to bring a new container into position for being printed upon. For this purpose as shown in Figure 6, the magazine is carried by bracket **28** upon the base and the magazine frame carries four mandrels **11** which are each similar to that shown in the previous figures, and a tubular container **10** is slipped on to each mandrel to overhang the transfer pad, whereby the lowest container will be in a position to roll off the impression from the transfer pad, as it moves to the right in Figure 6. During the return movement of the pad to the left, the magazine is given a part rotation to bring the next mandrel and tube into position to be printed upon. This is effected by attaching the transfer pad through a connection **29** to a link **30**, which in turn is pivoted to one arm of a two-armed lever **31**, **32**, fulcrumed at **33** upon a bearing bracket **34** secured to the base **1**. The other arm **32** of the two-armed lever is slotted at **35** to engage a pin **36** carried on a lever **37** fulcrumed at **38** upon the bearing bracket **34**. It may be explained that the machine in Figure 6 is intended to be operated by power e. g. an electric motor. Such motor by means not shown causes the frame **5** to be raised and lowered as previously described, and also oscillates the lever **37**. The linkage shown in this figure replaces that shown in Figures 1 and 2. To the lever **37** is pivoted at **39**, a rod **40** ending in a pawl **41** of hook shape and having a cam surface **41***a*. The hook pawl engages one of four pins **42** projecting from the frame of the magazine **27**, and the pins correspond with the axes of the respective mandrels **11**. The hooked pawl **41** is held in engagement with any of the pins **42** by a spring **43** anchored to the magazine frame. By such an arrangement it will be understood that as the transfer pad bearing the inked impression is moved to the right in Figure 6 by the rising action of the frame **5**, the inked impression is simultaneously rolled off on the lowest container **10** carried by the magazine frame which during this movement is held stationary. This outward movement of the pad by means of the link **30** rocks the double-armed lever **31** and **32**, and swings the lever **37** to the right and releases the pawl **41** from the pin **42**. With the inward movement of the pad the pawl rod **40** is moved to the left and the magazine is now adjusted so as to bring the next container into position to be printed thus with each successive movement of the transfer pad, so the magazine **27** will be rotated stepwise to bring a new mandrel and container into position, the operator keeping the magazine supplied with new containers, whilst the frame **5** is being intermittently raised and lowered. As the pawl rod **40** completes its movement to the right, the cam surface **41***a* comes into contact with the next pin **42** and is deflected downwards so that the hook-shaped pawl may snap up behind the pin in readiness for the next stepwise movement of the magazine. The magazine is thus always turned in one direction, and a detent **42***a* is provided to successively engage the pins **42**.

It will be understood from the foregoing description, that a portable printing machine is obtained which by means of a rising and falling frame, and actuated by hand, foot or power gives a printing impression on a work piece or an inking impression on a transfer pad, this said movement of the frame also being made to laterally move the transfer pad in line with the frame for single-colour work or crosswise thereto for multi-colour work.

Such a machine is capable of many varieties of work as follows:

Single-colour work

(*a*) Direct printing upon a hard platen to replace the yielding pad.

(*b*) Offset printing on a flat surface.

(*c*) Offset printing on a rolled off or a curved surface such as a tubular container.

(*d*) Offset printing by the operator rolling the work piece on the transfer pad.

(*e*) Offset printing on a large work piece owing to the work-space obtained by the raised frame.

(*f*) Offset printing on containers supported in a magazine moved stepwise to print containers in turn one after the other.

Multi-colour work

(*g*) Direct printing.

(*h*) Offset printing on a flat surface.

(*i*) Offset printing by rolling off on a tubular container.

(*j*) Offset printing in series on a number of tubular containers carried by a magazine.

(*k*) Offset printing by rolling the work piece on the flat transfer pad, the machine affording a side space to deal with large or small work pieces.

I claim:

1. A portable printing apparatus comprising in combination, a base, an operating frame pivoted thereon, a printing block carried on the frame, means for inking the printing block as the frame is hinged upwards, a transfer pad slidably supported on the base to receive a print as the frame is moved downward, means extended between the operating frame and the transfer pad, whereby as the frame is raised, the pad is slid forward to a free working space, and means whereby the transfer pad may give a direct print upon a workpiece.

2. A portable printing apparatus comprising a base, parallel rail guides thereon, an operating frame pivoted on the base, a printing block carried on the frame, means for inking the printing block as the frame is hinged upwards, a transfer pad supported on the rail guides on the base, adapted to receive a print from the printing block, as the frame is hinged down, a pivoted linkage connecting together the operating frame and the transfer pad so that when the frame is raised, the pad bearing the imprint thereon is slid forward to a free working space, where a flat print may be applied upon a workpiece.

3. In a printing apparatus as claimed in claim

2, means for making an offset print comprising in combination, a lever arm pivoted on the base, a mandrel carried by the free end of the lever, for supporting a tubular workpiece, both the mandrel and the workpiece overhanging the path of movement of the transfer pad so that as the pad slides along the base, the print on the pad is rolled off upon the workpiece.

4. In a printing apparatus as claimed in claim 2, means for making an offset print comprising in combination, a lever arm pivoted on the base, a mandrel carried by the free end of the lever, for supporting a tubular workpiece, both the mandrel and the workpiece overhanging the path of movement of a transfer pad, means whereby the print on the pad is rolled off upon the tubular workpiece during the outward stroke of the pad, and means for raising the lever and mandrel during the return stroke of the pad to prevent surface contact of the workpiece therewith.

5. In a printing apparatus as claimed in claim 2, the combination of a hinged operating frame carrying a printing block, a transfer pad, a pivoted linkage between the frame and pad, to move the latter to and fro, and a lost motion device which connects the linkage to the pad, so that the movement of the pad does not commence until after the printing block has been raised clear of the transfer pad.

6. A portable offset printing apparatus, comprising a base, parallel rail guides thereon, an operating frame pivoted on the base, a printing block carried on the frame, means for inking the printing block as the frame is hinged upwards, a transfer pad supported on the rail guides on the base adapted to receive a print as the frame is hinged down, a pivoted linkage system connecting together the operating frame and the transfer pad to slide the pad backward and forward on the base in unison with the up and down movements of the hinged frame, a bracket on the base, a rotary frame carried by the bracket, a plurality of mandrels projecting on the rotary frame spaced apart in circular formation and transversely overhanging the base, the lowest being in the path of the transfer pad, said mandrels forming supports for tubular workpieces, and means whereby after one workpiece has been printed, the said rotary frame is moved stepwise to bring another mandrel and blank workpiece into position ready for the transfer pad to pass thereunder and roll off the imprint thereon on to the workpiece.

7. In a portable printing apparatus as claimed in claim 6, the combination with the rotary frame on the bracket, of a plurality of pins projecting from one side of the frame, of the same number as that of the mandrels on the other side, a pawl linked to the sliding transfer pad, and means whereby when the transfer pad has rolled-off its impression on a tubular workpiece, the rotary frame is turned by the pawl to bring another workpiece into position ready to receive an impression on the next stroke of the transfer pad.

8. A portable offset multi-color printing apparatus comprising in combination, a base, an operating frame pivoted thereon, a printing block carried on the frame and having a plurality of printing sections, means for multi-color inking the sections of the printing block successively each time the frame is hinged upwards, a transfer pad of the same width as one of the printing block sections and slidably supported on the base, means extended between the hand operated frame and the transfer pad whereby each time the frame is raised, the pad is moved intermittently and transversely across the base for a distance equal to one section of the printing block, so as to successively receive a series of imprints in different colors which are subsequently printed off upon a suitable surface when the pad completes its transverse travel.

9. The combination with a multi-color printing apparatus as claimed in claim 8, of a tubular workpiece receiving mandrel carried on the base in the path of travel of the pad, whereby when the pad has received its full number of multi-color imprints the said imprints are rolled off upon the workpiece during the final travel of the pad.

10. A multi-color printing apparatus as claimed in claim 8, in which the means for moving the pad transversely across the base comprise in combination a double-armed lever pivoted on the base, a link extending between one arm of the lever and the transfer pad, stepped cam means actuated by the movements of the operating frame which engage with the other arm of the lever, whereby as the frame makes its various hinging movements the cam by its several steps intermittently moves the transfer pad to receive a series of color imprints in succession, and spring means to return the pad to its original starting position on the base, after it has completed its transverse travel and printed-off its multi-colored imprint.

11. A portable printing apparatus comprising a base, parallel rail guides thereon, an operating frame pivoted on the base, a printing block carried on the frame, means for inking the printing block as the frame is hinged upwards, a transfer pad supported on the rail guides on the base adapted to receive a print from the printing block as the frame is hinged down, a pivoted linkage connecting together the operating frame and the transfer pad for moving the pad forward on the base, a mandrel for supporting a tubular workpiece, a lever pivoted at one end on the base, and carrying both mandrel and the workpiece at its free end, the lever being movable into one position to enable the workpiece to receive a rolled-off impression from the pad, or movable into a second inoperative position to enable a flat print to be taken off the pad.

12. A portable printing apparatus comprising a base, parallel rail guides thereon, an operating frame pivoted on the base, a printing block carried on the frame, means for inking the printing block as the frame is moved upwards, a transfer pad supported on the rail guides on the base, adapted to receive a print from the printing block as the frame is hinged down, a pivoted linkage connecting together the operating frame and the pad for moving the latter to and fro on the base in unison with the up and down movements of the frame, a lever pivoted at one end on the base, a mandrel on the free end of the lever for supporting a tubular workpiece, a weighted hinged strut on the free end of the lever adapted to rest on the base, a stop for limiting the hinging movement of the strut in one direction, and pins projecting from the pad so that during the outward stroke of the pad, the strut is moved free to allow the tubular workpiece to receive a rolled-off impression, but on the return movement of the pad, the strut is operated to prevent the workpiece from making contact with the pad.

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