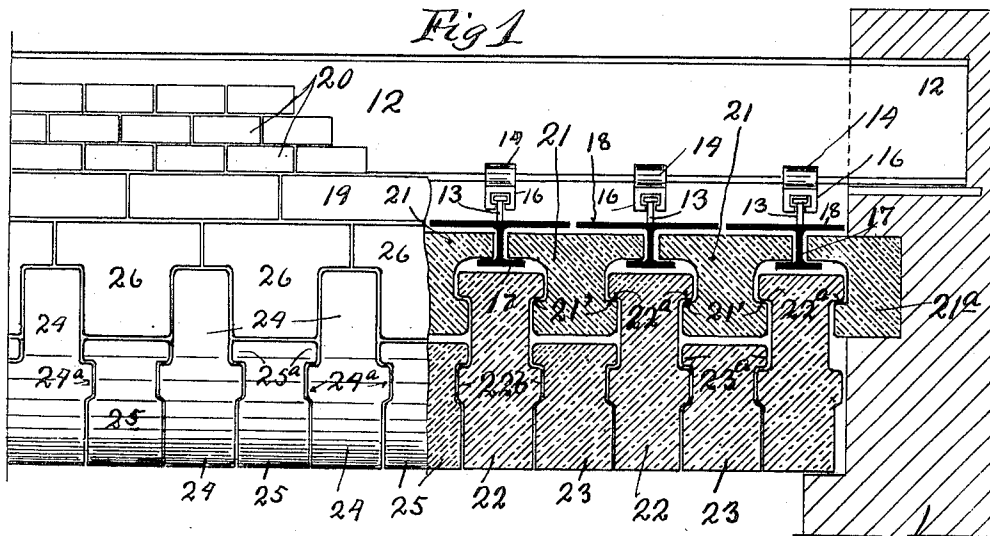
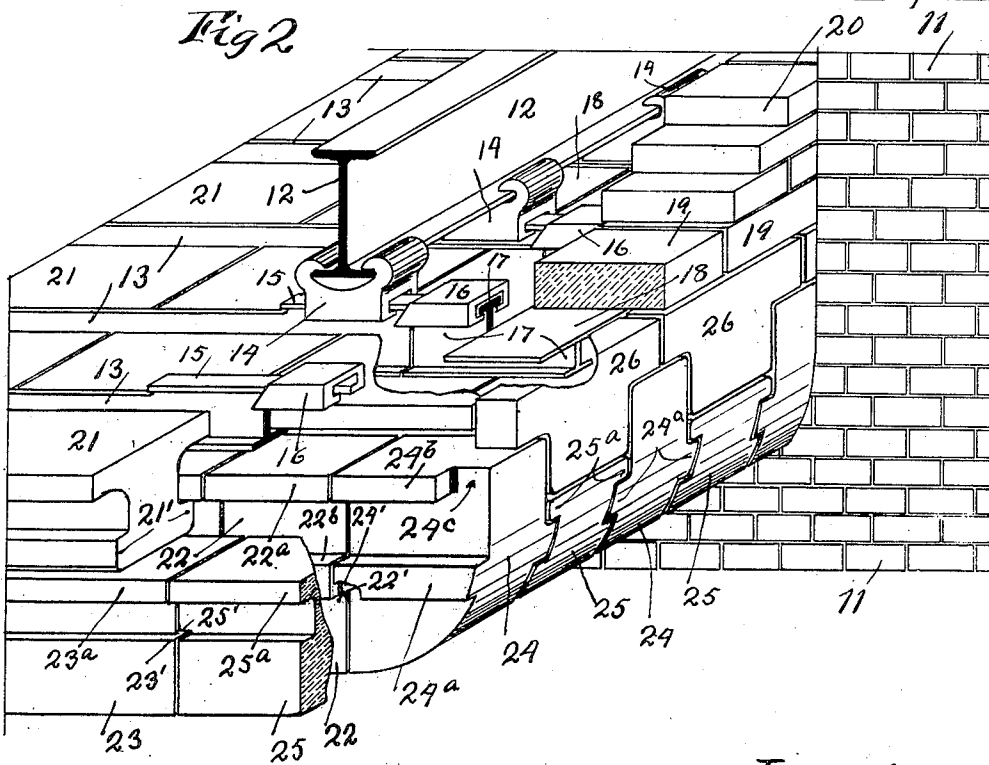


Jan. 30, 1923.

1,443,487.

M. LIPTAK.
FURNACE ARCH FOR BOILERS.
FILED JAN. 20, 1919.

3 SHEETS—SHEET 1.



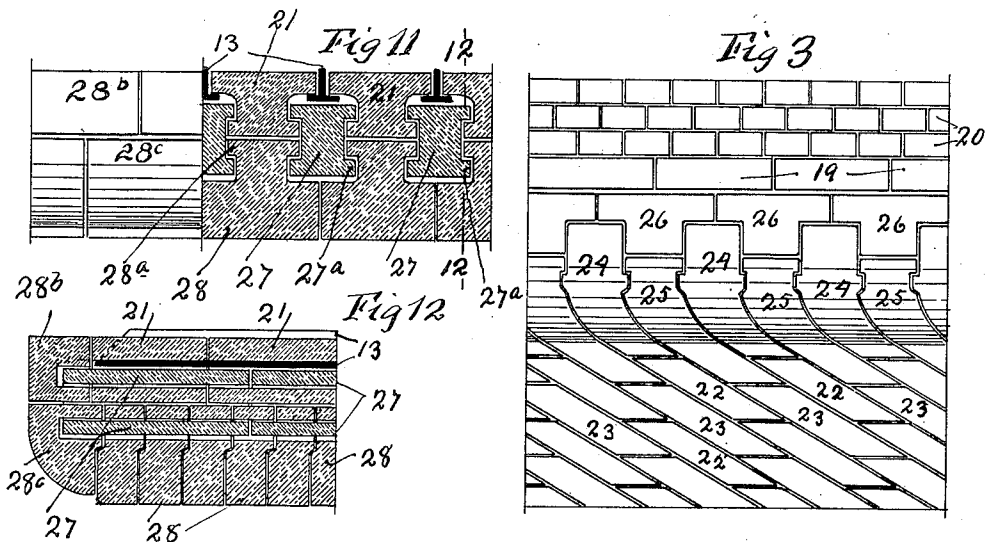
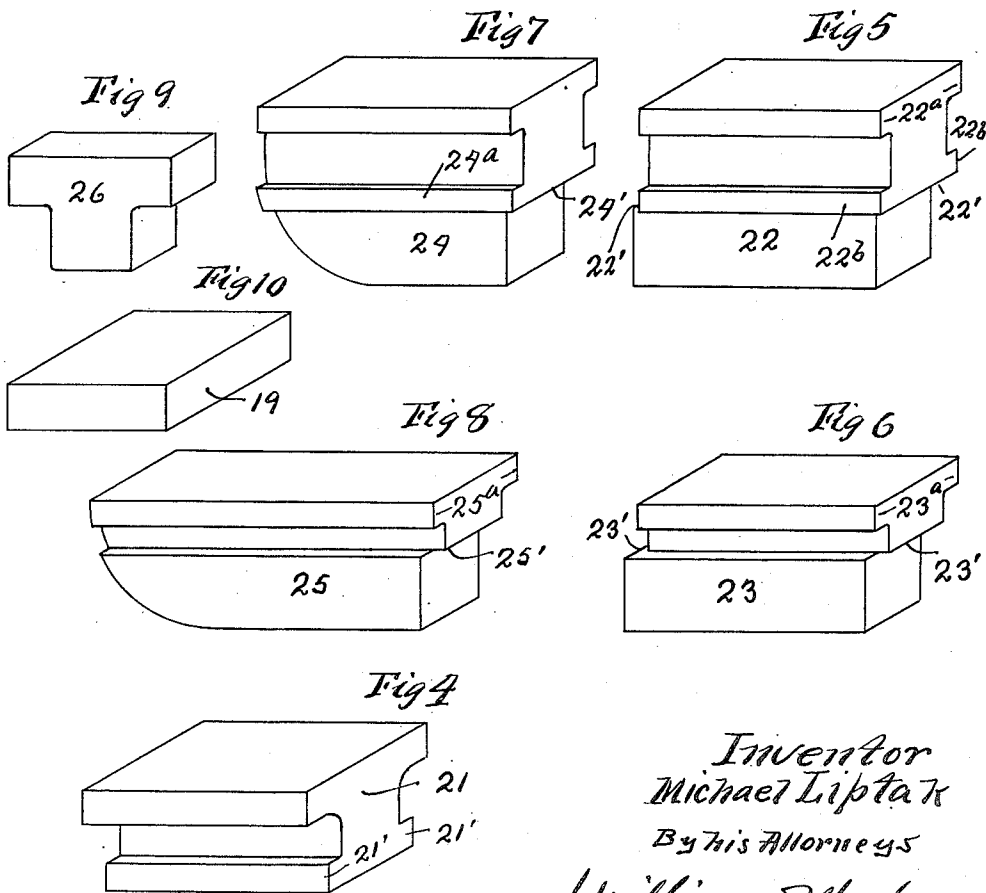
Inventor
Michael Liptak
By his Attorneys
William M. Muehler

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3 SHEETS—SHEET 2.



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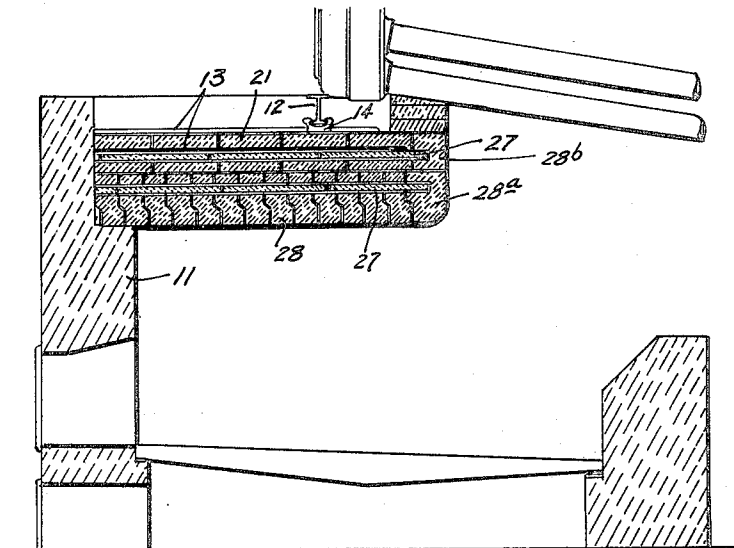
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3 SHEETS—SHEET 3.

Fig. 13



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UNITED STATES PATENT OFFICE.

MICHAEL LIPTAK, OF ST. PAUL, MINNESOTA, ASSIGNOR TO LIPTAK FIRE BRICK ARCH CO., OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

FURNACE ARCH FOR BOILERS.

Application filed January 20, 1919. Serial No. 272,116.

To all whom it may concern:

Be it known that I, MICHAEL LIPTAK, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Furnace Arches for Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to furnace arches for the fire boxes of boilers and furnaces and is in the nature of an improvement on or refinement of the construction disclosed and broadly claimed in my prior Patents No. 1,326,752 and No. 1,326,753, both issued of date December 30, 1919, and entitled "Furnace arch for boilers."

The invention is illustrated in the accompanying drawings wherein like characters indicate like parts throughout the several views. Referring to the drawings;

Fig. 1 shows one-half of the arch partly in rear elevation and partly in transverse vertical section with some parts that are at the rear of the section line shown in full;

Fig. 2 is a fragmentary view in perspective looking downward at the arch;

Fig. 3 is a perspective view looking at the arch from a point below the bottom thereof and showing both the rear wall and bottom formation;

Fig. 4 is a perspective view of one of the hanger blocks;

Fig. 5 is a perspective view of one of the underfacing blocks;

Fig. 6 is a perspective view of one of the supplemental underfacing blocks;

Fig. 7 is a perspective view of one of the main corner blocks;

Fig. 8 is a perspective view of one of the supplemental corner blocks;

Fig. 9 is a perspective view of one of the filler blocks;

Fig. 10 is a perspective view of one of the crown blocks;

Fig. 11 is a fragmentary view in rear elevation illustrating a modified arrangement of the hanger and underfacing blocks; and

Fig. 12 is a section on the line 12—12 of Fig. 11.

Fig. 13 is a longitudinal section of a furnace and of a modified form of my improved arch applied thereto.

The preferred construction illustrated in Figs. 1 to 9, inclusive, will first be described. The customary masonry walls of the furnace arch are indicated by the numeral 11. The furnace arch is hung from the customary transverse main arch beams 12, the ends of which are embedded in the masonry walls. A multiplicity of laterally spaced supplemental beams 13 are hung from the lower flanges of the main beams, preferably by beam hangers 14 of a type disclosed and claimed in my pending application S. N. 240,292 which hangers have upper flanges that embrace the lower flanges of the main beams and have lower flanges that embrace upper flanges 15 on the rear or inner ends of said supplemental beams. At their rear end extremities, the supplemental beams 13 are provided in line with their upper flanges 15 with rigidly secured and preferably integrally cast sockets 16 that are formed with T-shaped longitudinal channels open at the underside.

T-shaped channels of the sockets 16 are adapted to receive and interlock with the upper flanges of detachable beam tips 17. Preferably, the beam tips 17, in their main cross section, are of approximately the same form as the inner portions of the supplemental beams 13, but portions of the upper flanges and portions of the webs of said beams are omitted and the projecting ends are formed with laterally projecting horizontal crown plates 18 that directly support crown blocks 19 on which latter the apron wall 20 is built. This construction, however, is disclosed and claimed in my pending application S. N. 259,026, filed October 21, 1918, and entitled "Furnace arch."

The arch proper is made up of interlocking and replaceable blocks of the general character disclosed and broadly claimed in my pending application 216,152, but are of what I believe to be a much improved arrangement. As preferably now constructed, this arch is made up of blocks that may, because of their functions, be distinguished as the hanger blocks, the main and supplemental underfacing blocks, the main and supplemental corner blocks and the filler blocks. The hanger blocks form the upper layer and are directly hung from the laterally spaced or supplemental beams. The said hanger blocks 21 are approximately T-shaped in cross section with wide upper

flanges that rest on the lower flanges of the beams 13 and with relatively narrow lower flanges that detachably support the so-called main underfacing blocks. The hanger blocks 21^a at the extreme sides, are half sections of the blocks 21 and are partly embedded in the masonry wall 11.

The main underfacing blocks 22, with respect to the supplemental underfacing blocks 23, are relatively deep in a vertical direction. The said main underfacing blocks 22 fit loosely between the lower portions of adjacent hanger blocks 21 and they have upper edge flanges 22^a that rest upon the lower flanges 21' of the hanger blocks 21. At points considerably below the lower portions of the hanger blocks 21, the main underfacing blocks 22 are provided on each side with outstanding ribs 22^b.

The supplemental underfacing blocks 23 fit between the main underfacing blocks 22 and, in their sides, they have grooves that fit the ribs 22^b and just above said grooves, at their extreme upper portions, they are formed with flanges 23^a that rest upon the said ribs 22^b. The upper surfaces of the main blocks 22 are spaced from the lower portions of the beam 13 and the upper portions of the supplemental blocks 23 are spaced from the lower portions of the overlying hanger blocks 21, so as to afford heat insulating air spaces that reduce to a minimum, the conduction of heat through the arch.

The main corner blocks 24 have the same general cross section as the main underfacing blocks 22, so that they may be interlocked to and detachably hung from the overlying hanger blocks; but the rear face of said blocks 24 are rounded or curved downwardly and forwardly, as best shown in Fig. 2.

The supplemental corner blocks 25 have the same general cross section as the supplemental underfacing blocks 23 so that they may be detachably hung from the main corner blocks 24 and in part also from the horizontally adjacent main underfacing blocks 22. Here it is important to note that the said supplemental corner blocks 25, while, vertically, of much less depth than the main corner blocks 24, are, in a longitudinal horizontal direction, considerably longer than the main corner block so that when hung on adjacent main corner blocks they are extended rearward and interlock with certain of the main underfacing blocks 22, thereby forming lapped joints therewith. Also, it will be noted that because of the varying lengths of the main and supplemental corner blocks, and because of the same length as between the main and supplemental underfacing blocks, all of the underfacing blocks are caused to break or lap joints, as best shown in Fig. 3.

The ribs on the sides of the main corner blocks 24 that correspond to the ribs 22^b on the sides of the main underfacing blocks 22 are indicated at 24^a, and the upper flanges of said main corner blocks that correspond to the upper flanges 22^a of said blocks 22 are indicated at 24^b. The flanges on the upper portions of the supplemental corner blocks 22, that rest upon the ribs 24^a and correspond to, and align with the flanges 23^a of the supplemental underfacing blocks 23, are indicated at 25^a. Preferably, the hanger blocks 21 are formed with flat front and rear ends, but the main underfacing blocks 22, supplemental underfacing blocks 23, main corner blocks 24 and supplemental corner blocks 25, at abutting ends, are formed with offset upper and lower portions and intermediate shoulders 22', 23', 24' and 25', respectively. These offset portions and shoulders cause the abutting members of the said blocks, at their end joints to over and underlap each other, and this not only breaks the joint vertically, but produces an interlocking between the longitudinally adjacent blocks, and this interlocking greatly assists in preventing a badly damaged block from falling from the arch. Moreover, the interlapping of the corner blocks and underfacing blocks not only produces the offset or broken joints above noted, but produces an interlocking, not only between over and underhanging blocks but also between longitudinally adjacent blocks. For example, a supplemental corner block 25 is not only interlocked to and hung from the laterally adjacent main corner blocks but is extended back and interlocked to longitudinally adjacent main underfacing blocks 22. Otherwise stated, each supplemental corner block and each supplemental underfacing block is interlocked to two main blocks, and each main underfacing block is interlocked to two hanger blocks. This interlocking is highly important because it is very desirable that the underfacing blocks, even when very badly damaged, should be held in position to protect the hanger blocks and the metallic beam structures.

With the above described lapping of blocks, the rear or innermost of the hanger blocks 21 will be forward of the inner or rear faces of the corner blocks 24, thereby leaving intervening spaces, and to fill these spaces, I employ approximately T-shaped filler blocks 26. To permit these filler blocks to be inserted into the said spaces flush or approximately flush with the rear face of the corner blocks 24 and 25, portions of the upper flanges 24^b of the main corner blocks 24 are cut away flush with the neck or sides of said blocks, as shown at 24^c, (see Figs. 2 and 7).

As is evident from the foregoing descrip-

tion, the supplemental corner blocks 25 and the supplemental underfacing blocks 23 may be slid and replaced without disturbing the main corner blocks or main underfacing blocks. Also, of course, the filler blocks 26 may be removed and replaced without disturbing any of the other blocks. The main corner blocks and main underfacing blocks may also be slid and removed and replaced without disturbing the hanger blocks and the hanger blocks, themselves, when necessary, may be slid from the laterally spaced beams and replaced without disturbing the said beams or the apron wall, which latter is supported by the beam tips and the so-called crown plates above the plane of the upper surfaces of the said hanger blocks.

It is also important to note that the interlocking engagement between the main and supplemental underfacing blocks and between the main and supplemental corner blocks is high up or far above the undersurface of the arch, so that even when large portions of the under blocks are cracked off or burned away, the interlocking engagement between the said blocks will still be maintained.

In the modified construction illustrated in Fig. 11, the main underfacing blocks 27 are displaceably interlocked to the hanger blocks 21, as already described, but are not extended to the bottom of the arch. Their intermediate ribs are dispensed with and they are formed at their lower edges with outstanding flanges 27^a. The supplemental underfacing blocks 28 have portions that fit between the depending portions of the blocks 27 and are provided with upper flanges 28^a that rest on the flanges 27^a of the blocks 27; and the lower portions of said supplemental blocks 28 are made of such width that the assembled blocks 28 approximately meet midway under the blocks 27. In this arrangement, the undersurfaces of the blocks 28 alone are directly exposed to the action of the flames. In both of the arrangements illustrated, the supplemental blocks are either directly or indirectly and detachably hung from the hanger blocks.

In the construction illustrated, in Figs. 11 and 12, upper corner blocks 28^b are slipped onto the upper flanges of the blocks 27 and lower corner blocks 28^c are slipped onto the lower flanges of the blocks 27.

It is evident that the above described plan of detachably interlocking the blocks makes it possible to construct an arch with any desired number of layers.

What I claim is:

1. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks detachably hung from said hanger blocks, and supplemental underfacing blocks interposed between and detachably hung directly from

the depending portions of said main underfacing blocks.

2. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks detachably hung from said hanger blocks, and supplemental underfacing blocks interposed between and detachably hung directly from the depending portions of said main underfacing blocks, the said main and supplemental underfacing blocks being removable and replaceable by approximately horizontal sliding movements.

3. In a furnace arch, the combination with laterally spaced flanged beams, of hanger blocks slidably and detachably interlocked to said beams and having depending portions flanged on both sides, main underfacing blocks having their upper portions interposed between the depending portions of said hanger blocks and flanged for interlocking and sliding detachable engagement with said hanger blocks, and supplemental underfacing blocks interposed between the depending portions of said main underfacing blocks, the said main and supplemental blocks having interlocking flanges and grooves for supporting said supplemental blocks from said main blocks and permitting the latter to be detached and replaced by approximately horizontal sliding movements.

4. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks detachably hung from said hanger blocks, and supplemental underfacing blocks interposed between and detachably hung directly from the depending portions of said main underfacing blocks, there being air spaces between the bottoms of said hanger blocks and the tops of said supplemental blocks.

5. In a furnace arch, the combination with laterally spaced flanged beams, of hanger blocks slidably and detachably interlocked to said beams and having depending portions flanged on both sides, main underfacing blocks having their upper portions interposed between the depending portions of said hanger blocks and flanged for interlocking and sliding detachable engagement with said hanger blocks, and supplemental underfacing blocks interposed between the depending portions of said main underfacing blocks, the said main and supplemental blocks having interlocking flanges and grooves for supporting said supplemental blocks from said main blocks and permitting the latter to be detached and replaced by approximately horizontal sliding movements there being air spaces between the tops of said main underfacing blocks and the bottoms of said beams and also air spaces between the tops of said supplemental blocks and the bottom of said hanger blocks.

6. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks and laterally spaced main corner blocks detachably hung from said hanger blocks, and supplemental underfacing blocks and supplemental corner blocks interposed between and detachably hung, respectively, on said main underfacing and corner blocks. 35
7. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks and laterally spaced main corner blocks detachably hung from said hanger blocks, supplemental underfacing blocks and supplemental corner blocks interposed between and detachably hung, respectively, on said main underfacing and corner blocks, said main corner blocks being relatively short and relatively deep as compared with said supplemental corner blocks, and said main and supplemental underfacing blocks being of substantially the same length whereby the said blocks are connected with lap joints. 40
8. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks and laterally spaced main corner blocks detachably hung from said hanger blocks, supplemental underfacing blocks and supplemental corner blocks interposed between and detachably hung, respectively, on said main underfacing and corner blocks, said main corner blocks having offset overlapping portions. 45
9. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced main underfacing blocks and laterally spaced main corner blocks detachably hung from said hanger blocks, and supplemental underfacing blocks and supplemental corner blocks interposed between and detachably hung, respectively, on said main underfacing and corner blocks, the abutting ends of said main underfacing and corner blocks having offset overlapping portions. 50
10. A furnace arch comprising hanger blocks supported in an upper layer, laterally spaced blocks detachably hung from said hanger blocks, and other blocks detachably hung from said second noted blocks and co-operating therewith to form the under surface of the arch. 55
- In testimony whereof I affix my signature in presence of two witnesses.
- MICHAEL LIPTAK.
- Witnesses:
CLARA DEMAREST,
BERNICE G. BAUMANN.