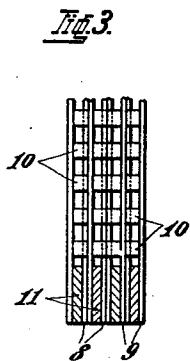
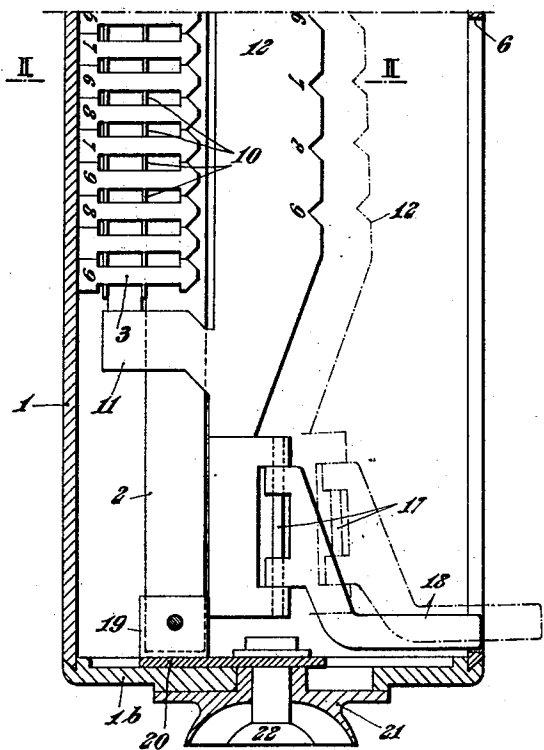
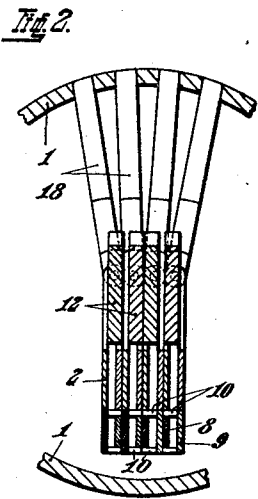
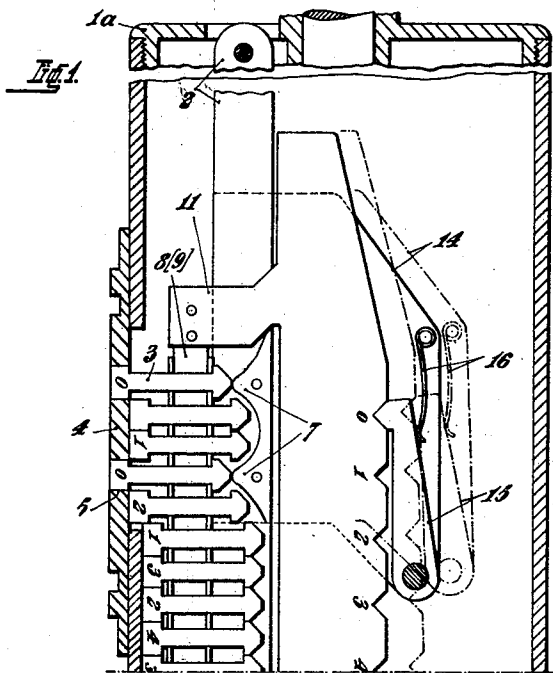


May 10, 1932.

U. KOHLER  
DIE PRINTING MACHINE  
Filed June 13, 1929

1,857,918

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |   |   |   |   |   |   |   |   |   |   |
| 0 | 1 | 0 | 1 | 2 | 3 | 2 | 3 | 4 | 5 | 4 | 5 | 6 | 7 | 6 | 7 | 8 | 9 | 8 | 9 |

Fig. 5.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |   |   |   |   |   |   |   |   |   |   |
| 0 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 |

Fig. 6.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 |   |   |   | 4 | 5 | 6 | 7 |   |   |   |   |   |   | 8 | 9 |   |
| 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 4 | 5 | 6 | 7 | 8 | 9 | 8 | 9 |

Fig. 7.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |   |   |   |   |   |   |   |   |   |   |   |
| 0 | * | 1 | 0 | 2 | 1 | 3 | 2 | 4 | 3 | 5 | 4 | 6 | 5 | 7 | 6 | 8 | 7 | 9 | 8 | 9 |

Fig. 8.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 |   |   |   |   |   | 5 | 6 | 7 | 8 | 9 |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 0 | 1 | 2 | 3 | 4 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 5 | 6 | 7 | 8 | 9 |

Fig. 9.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |   |   |   |   |   |   |   |   |   |   |
| 0 | 1 | 2 | 0 | 3 | 1 | 4 | 2 | 5 | 3 | 6 | 4 | 7 | 5 | 8 | 6 | 9 | 7 | 8 | 9 |

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## UNITED STATES PATENT OFFICE

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## DIE PRINTING MACHINE

Application filed June 13, 1929, Serial No. 370,707, and in Switzerland June 27, 1928.

This invention relates to a die printing machine having dies capable of being displaced in rows in a hollow cylinder longitudinally thereof and of being adjusted transversely thereof. According to the invention the dies belonging to a group are spaced apart and capable of being adjusted independently of one another, at least two cams being provided for simultaneously adjusting the dies to be jointly printed, which cams are stationary with respect to longitudinal guides for the rows of dies and together control a row of dies.

In the accompanying drawings, Fig. 1 shows that part of the hollow cylinder of a constructional example of a die printing machine required for illustrating the invention. Fig. 2 is a cross-section on line II—II of Fig. 1. Fig. 3 shows a detail (transverse guide for the dies) in plan view and Figs. 4 to 9 each show diagrammatically one grouping of the dies.

The horizontal hollow cylinder 1 contains four pairs (or a greater or less number) of longitudinally extending, flat guiding bars 2 standing on edge, one for each row of dies 3. The hollow cylinder 1 has at its periphery a die plate 4 provided with two apertures 5 spaced a distance apart, each for one of the dies. The dies, each of which has a head at its end, each has a number at its lower end face, two dies each having the same numerical value. These two dies forming a group are shown in the example illustrated in Fig. 1 spaced apart by the thickness of two dies. For utilizing the intermediate space between the dies of each group two dies of two further consecutive groups of dies are arranged between them. An exception to this rule is provided by the end groups of each row, in so far that between the dies of the said groups there is only a single die of another group and a blind die (bearing no number). The numerical values of the separate dies are given in Fig. 1. Through this interengagement of the groups of dies the overall length of the hollow cylinder is reduced to a minimum. The dies belonging to the same group are printed simultaneously and must therefore be jointly introduced into the openings 5 in the die plate 4. For this purpose above the openings 5 between the guiding bars 2 belonging to each pair is a pair of cams 7 fixed to the said bars, which in the example shown are made in one piece. Each die is capable of being displaced or adjusted vertically independently of the other. Four pairs of flat bars 8, 9 which are on edge are provided for guiding the dies transversely to the bars 2 and at the same time for displacing them in the longitudinal direction of the latter. The bars 8 are provided above and below with lugs 10 bent over laterally towards the corresponding bars 9, between which lugs the dies are guided so as to be capable of sliding upwards and downwards. Both bars 8 and 9 might instead be provided at the top or the bottom with such lugs. For sliding the rows of dies in the longitudinal direction the pairs of bars 8, 9 are fixed at their ends to a lug 11 on a joint adjustable slide 12, which extends right through downwards between the corresponding guiding bars 2. Each adjustable slide 12 has at its upper end ten notches 13 and extends above the die plate 4 between two plates 14 fixed to the corresponding bars 2. Between the latter a pawl 15 actuated by a spring 16 engages in one of the notches 13 and holds the particular slide in the corresponding position. At the rear end, in Fig. 1 the right-hand end, of each adjustable slide there is pivoted laterally on a shaft 17 which is parallel to it an adjusting finger 18, the unsupported end of which extends into a longitudinal slot 6 in the hollow cylinder 1. For enabling the whole row of dies to be displaced by means of the corresponding finger 18 in the longitudinal direction of the hollow cylinder, the bars 2 must be moved upwards out of the position shown in full lines into the position indicated by dot and dash lines. For this purpose the bars 2 are pivoted at their forward ends about a horizontal shaft at the forward end wall 1<sup>a</sup> of the hollow cylinder so as to be capable of rocking upwards and downwards and are pivoted at their rear ends to forwardly projecting lugs 19 on a common slide 20 which is capable of sliding upwards and downwards on the rear end wall 1<sup>b</sup> of

the hollow cylinder. The slide 20 is rigidly connected to a hollow handle 21 which extends through the end wall 1<sup>b</sup> and which, after a locking knob 22 in the handle 21 has been pressed inwards, can be pushed from the lower into the upper position and conversely from the upper into the lower position. By this means the whole set of bars 2 with all the dies can be moved upwards or downwards. In the upper position the dies lying below the cams 7 will also be lifted out of the openings 5 with the die plate 4 so that they will not interfere with the displacement of the rows of dies. The displacement of the rows of dies is effected by hand by means of the adjusting finger 18 which projects upwardly out of the hollow cylinder, the various positions of the slide being determined by a scale provided alongside each slot 6 of the hollow cylinder and corresponding to the notches 13. During this displacement the dies travel with their upper heads which are bevelled off at both sides successively under the cams 7. When the whole set of dies is moved downwards, the dies which happen to be above the openings 5 will enter the latter and are held in them by the cams 7, so that they cannot move back again during the printing operation. All the other dies rest against the wall of the hollow cylinder and can move upwards.

Figs. 4 to 9 show diagrammatically that the groups of dies within one row of dies can be arranged differently with respect to one another.

In Fig. 4 the dies of each of the ten groups are spaced apart by the thickness of one die and between the dies of each group is a die of the next following group. The numerical values of the dies are given in the lower row of numerals. In the upper row of numerals it will be seen that for setting successive numerical values the displacement of the row of dies of one group of numerals is different from the other. The displacement from the even numerical values to the odd numerical values is effected by a step of the size and the thickness of a single die and from the odd to the even numerical values the steps are twice as great.

In the grouping of numerical values according to Fig. 5 the successive groups follow one another immediately. Between the dies of each group is an empty space of the thickness of a single die. Correspondingly the entire row of dies is longer by the sum of all the empty intermediate spaces than in the arrangement according to Fig. 4, which involves a correspondingly longer printing cylinder. The distance between the marks of the adjusting scale is regular, as is indicated by the upper row of numerals. The empty intermediate spaces may be smaller or larger than the thickness of a single die.

According to Fig. 6 the groups of four

numerical values overlap one another. Between the dies of the single groups, with one exception at the rear end of the row of dies, there are no empty intermediate spaces, so that the row of dies is relatively short. The adjusting scale (upper row of numerals) is irregular.

According to Fig. 7 the dies of each group are spaced apart by the thickness of three dies and successive groups overlap one another by one numerical value. Hence in the numerical groups 1-8 there is an intermediate space of the thickness of one die and in the numerical groups 0 and 9 and intermediate space of twice the size. The adjusting scale is regular.

Fig. 8 shows an arrangement of numerical groups, in which the dies of each group overlap one another by the thickness of four dies. The adjusting scale shows two groups of five marks each. As there are no empty intermediate spaces between the dies of each group, the whole row of dies is short.

Finally Fig. 9 shows how a regular adjusting scale can be obtained, even when several succeeding groups overlap one another. This is however only possible at the expense of the shortness of the rows of dies, as in each end group there are two empty intermediate spaces.

What I claim is:

1. A die printing machine comprising a hollow cylinder, rows of dies arranged in the said cylinder in the longitudinal direction thereof and capable of being displaced in the said longitudinal direction and of being set transversely thereto and of which a group of at least two dies in each row can be printed, the dies in each group being spaced apart and capable of being set independently of one another, means for longitudinally guiding the rows of dies, at least two cams fixed relatively to the said longitudinal guiding means for simultaneously setting the dies to be printed from, heads at the ends of the dies, flat guide bars standing on edge on either side of each row of dies for guiding the dies independently of one another and lateral lugs on at least one of the said flat guide bars and facing the other bar, as and for the purpose set forth.

2. A die printing machine comprising a hollow cylinder, rows of dies arranged in the said cylinder in the longitudinal direction thereof and capable of being displaced in the said longitudinal direction and of being set transversely thereto and of which a group of at least two dies in each row can be printed, the dies in each group being spaced apart and capable of being set independently of one another, sliding members extending longitudinally of the hollow cylinder, bars for longitudinally guiding the rows of dies, at least two cams fixed with respect to the said longitudinal guiding bars, lugs on the said sliding members extending downwards between the

said longitudinally guiding bars, flat guide bars standing on edge on either side of each row of dies, suspended at either end to the said downwardly extending lugs for guiding the dies independently transversely to the said longitudinal guiding bars and displacing them longitudinally thereof, as and for the purpose set forth.

3. A die printing machine as claimed in claim 2, and comprising a longitudinal slot in the wall of the hollow cylinder, a scale along the side of the slot and a finger on each sliding member capable of projecting out of the said slot when the guiding bars have been displaced transversely to the longitudinal direction of the hollow cylinder and of being slid longitudinally of the said slot along the said scale for longitudinally displacing the row of dies, as and for the purpose set forth.

4. A die printing machine as claimed in claim 2, and comprising a longitudinal slot in the wall of the hollow cylinder, a scale along the side of the slot, a finger on each sliding member capable of projecting out of the said slot when the guiding bars have been displaced transversely to the longitudinal direction of the hollow cylinder and of being slid longitudinally of the said slot along the said scale for longitudinally displacing the row of dies, a plurality of notches on the sliding members corresponding to the divisions of the said scale, a pawl pivoted to the hollow cylinder and a spring for causing the pawl to engage in the said notches, as and for the purpose set forth.

5. A die printing machine of the type having a hollow cylinder with rows of dies arranged in the cylinder in the longitudinal direction and capable of being displaced in the said longitudinal direction and of being set transversely thereto, said dies being arranged so that a group of at least two dies in each row can be printed, means for spacing apart the dies of each group so that the dies are capable of being set independently of one another, means for longitudinally guiding the rows of dies, and at least two cams fixed relatively to the said longitudinal guiding means for simultaneously setting the dies to be printed from.

Signed at Bern, this first day of June, 1929.  
ULRICH KOHLER.